NÚMERO 438

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The Mexican Cotton Textile Industry: An Overview

DICIEMBRE 2008

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Abstract

The history of the Mexican textile industry is long and exceptional. In this paper we provide an overview of the development of the industry from colonial times to the Porfiriato. Five conditions explain Mexico's early industrial growth, relative to other countries in the periphery. First, its relatively large population provided the consumer market necessary for industry to develop. Second, the evolution of Mexican terms of trade fostered industrialization. Third, Mexico maintained better wage competitiveness based on a better relative agricultural productivity performance. Fourth, a tradition of artisan textile production was able to generate political support for protectionist policies, and Mexico had the autonomy to implement these policies. Finally, the high transport costs resulting from the concentration of population far from the sea in rugged terrain provided additional protection. However, institutional frailty and a concomitant slow development of the financial system hindered its development. During the Porfiriato the social network of the Barcelonnettes was key form the modernization of the sector both in terms of production and of commercialization.

Resumen

La historia de la industria textil mexicana es larga y excepcional. En este trabajo se ofrece una descripción del desarrollo de la industria desde tiempos coloniales hasta el Porfiriato. Cinco condiciones ayudan a explicar el temprano desarrollo industrial de México, en relación con otros países de la periferia. En primer lugar, su población relativamente grande proporcionó el mercado necesario para el desarrollo industrial. Segundo, la evolución de sus términos de intercambio fomentó la industrialización. Tercero, México mantuvo salarios más competitivos basado en un mejor desempeño relativo de la productividad agrícola. Cuarto, la tradición de producción textil artesanal pudo generar apoyo político para la implementación de políticas proteccionistas. Finalmente, los altos costos de transporte resultantes de la concentración de población alejada del mar proporcionaron protección adicional. Sin embargo, la fragilidad institucional y un desarrollo lento del sistema financiero obstaculizaron su desarrollo. Durante el Porfiriato la red social de los Barcelonnettes fue clave para la modernización del sector en términos de producción y comercialización.

Introduction

The long and exceptional history of Mexico's textile industry winds through a complex and intriguing historical landscape. Very few countries in the world share with Mexico such a long and continuous history of textile manufacturing. Cotton spinning and backstrap weaving were widespread even in pre-Hispanic America and would not be interrupted by the arrival of the Spaniards.[1] Early in the 16th century, a new technology and organization of production was developed for the manufacturing of woolens. This new organization of production, or *obrajes*, were large workshops that vertically integrated every part of the woolen cloth production, employing from twenty to one hundred workers, usually in some form of coerced labor.[2] Mexico is one of the two present-day Latin American countries where *obrajes* acquired large economic importance during the 16th century, the other being Ecuador.[3]

Woolen textiles production increased until the end of the 17th century. But by the 1750's century its heyday had passed as a result of greater labor costs, an increasingly fierce competition from British and Catalan cloth, and from growing Mexican cotton textile production.[4] When *obrajes* began to falter, a putting-out system,[5] similar to that which flourished in pre-industrial Europe, appeared in Mexico, Tlaxcala and Guadalajara, but nowhere on more solid grounds than in Puebla.[6]

A well-established network linked the different parts of cotton manufacturing from the cultivation of cotton to its final markets. Merchants in Puebla or in Veracruz, known as *aviadores,* invested in cotton agriculture by advancing either cash or manufactured goods to cotton growers at annual fairs. The aviadores received commercial backing from the large import-export merchants of Puebla, Oaxaca and Veracruz. In the early eighteenth

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1 Carmen Ramos Escandón, *Industrialización, género y trabajo femenino en el sector textil mexicano: El obraje, la fábrica y la compañía industrial.* (Mexico City: Publicaciones de la Casa Chata, 2004), 39-41.

2 Carmen and José Ignacio Urquiola Viqueira, *Los obrajes en la Nueva España:1530-1630*, vol. Conaculta (Mexico City1990); Aurora Gómez Galvarriato, "Premodern Manufacturing", in *The Cambridge Economic History of Latin America*, ed. John H. Coatsworth Bulmer-Thomas Victor and Roberto Cortés Conde (New York: Cambridge University Press, 2006), 376-77.

3 Manuel Miño Grijalva, *La protoindustria colonial hispanoamericana*, 1. ed., *Sección de obras de historia* (México: El Colegio de México, 1993), 185-93.

4 Richard J. Salvucci, *Textiles and Capitalism in Mexico: An Economic History of the Obrajes* (Princeton: Princeton University Press, 1987).

5 In the putting-out system, middlemen residing in a commercial center coordinate various stages of production, from the purchase of raw materials to the sale of final products, supplying, or "putting out", raw materials to artisans who manufacture the products in their households. See Guy Thomson, "The Cotton Textile Industry in Puebla During the Eighteenth and Early Nineteenth Centuries", in *The Economies of Mexico and Peru During the Late Colonial Period 1760-1810*, ed. Nils Jacobsen and Hans Jurgen Puhle (Berlin: Colloquium Verlag, 1986).

6 Manuel Miño Grijalva, *Obrajes y tejedores de Nueva España, 1700-1810: la industria urbana y rural de una economía colonial* (México, D.F.: El Colegio de México, 1998).; Guy Thomson, "Continuity and Change in Mexican Manufacturing, 1800-1870", in *Between development and underdevelopment: the precocious attempts at industrialization of the periphery, 1800-1870* ed. Jean Batou (Genève: Libr. Droz, 1991), 259.

century, dealers, known as *algodoneros* or *regatones,* bought raw cotton from the merchants and muleteers, who transported the fiber, and sold it to spinners, who managed their own spinning and sold their product to independent weavers. However, by the end of the century, the *algodoneros* became wholesale merchants who gradually increased their control over all aspects of the business, from the cultivation of raw cotton to the distribution of cloth. By advancing both cotton and credit they linked the two principle agents of production: the spinners —usually Indian women in rural households—, and the weavers —an independent and culturally distinct creole or mestizo male artisanate usually located in larger towns.[7] The *algodoneros* also managed the commercialization of the cloth, since few cotton weavers possessed the capital, enjoyed the contacts, or could afford the delay in payment that long-distance trade involved.

Colonial regulations granted substantial protection to New Spain's textile manufacturing. Commerce between Spain and Spanish America was strictly regulated until 1765, when the Spanish government endorsed the *Decree of Free Trade.* Yet even after extending to New Spain the so-called free-trade ordinance of 1778, foreign textiles imported via the Spanish port remained expensive enough to dress only the upper classes. Moreover, the Napoleonic Wars in Europe cut off communications between New and Old Spain encouraging the expansion of textile manufacture in Mexico.[8]

After 1802 the good times for domestic cotton textile manufacturing ended as Spanish imports arrived once again to the colony. Hardship for domestic cotton grew following 1805 when Spanish policy allowed neutral powers to trade directly with the Indies, allowing textile imports to surge.[9] The wars of Independence (1810-1821) further increased the problems Mexican texile manufacturers had to cope with even though actual violence rarely struck those regions in which the industry was located. Many textile workers abandoned their looms to join the contending armies and many died as a consequence of those epidemics frequently associated with early conflicts.[10] Raw materials became scarce, and the commercial routes to the north, traditionally an important market for domestic textile production, were cut. The wars of Independence together with greater foreign competition gave *Obrajes* a final blow; whereas there were still 19 obrajes with 291 looms operating in Queretaro in 1810, only four were still working in

[7] Thomson, "The Cotton Textile Industry in Puebla During the Eighteenth and Early Nineteenth Centuries", 169.
[8] Robert A. Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio* (Amherst: The University of Massachusetts Press, 1983).
[9] Miño Grijalva, *Obrajes y tejedores de Nueva España, 1700-1810: la industria urbana y rural de una economía colonial*, 266-67, Thomson, "Continuity and Change in Mexican Manufacturing, 1800-1870", 260, Guy Thomson, *Puebla de los Angeles: Industria y Sociedad de una Ciudad Mexicana 1700-1850* (Mexico City: Benemérita Universidad de Puebla, 2002), 84-85.
[10] Richard J. Salvucci, *Textiles y capitalismo en México: Una historia económica de los obrajes, 1539-1840* (Meixco City: Alianza, 1992), 238. Thomson, *Puebla de los Angeles: Industria y Sociedad de una Ciudad Mexicana 1700-1850*, 244-45.

1812.[11] Cotton textile production was greatly weakened as well. Guadalajara's land-locked textile production, which by 1802 had similar dimensions to that of Puebla "was virtually eliminated by competition from imports through the newly opened Pacific ports."[12]

The emergence of Mexican Independence did not improve the situation of textile producers because the first Mexican governments adopted liberal policies that were designed primarily to increase government revenue rather than protect domestic manufactures. Tariffs on textiles were an extremely important fiscal issue given that textiles represented between 60% and 70% of total imports from 1821 and 1830, and that around 50% of government revenues came from import duties.[13] The first law to regulate foreign trade passed in December 1821 allowed the entrance of foreign goods with an *ad valorem* duty of 25% on valuations stipulates in the tariff act, or determined by customs appraisers at the ports of entry.

Protest from the artisans and merchants involved in the domestic textile business, mostly from the states of Puebla and Jalisco, grew stronger and the protectionist debate gained importance on the press and on the Congress sessions of those years. Something had to be done. A few governmental policies in favor of textile artisans were established in 1822 and 1824 but they were not enough to give domestic textile goods the possibility to compete favorably in the existing market.[14]

In December 1828, two riots of unprecedented scale and duration erupted in the city of Puebla.[15] Artisans' discontent played an important role in the electoral victory of the Yorkinos and in the uprising that put General Guerrero into the presidency. On May 22 1829 a ban was placed on the entry of coarse cotton and woolen textiles, warmly applauded in the artisan circle. However, in spite its protectionist will, Guerrero's government could not implement the law because of the revenue loss it would have allowed. First it was postponed for six months, based on legal grounds. Then, the landing of a small Spanish force in Tampico along with a new domestic political crisis made the government postpone the prohibitory law to the end of December, when Anastasio Bustamante seized power.

[11] Salvucci, *Textiles y capitalismo en México: Una historia económica de los obrajes, 1539-1840*, 238.
[12] Thomson, "Continuity and Change in Mexican Manufacturing, 1800-1870", 275.
[13] Carlos Marichal, "Paradojas fiscales y financieras de la temprana república mexicana, 1825-1855", (paper presented at the Seminario de Historia Económica, Fundación Ramos Areces Obstáculos al Crecimiento Económico en Iberoamérica y España 1790-1850., Madrid, Spain, May 18-19, 2007). Inés Herrera Canales, *El comercio exterior de México 1821-1875*, ed. El Colegio de México (Mexico City, 1977).
[14] Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio*, 14-28.
[15] Thomson, *Puebla de los Angeles: Industria y Sociedad de una Ciudad Mexicana 1700-1850*, 292-93.

I. The Origins of the Mechanized Mexican Textile Industry

Although the cotton textiles sector was heavily damaged, it survived the three decades of foreign competition and Insurgencia. Even in the midst of foreign competition some 6,000 looms were in operation in Puebla.[16] Further, inspite of the difficult situation, two Puebla merchants made important investments in the textile business during the 1820s. One of these, the Catalan Francisco Puig, introduced in 1820 the first modern "brocas" in Puebla to produce medium quality cloth (*paño entrefino*), coarse cloth (*jerga)* and blankets (*colchas*) in a two story building. His factory, the "Casa Puig", continued producing until 1850 and became an important supplier of both woolen cloth and cotton yarn, besides selling its own product. The other merchant was Estevan de Antuñano from Veracruz, who had been involved before Independence in the trade of raw cotton. In 1821, he established modern spinning machinery in a house in the weavers district of San Francisco, Puebla. But the factory closed in 1824, no longer being able to face cheap foreign imports.[17]

Important changes had been taking place in the world since 1750, to which New Spain became suddenly exposed. First, European policy moved away from anti-global mercantilism and towards pro-global free trade. Second, a world-wide transport revolution reduced transport costs and integrated world commodity markets. And third, important technological changes in the manufacturing production, first in England and later in other core economies, led to a rapid expansion of their industrial output and productivity, sharply reducing their production costs. The price of manufactures relative to agriculture and other natural-resource based products fell everywhere. The cost of British cottons fell by as much as 70% between 1790 and 1812.[18]

While Mexico had to deal, like the rest of the poor periphery with the de-industrialization forces that came about as a result of the Industrial Revolution, it did better on this score than most countries around the periphery. In fact, Mexico's textile industry was able to survive, and even prosper.[19] Five conditions explain Mexico's early industrial growth, relative to other countries in the periphery. First, its relatively large population provided the consumer market necessary for industry to develop. Second, during this period, there was a relatively small improvement in Mexican terms of trade, compared to those experienced by most nations in the periphery, because the price of Mexico's most important export —silver— remained stagnant through out this time. Third, in comparison with other countries in the periphery,

16 Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio*, 32.
17 Thomson, *Puebla de los Angeles: Industria y Sociedad de una Ciudad Mexicana 1700-1850*, 104.
18 Salvucci, *Textiles and Capitalism in Mexico: An Economic History of the Obrajes*, 156.
19 Rafael Dobado, Aurora Gómez Galvarriato and Jeffrey Williamson, "Globalization, De-Industrialization and Mexican Exceptionalism 1750-1879", *Journal of Economic History* 68, no. 3 (2008).

Mexico maintained better wage competitiveness *vis a vis* the core, based on a better relative agricultural productivity performance. Fourth, a tradition of artisan textile production was able to generate political support for protectionist policies. And Mexico had the autonomy to implement these policies, unlike many other countries in the periphery that could not as a result of their colonial status.[20] Finally, the high transport costs resulting from the concentration of population far from the sea in rugged terrain provided additional protection.

Between 1830 and 1840, the national government, under the influence of statesmen such as Lucas Alamán and industrialists such as Estevan de Antuñano provided both tariff protection and means of finance through a public development bank, the Banco de Avío.[21] Mexico's "industrialists," as they called themselves, established the first mechanized mills in the 1830s, around the same time that the Lowell mills were built, and only twenty years after the first mechanized mill was established in the United States. Mechanized textile mills appeared in Mexico earlier than in any other country outside of Europe and British North America, with Egypt as a notable exception.[22] Brazil, the other early industrializer in Latin America during this period, established its first mills in the 1840s. Yet by 1853 it had only 8 mills with 4500 spindles,[23] whereas ten years earlier, Mexico's textile manufacture included 59 mills with more than 100,000 spindles.[24]

In 1835 Estevan de Antuñano established La Constancia Mexicana, the first enduring mechanized textile mill to operate in Mexico.[25] It was financed by a government-owned development bank run by Lucas Alamán (1792-1853), who had become Minister of Interior and Foreign Affairs in 1830.[26] In that year he had organized a bank for the promotion of industrialization, the "Banco de Avío para Fomento de la Industria Nacional".

Alamán designed a precise and cogent industrial policy. His goal was not merely to protect the inefficient artisan production of colonial times, but to promote a mechanized industry that could produce at a price and quality equal to foreign competitors. It was clear to him that more than mere tariff

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20 *Ibid.*

21 Aurora Gómez Galvarriato, "Fragilidad institucional y subdesarrollo: La industria textil mexicana en el siglo XIX", in Aurora Gómez Galvarriato (coord.), *La industria textil en México* (Mexico City, 1999), 142-182.

22 Egypt had 400,000 spindles by 1834. Jean Batou, "Muhammad Ali's Egypt, 1805-1848. A command economy in the 19th Century?" in Jean Batou, "Muhammad Ali's Egypt, 1805-1848", in *Between Development and Underdevelopment: the Precoucious Attempts at Industrialization of the Periphery, 1800-1810*, ed. Jean Batou (Geneva: Libr. Droz, 1991).

23 Stanley J. Stein, *The Brazilian Cotton Manufacture* (Cambridge Ma.: Harvard University Press, 1957), 191.

24 Mexico, "Memoria sobre el Estado de la agricultura e industria de la república en el año de 1843", ed. Dirección de Agricultura e Industria [Lucas Alamán] (Mexico City: Imprenta de J. Lara, 1843), Table No.5.

25 Technically "La Aurora Yucateca" was built first, in 1833, by Pedro Sainz de Baranda, but it was small and short-lived. Howard F. Cline, "The Aurora Yucateca and the Spirit of Enterprise in Yucatán 1821-1847", *Hispanic American Historica Review* 27, no. 1 (1947).

26 Alamán was also an entrepreneur. He was the owner of textile factories in Orizaba and Celaya, and was the first person to bring a steam engine to Mexico.

protection would be necessary to promote industrialization.[27] Alamán believed that by itself the "invisible hand" was not going to lead to industrialization.[28]

He devised a plan whereby the total prohibition of textile imports enacted after independence would be replaced by tariffs. One fifth of the total duties accrued would then be used to form the capital of the Banco de Avío until one million pesos had been accumulated. The bank would lend money at low interest rates to entrepreneurs proposing to establish modern factories. Moreover, the Bank opened a way out for Anastasio Bustamante's government that was struggling to not put into effect a ban on textile imports, passed in Guerrero's regime, which would have forced a substantial reduction of fiscal resources.[29]

Alamán's Banco de Avío was a clever way to circumvent the vicious circle in which Mexican textile production was trapped. Low profits led to low investment, while low investment led to low profits and the inability to compete with foreign manufacturers. Free trade would have lowered profits even more, and inhibited the possibility of national textile production, but protection without investment became a heavy burden on the consumer without any compensation in terms of economic development. The bank tried to square the circle by translating lower protection into capital for investment. While the bank was never able to accumulate the planned capital of one million pesos, it managed to finance industrial projects until 1840, when it ceased to function as an industrial loan agency.

Despite the haphazard way the bank functioned during those unstable years, it was able to implement a machine-purchasing program. In 1830, the bank acquired equipment for five cotton mills and two paper mills from New England machinery manufacturers.[30] In addition to these special purchase programs, the bank lent money to private entrepreneurs. Thirteen of the forty loans granted from 1830 to 1840 went to establish cotton textile factories, while the rest financed paper mills and iron foundries. Half the cotton textile mills opened with Banco de Avío credit were still operating in 1845.[31] Three of those mills, La Constancia Mexicana, Cocolapan, and Industrial Jalapeña were still functioning in 1893.[32]

Viewed from this perspective, the impact of the Banco de Avío on Mexican industrialization seems substantial. The bank's role in the promotion of industry must not be exaggerated however. Of the fifty-nine companies Alamán lists in the 1843 Report on Industry and Agriculture, only six received a bank loan. Nevertheless, it is possible that the establishment of the first

[27] México, *Memoria de la Secretaría de Estado y del Despacho de Relaciones Interiores y Exteriores*, 1830, 29-30, in Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio.*· 42.
[28] *Ibid.*, 29
[29] Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio*, 40-42.
[30] *Ibid.*· 55
[31] *Ibid.*· 124
[32] Mexico, "Anuario Estadístico de 1893", ed. [Antionio Peñafiel] Dirección General de Estadística (1894).

firms —that received loans from the bank— stimulated the creation of firms that came later, giving a clear indication of the government's commitment to industrialization.

Alamán's industrial policy, as Bernecker has pointed out, required lasting, stable political conditions established on the basis of well-organized public finances, an effective system of tax collection, and a gradual transition to an era of steady economic growth.[33] Unfortunately, political instability, cause and consequence of a permanent disorder in public finances, made these requirements impossible to attain in Mexico during most of the 19th century. In the fifty-five years between Independence and the Porfiriato, the presidency changed hands seventy-five times.[34] Political instability generated institutional frailty under which it was impossible for the government to implement a cogent industrial policy. [35]

In 1836, representatives of the cotton-growing regions of Veracruz and Oaxaca successfully introduced a bill to ban the entry of raw cotton. The textile manufacturers did not oppose the bill, since domestic cotton production was sufficient to supply the small cotton textile industry and because later in 1837 the imports of every kind or class of foreign yarns and "ordinary" cloth were also forbidden, although these bans were not implemented until October 1838.[36] However, the prohibition of raw cotton imports soon yielded terrible consequences. While initially adequate, within a matter of months the national cotton crop was no longer sufficient to provide the actual consumption for the established factories. From 1838 onwards cotton started to become scarce; and its price, which at that time was only 16 or 17 pesos per quintal, has increased 40 pesos. The manufacturers had to either stop production entirely, or shorten daily production in an effort to continue, waiting anxiously for the arrival of new crop.[37] It made no economic sense to impose tariffs on both the products and on the inputs of the textile industry.

In 1843, Estevab de Antuñano wrote several letters to President Santa Anna. These letters attempted both to explain the problems that the ban on raw cotton were having on the textile industry, and tryed to convince the

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33 Walter Bernecker, *De agiotistas y empresarios* (Mexico City: Universidad Iberoamericana, 1992), 254.

34 Stephen Haber, *Industry and Underdevelopment. The Industrialization of Mexico 1890-1940* (Stanford: Stranford University Press, 1989)., 21.

35 I define institutional frailty as an inefficient institutional arrangement that has two dimensions: institutional uncertainty and institutional weakness. Institutional uncertainty is institutional frailty in terms of time: the rules of the game continually change, and thus, there is no reliable set of expectations about which present courses of actions will be rewarded or punished in the future. Institutional weakness is institutional frailty in terms of strength: the rules of the game are not enforced and discretionary benefit powerful players. One important kind of institutional weakness is institutional fragmentation: the rules of the game are not homogeneous throughout the nation. See Aurora Gómez Galvarriato, "Fragilidad institucional subdesarrollo: La industria textil mexicana en el siglo XIX", in *La industria textil*, ed. Aurora Gómez Galvarriato, *Lecturas de Historia Económica Mexicana* (Mexico City: Instituto Mora, El Colegio de Michoacán, El Colegio de México and IHH-UNAM, 1999), 152.

36 Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio*, 129.

37 México, "Memoria sobre el estado de la agricultura e industria de la república en el año de 1843", 22-23.

president to lift the prohibition.[38] Santa Anna, the political boss of a major cotton growing region, had too many commitments to cotton growers to relax the ban and the protection it gave them. Santa Anna himself may have been in the cotton business, thus having a personal interest in the protection of raw cotton.[39] Instead of lifting the ban, Santa Anna arbitrarily granted special cotton import licenses that usually ended in the hands of *agiotistas* (money-lenders). One such agotista was Cayetano Rubio, a man of considerable influence who who was both a merchant selling cotton and the owner of a textile mill.[40] It is likely that the government granted the import licences as part of its negotiations in order to obtain further credits to support their permanent deficit.[41]

Textile industrialists also had to withstand the granting of licenses for the importation of manufactured textiles. The precarious fiscal situation of the Mexican governments made their commitment to protect textile manufactures very vulnerable. In 1841, for example, in order to finance the war against Texas, General Mariano Arista authorized the sale of special import licenses for textile manufactures. Guillermo Drusina and Cayetano Rubio, one of the above mentioned government supported merchants, purchased these licenses over the harsh opposition of other textile producers.[42] Furthermore, textile manufacturers often complained of the smuggling that further limited their market. [43]

We can blame both the protectionism practiced by Mexican governments in this period and the resulting growth of smuggling practices on institutional frailty. Their fiscal and military weakness and the concomitant constant changes of government made it impossible to undertake a trade policy focused on the promotion of industry. The weakness of national governments, both in terms of their capacity to implement policies and in terms of their lack of control over regional governments, made smuggling inevitable. For governments in this period, short-term objectives always prevailed over long-term goals. Given the precarious situation the government faced, it was not in a strong enough of a place to foster policies that would have increased government revenues in the long run, such as promoting industry and

[38] Letter from de Antuñano to Santa Anna, Puebla, January 22, 1843, de Antuñano, *Economía política. Documentos*, 6-7 quoted by Carlos Illades, "La empresa industrial de Estevan de Antuñano (1831-1847)", in *Secuencia* 15 (Sept/Dic 1989), 12.

[39] Jan Bazant, "Antonio López de Santa Anna", 34, quoted by Carlos Illades, "La empresa industrial de Estevan de Antuñano (1831-1847)", *Secuencia* 15 (1989), 41.

[40] Letter from de Antuñano to Santa Anna, n.d. in *Ibid*., 43.

[41] Decree of April 12, 1843, *El observador judicial y de legislación*, 3, 366-67 and *Memoria que el Secretario de Hacienda presentó, 1844*, 15, both quoted by Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio*, 142; Bernecker, *De agiotistas y empresarios*, 226, 265.

[42] David W. Walker, *Parentesco, negocios y política: La familia Martínez del Río en México, 1823-1867* (Mexico City: Alianza, 1991), 200.

[43] Bernecker, *De agiotistas y empresarios*, 200, 215, 221.

economic growth. It needed resources immediately in order to survive, and tried to obtain them at whatever cost was necessary.

Another problem the textile industry faced during this period was the backwardness of financial institutions. Apart from the Banco de Avío, which closed its doors in 1840, there was no institutional lending to industry until the 1880s. Only after 1864 did a rudimentary banking system with specialized institutions and stable practices begin to develop in Mexico. By 1884 only eight banks were in operation in Mexico. Interest rates were exorbitantly high and fluctuated unpredictably, there were no banking institutions, and there was no formal stock market. Industrialists were forced to rely on informal mechanisms of raising capital, in most cases based on kinship networks of credit. Studies of particular mills during this era tell of the serious difficulties businessmen faced in obtaining credit, which frequently drove them to bankruptcy.[44] Successful entrepreneurs were those who undertook speculative activities as part of their businesses, such as money lending to the government. *Agiotistas* such as Cayetano Rubio, Pedro Berges de Zúñiga and Manuel Escandón became major textile-mill owners by the mid-nineteenth century.[45]

Mexico's financial system lagged behind not only those of developed countries, such as the United States, but also those of other Latin American countries such as Brazil, Argentina, and Chile. According to Carlos Marichal, the instability of Mexican financial markets and the difficulties in the development of modern capital markets during the greater part of the nineteenth century were mainly the result of the state's underdeveloped fiscal and credit policies.[46] Two basic preconditions for the development of capital markets were absent in nineteenth century Mexico: the stabilization and broadening of short-term money-markets and the creation of a relatively open, internal market for public securities.[47] These two conditions could not exist until the Mexican government's fiscal resources enabled it to pay its debts regularly. Political instability, prevalent throughout this period, played against the governments' fiscal health, and was also a result of it.

In addition to the problems industrial expansion faced from the supply-side, the slow growth of domestic demand must also have placed a considerable constraint on the growth of the textile industry. In the United States, demand changes accounted for more than half the expansion of its textile industry between 1815 and 1833, in which sales increased on average by a 15.4% per year. This was the result of rapid population growth, averaging

[44] Mario Trujillo, "La Fábrica Magdalena Contreras (1836-1910)," in *Historia de las Grandes Empresas en México 1850-1930*, ed. Carlos Marichal and Mario Cerutti (Mexico City: Fondo de Cultura Económica, 1997)., 245-274 and Illades, "La Empresa Industrial".

[45] See Bernecker, *De Agiotistas y Empresarios*. 183-190.

[46] Carlos Marichal, "Obstacles to the Development of Capital Markets in Nineteenth-Century Mexico," in *How Latin America Fell Behind?*, ed. Stephen Haber (Stanford, Ca.: Stanford University Press, 1997)., 119.

[47] Ibid.

3% a year over the 1815-1840 period, rising income levels enjoyed by the growing population, and improvements in transportation, which further increased demand for textiles by reducing the difference between prices at the factory gate and those consumers actually faced.[48] In Mexico, demand remained stagnant as the population grew slowly between 1800 and 1845 at an average annual rate of 0.51%, and income per capita decreased at an average annual rate of 0.6% during that same period. No improvements in transportation were achieved during this time.[49]

Despite these difficulties, the cotton industry was still able to grow during this period. Table 1 shows a pattern of continuous growth in the textile industry. Cotton textile factory production grew rapidly in the 1830s and early 1840s, rising from less than 30 thousand kilos of yarn produced in 1838 to more than 3.5 million kilos in 1843.

Jan Bazant's calculations show that the Mexican textile industry of this period compared relatively well in terms of efficiency with the British and American industries. According to the *Semanario de la Industria Mexicana*, between 1841 and 1842, capital-labor ratios in the Mexican textile industry were 20 spindles per worker, about the same as for American workers in 1830.[50] However, the prices of the products were very different from those in the United States. An 1846 U.S. report on the Mexican economy claimed that "cotton goods which sell in the United States for six cents per yard, are worth thirty cents in Mexico."[51] According to the author of that report, "this results from the high price of the raw material, which sells from forty to fifty cents per pound, and from the circumstance that all the machinery is imported and transported by land at an enormous cost; and also to the difficulty and delay of repairing it, when it breaks down."[52]

Bazant's calculations present the cotton industry as a profitable one. They show that in 1843 profit rates for the industry as a whole were 10% per piece of cloth produced, while for La Constancia they were 20% per piece of cloth.[53] However, Walker's study of the Miraflores mill suggests that the prosperity of a textile mill depended more on its owners' ability to speculate in the cotton market than on its productivity.[54]

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[48] Robert Brooke Zevin, "The Growth of Cotton Textile Production after 1825", in Fogel and Engerman, *The Reinterpretation of American Economic History* (New York, 1971), 122-144.

[49] John H. Coatsworth, *Los orígenes del atraso* (Mexico City: Alianza Editorial, 1990), 83.

[50] By 1840 each American worker handled 31 spindles on average, and 38 spindles in 1850. Jan Bazant, "Estudio sobre la productividad en la industria algodonera mexicana en 1843-1845", (México City, Sobretiro de vol. VII de la colección para la Historia del Comerio Exterior, 1964), 55-56.

[51] Thomas J. Farnham, *Mexico, Its Geography, its People and its Institutions* (New York: H. Long & Brother, 1846), 29.

[52] *Ibid.*

[53] Jan Bazant, *Estudio sobre la productividad en la industria algodonera mexicana en 1843-1845* (Mexico City: Sobretiro del vol. VII de la colección para la Historia del Comercio Exterior, 1964), 64-72. Interests rates in the period were between 10% and 12%.

[54] Walker, *Parentesco, negocios y política: La familia Martínez del Río en México, 1823-1867,* 183-219.

TABLE 1. GROWTH OF THE MEXICAN COTTON TEXTILE INDUSTRY (1837- 1878)

YEAR	NO. OF FACTORIES	NO. ACTIVE SPINDLES	YARNS (TONS)	CLOTH PIECES (1000's)
1837				45
1838			29	109
1839			15	125
1840			257	88
1841			467	196
1842			358	218
1843	59	106,708	3,738	327
1844		112,188		508
1845	55	113,813	1,317	657
1853			3,348	875
1850-1857	48	119,278	3,351	727
1862	57	133,122	3,615	1,259
1879	89	253,594	2,925	3,255

Sources: México, Dirección General de Agricultura e Industria [Lucas Alamán], "Memoria sobre el Estado de la Agricultura e Industria, México" (Mexico city, 1843), table no. 5, and 1845 tables no. 2, 3, 4; México, Ministerio de Fomento, "Estado de las fábricas de hilados y tejidos de algodón existentes en la república mexicana" (Mexico City, 1857); José Ma. Pérez Hernández, *Estadística de la república mexicana* (Guadalajara, 1862), 136-139; México, Secretaria de Hacienda [Emiliano Busto], *Estadística de la república mexicana* (Mexico City, 1880); México, Dirección General de Estadística, *Anuario estadístico de la república mexicana* (Mexico City, 1894). Note: A cloth piece (*pieza de manta*) was unbleached cloth one *vara* wide and between 30 and 36 *varas* long. A *vara* equals 0.8359 meters. A piece of manta was c.a. 33 inches wide and 82.3 – 99 inches long. Bazant, *op.cit.*: 43-44.

Although there was a large degree of political instability in Mexico throughout the first six decades of the Nineteenth century, its level was not constant for this whole period. After the wars of Independence (1810-1821), when violence and political instability was pervasive, a period of relative calm between 1821 and 1836 arrived. Instability increased as a result of the wars with the Texas (1836) and with the United States (1846-1848), but it had brief and relatively small consequences when compared with the surge in political instability that took place between 1854 and 1867;[55] A period when civil war between liberals and conservatives increased political instability through its various episodes: The Ayutla Revolution (1854), The war of Reform (1858-61), The French invasion (1861), And the Second Empire (1864-67). During some of these years, violence and destruction peaked to levels similar to those suffered during the wars of Independence.[56]

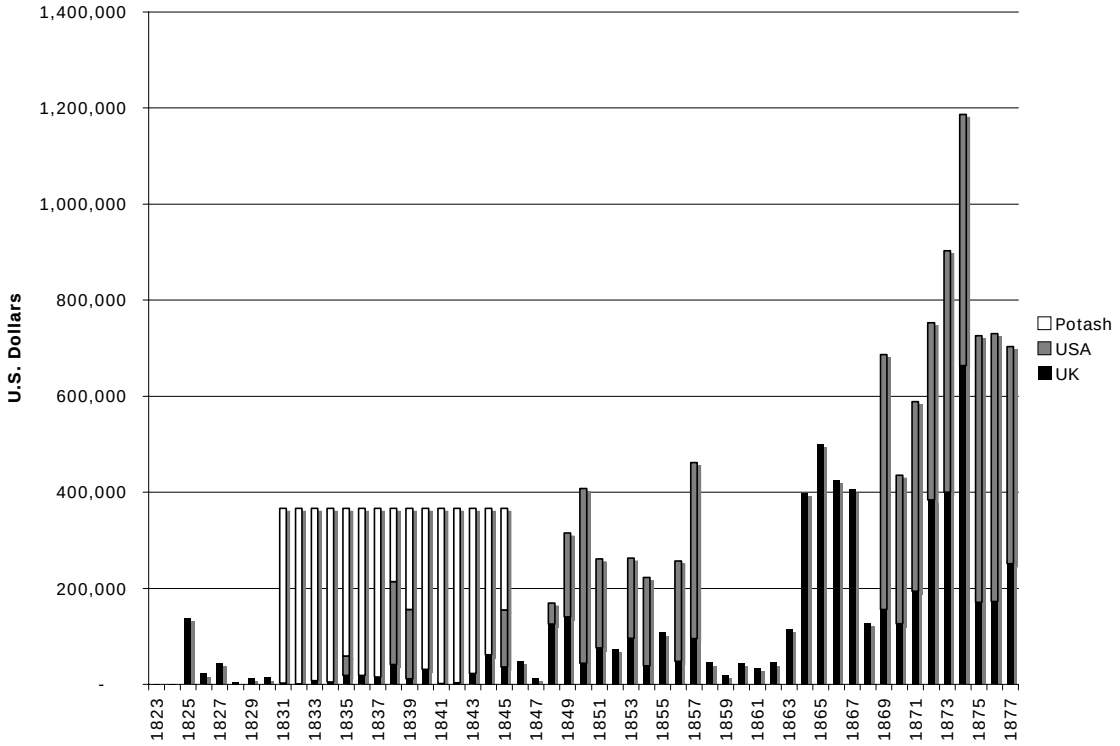
Yet Mexican imports of capital goods and machinery from 1845 to 1878, as shown in Figure 1, tell a story of relatively high industrialization during these years compared to the 1830-1845 period. These figures hold true even when

[55] The material destruction and life loss during the war with the United States (1846-1848) was relatively low when compared with the Mexican war episodes of 1810-21 and 1854-67. Robert L. Sheina, *Latin America's Wars. The Age of the Caudillo, 1791-1899*, vol. I (Dulles, Virginia: Brassey's Inc., 2003).

[56] Ernest Sánchez Santiró, "El desempeño de la economía mexicana tras la Independencia, 1821-1870: Nuevas evidencias e interpretaciones", (paper presented at the Seminario de Historia Económica, Fundación Ramón Areces, Obstáculos al crecimiento económico en Iberoamérica y España 1790-1850, Madrid, Spain May 18-19, 2007). Carlos Alejandro Ponzio, "Essays on the History of Economic Growth in Mexico", (Harvard University, 2004), 144.

we adjust the data to take into accounts machinery imports that might not have been reported in the United States and United Kingdom figures of exports to Mexico during the earlier period.[57] According to the figures on machinery imports the industry began to grow at a faster and steadier pace after 1870, once the Republic had been restored. However two periods of relatively high growth appear to have taken place; the first in the interval after the war with the United States and before the war of Reform (1849-1857), and the other during the Second Empire (1864-1867).

FIGURE 1. MACHINERY AND MILLWORK IMPORTED BY MEXICO FROM THE UK AND THE U.S.



Source: U.K. Parliamentary Documents, Return to and Order of the Honourable House of Commons. Several Issues.

After 1845, the growth in cotton textile production slowed down for several reasons: the scarcity and high price of domestic raw cotton due to its prohibiton until 1856; an increase in the terms of trade after 1845; a

[57] Since data on the exports of machinery of the United States to Mexico was not very good before 1845, I made an estimate of what might have imported the industry during those years taking into account Robert Potash´s valutation of a total investment of between $10 and 12 million during this period. We considered that machinery and millwork would account for 50% of the total investment. Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio*, 151.

reduction in the support that the government gave to the industry, exemplified by the closure of the Banco de Avío in 1842; and much larger levels of political instability. The survival of the textile industry during these years of foreign invasions, a major civil war, and a slow-growing population was in itself remarkable.[58] It was even more remarkable that the industry actually expanded. The total number of looms and spindles increased by 132% and 234% respectively between 1843 and 1878. Furthermore, the average firm grew, increasing its number of spindles by 58% and its number of looms by 126%, although not at the same pace as it was taking place in the United States.[59]

The cotton textile industry not only grew between 1843 and 1878, it also modernized. The industry successfully integrated spinning and weaving. Even more important was the complete transformation in the sources of power used. In 1843, 37% of the firms used men or mules as their source of power; only 3% ran on steam. By 1878 no textile mill operated with animal power. Instead, 64% of factories employed steam power. Of the total *manta* produced, only 2% was made using steam in 1843, but 70% in 1879. While in 1843 only 56% of the firms were using water power, by 1879 this figure had risen to 91%. More than half the firms, 55%, combined steam and water power.[60]

Technological progress appears to have had a positive impact on mill productivity levels. Although productivity has not been measured for the specific period studied here, measurements of labor productivity and total factor productivity[61] for the period 1850 to 1890 indicate that they increased by 3.3% and 2.6% respectively per year when production is measured by physical output.

Industrial growth between 1843 and 1878 is not easy to explain given the difficult economic and political conditions of the time. The central government's lack of control and its inability to guarantee security, even on the most important highways, greatly increased transportation costs. Roads were bandit-infested.[62] Moreover, historians have argued that tariff policy changed for the worse in this period as liberal politicians came into power.[63] There was a substantial reduction in the tariffs on cotton manufactures in

[58] Dawn Keremitsis, *La industria textil mexicana en el siglo XIX* (Mexico City: SEP-Setentas, 1973), 55.

[59] While in 1843 the average mill in terms of spindles per mill was roughly of the same size of the average mill in the United States in 1831, by 1878 it was only 20% of the average 1880 American mill.

[60] Mexico, "Memoria sobre el estado de la agricultura e industria de la república en el año de 1843."; ———, "Estadísticas de la república mexicana", ed. Secretaría de Hacienda [Emiliano Busto] (Imprenta de Ignacio Cumplido, 1880).

[61] Labor productivity is output produced per worker, total factor productivity is output produced per units of several inputs, weighted by their shares in the production process. Armando and Stephen Haber Razo, "The Rate of Productivity in Mexico, 1850-1933: Evidence from the Cotton Textile Industry", *Journal of Latin American Studies* 30, no. 3 (1998), 496-497.

[62] Haber, *Industry and Underdevelopment. The Industrialization of Mexico 1890-1940*, 21-22.

[63] Keremitsis, *La industria textil mexicana en el siglo XIX*, 41-42.

1856.[64] However, the effect of this reduction was balanced by government's simultaneous decision to lift the prohibition on raw cotton imports and replace it with a duty that in ad valorem temrs would have been around 9.5%. A raw estimate of the effects of the Liberal policy from 1855 to 1856 shows that the net effect for the textile industry was not necessarily negative.[65]

The American Civil War had a positive effect on the Mexican cotton textile industry, since it increased the price of international cotton manufactures and decreased the price of raw cotton. The blockade of the South by the Union —effective in Texas in mid-1861— forced the Confederates to channel cotton exports through the Mexican border.[66] This trade generated enormous profits among Mexican merchants and rapid growth in the Northeast.[67] Monterrey became a "free depot of cotton," in that any number of bales could be deposited there with duty paid only upon shipment to Matamoros or towards the interior; the city owed its future prosperity to its growth during this period.[68] The increased supply of raw cotton and the rise in demand for cotton manufactures from the embattled American South made it possible for Mexican textile mills to export their products. In 1861-62, the Ibernia factory in Saltillo produced approximately "11,500 pieces of common brown sheeting called *manta*, which were sold to the Southerners for $4.50 each."[69] This was a kind of foreign trade unheard of before the American Civil War.

Due to population growth, domestic demand for the period 1843-1877 increased, giving an additional boost to textiles' production. While population grew at even a lower rate from 1845 to 1860 than in the previous 45 years, its pace of growth considerably raised from 1860 to 1877. Income per capita, which according to Coatsworth's estimates continued to fall from 1845 to 1860, began to recover after that date growing at an average rate of 1.48% from 1860 to 1877.

The growth of the Mexican textile industry between 1843 and 1879 was accompanied by regional dispersion. In 1843, 64% of the firms (57% of spindles and 65% of looms) were located in Mexico City, the state of Mexico, and Puebla. By 1879, only 33% (46% of spindles, 44% of looms) were located in these places. In 1843, there were firms in only eight states, whereas by 1879

64 Daniel Cosío Villegas, *La cuestión arancelaria en México*, vol. III, *Historia de la Política Aduanal* (Mexico City: Ediciones del Centro de Estudios Económicos, 1932), 13, 43, 92.
65 Dobado, "Globalization, De-Industrialization and Mexican Exceptionalism 1750-1879".
66 Ronnie C. Tyler, *Santiago Vidaurri and the Southern Confederacy* (Fort Worth, Texas: Texas State Historical Association, 1973), 121.
67 Mario Cerutti, *Burguesía, capitales e industria en el norte de México* (Mexico City: Alianza, 1992), 74-87.
68 Tyler, *Santiago Vidaurri and the Southern Confederacy*, 110.
69 Charles Lempriere, *Notes in Mexico in 1861 and 1862: Politically and Socially Considered* (London: Longman, Green and Longman, Roberts and Green, 1862), 133 quoted by Tyler, *Santiago Vidaurri and the Southern Confederacy*, 110.

almost every state had its own textile mill. Regional dispersion of the industry was well underway before 1862.[70]

Mexico's geography, a few navigable rivers and many mountains, made transportation extremely difficult.[71] The high transportation costs in Mexico explain the geographical dispersion of the Mexican textile industry during its early development. Most transportation was by mules and ox-carts until the 1880s. In addition to the natural problems inter-state tariffs —the *alcabalas*— raised transportation costs even more.[72]

It is difficult to exaggerate the importance of *alcabalas* as an obstacle to economic growth. The owner of La Estrella mill in Coahuila wrote in 1877: "the *alcabalas* are a true gangrene to the social body, even more dangerous than the turbulence to which we are prey so frequently, and if they are not suppressed, they will crush the few industries that some few daring men, who want to see their country full of factories and their fellow citizens employed support."[73] Inter-state trade barriers were formally abolished by the 1857 Constitution. Yet their great importance as a source of revenues for the states made it impossible to put the law into practice until a new balance of power between the federal and the states' governments was attained, a balance which would allow the federal government greater control over the nation.

Transportation costs driven up by nature, by the lack of safety on the roads, and by the *alcabalas* that limited the markets accessible to firms, often reducing them to the state in which they operated. High transportation costs and inter-state tariffs reduced market size and made for a more dispersed organization of firms. This is exactly the pattern of industrialization found in Mexico.[74] The Industry of cotton cultivation dispersed throughout Mexico, from only five states in 1843 to twelve states by 1879.[75]

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[70] Mexico, "Memoria sobre el estado de la agricultura e industria de la república en el año de 1843"; ———, "Memoria sobre el estado de la agricultura e industria de la república en el año de 1845", ed. Dirección de Agricultura e Industria [Lucas Alamán] (Imprenta de J. Lara, 1846).; ———, "Estadísticas de la república mexicana"; José María Pérez Hernández, *Estadísticas de la república mexicana* (Guadalajara: Tipografía del Gobierno a cargo de Antonio de P. González, 1862).

[71] Mexico's high transportation costs are evident in Coatsworth's measurements of railroad social savings in Mexico, especially when compared to the small effect of railroads that Fogel found for the United States. See John H. Coatsworth, *Growth against Development. The Economic Impact of Railroads in 19th Century Mexico* (Delkab: Northern Illinois University Press, 1981).John Coatsworth, *Growth Against Development. The Economic Impact of Railroads in 19th Century Mexico* (Delkab, 1981); Robert Fogel, *Railroads and American Economic Growth* (Baltimore: John Hopkins, 1964).

[72] *Alcabalas* were taxes on inter-state commerce, defined and regulated by each state, that existed from Colonial times until 1896.

[73] Mexico, "Estadísticas de la república mexicana", vol. II, 319.

[74] The extraordinary dispersion of the Mexican cotton industry also resulted from the power used. The use of water and wood as sources of power could explain a dispersed pattern of location generated by mills setting up in sites close to water sources and forests. However, if this had been the major source of the dispersion the industry would have located in those regions where water power and wood were cheaper, which is not what evidence for the Mexican textile industry shows.

[75] This process appears to have been underway by 1862 when 33 ginning machines existed in Mexico, 8 in Veracruz, 6 in Oaxaca, 6 in Guerrero, 4 in Colima, 4 in Chihuahua, 3 in Durango and 2 in Coahuila. Pérez Hernández, *Estadísticas de la república mexicana*, 140.

The geographically scattered nature of Mexico's textile industry development contrasted not only with that of the United States but also with that of Great Britain or Spain, where the industry also expanded in a more regionally concentrated pattern. Regions with comparative advantages over others in Mexico in terms of cotton, energy, and labor costs, did not concentrate the industry as they did in the United States. Relatively efficient mills coexisted with highly inefficient ones. Furthermore, regional dispersion reduced the externalities a "big push" might have generated if the industry had concentrated in particular regions.[76]

As it has been explained, a more effective government could have allowed a stronger industrialization process in Mexico during the first three quarters of the 19th century. However, what Mexico achieved was substantial when placed in comparative terms with other countries in the periphery. In 1879 Mexico produced around 60 million square meters of cloth, and imported 40 million squares meters. Domestic production thus claimed 60% of the local market, which compares well to that figures for countries like India (35-45% in 1887) or the Ottoman Empire (11-38% in the 1870s), which had been important textile producers at the beginning of the 19th century.[77]

As we have seen, the Mexican textile industry grew and modernized during this period, and although not at the same pace as countries in the core, it achieved a substantial reduction in its domestic cotton cloth prices. While in 1834-35 the price of the vara (0.836 meters) of cloth was around 0.30 pesos, by 1850 it had fallen to around 0.12 pesos and to 0.11 in 1877.[78]

2. The Textile Industry during the Porfiriato

Fundamental changes in the Mexican economic environment took place during the Porfirian regime (1876-1910). After the union of the United States in 1865 and the restoration of the Republic of Mexico in 1867, the calamitous wars that undermined the Mexican government's capacity to put its finances in order and establish a reliable set of institutions gave way to a more peaceful environment. The Mexican federal government gradually gained control of the whole nation. This objective, more successfully approached by Lerdo than by Juárez, was fully accomplished by Porfirio Diaz's combination of repression and concession towards regional *caciques* (political bosses).[79]

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[76] See Kevin M. Murphy, Andrei Shleifer, and Robert W. Vishny, "Industrialization and the Big Push", *Journal of Political Economy* 97, no. 5 (1989).

[77] Dobado, "Globalization, De-Industrialization and Mexican Exceptionalism 1750-1879".

[78] Potash, *Mexican Government and Industrial Development in the Early Republic. The Banco de Avio*, 163. Thomson, *Puebla de los Angeles: Industria y sociedad de una ciudad mexicana 1700-1850*, 373. Walker, *Parentesco, negocios y política: La familia Martínez del Río en México, 1823-1867*. Keremitsis, *La Industria Textil Mexicana en el Siglo XIX*, 71.

[79] Friedrich Katz, "The Liberal Republic and the Porfiriato, 1821-1867", in *Mexico since Independence*, ed. Leslie Bethell (Cambridge: Cambridge University Press, 1991), 49-74.

After long, difficult negotiations to settle Mexico's foreign loans and re-establish a schedule of payments, in 1886 the Porfirian government regained access to the international financial system, and in just two years negotiated its first foreign loan since 1829. [80] Furthermore, the risk premium the Mexican government paid on its foreign debt diminished considerably from 1893 to 1910, which shows the growing confidence Mexico enjoyed in international financial markets.[81]

The more reliable environment that these post-1867 administrations generated for foreign investment, as well as active policies that granted both concessions and subsidies for railway construction, led to the construction of railway lines. The port of Veracruz and Mexico City were finally linked by rail when the new Ferrocarril Mexicano line was inaugurated in 1873. An important railroad construction spurt took place in the 1880s, so that by the 1890s railroads connected most of the central and northern part of the country. The first railway line between Mexico and the United States was inaugurated in 1884. The length of Mexico's railway network rose from 665 kilometers in 1878 to 19,748 kilometers by 1910.[82]

Aided by political stability, effective national government, and access to foreign credit markets, the Porfirian government gradually reorganized its public finances.[83] Greater central government control over state politics and improved finances allowed the government finally to abolish all *alcabalas* in 1896, when states were compensated with income from newly legislated federal taxes.[84] Furthermore, significant legal reforms generated a more favorable and predictable institutional environment. The commercial codes of 1884 and 1889 defined property rights more conducive to fostering investment, progressively guaranteeing the operation of joint-stock companies.

All these changes created the two preconditions necessary for the development of financial markets during the Porfiriato. By 1883 the stabilization and broadening of short-term money markets had been achieved, and by 1890 the creation of a relatively open internal market for public securities became possible. After that year, public bonds began to be sold both nationally and internationally.[85] Thus, a banking system began to spread

[80] Nicolás D' Owler, "Las inversiones extranjeras", in *Historia Moderna de México*, ed. Daniel Cosío Villegas (Mexico City: Hermés, 1964), 1006-1010; Jan Bazant, *Historia de la deuda externa de México 1823-1946*, 3rd ed. (Mexico City, 1995), 134-137.

[81] Jaime Enrique Zabludowsky, "Money, Foreign Indebtedness and Export Performance in Porfirist Mexico", (Yale University, 1984), 123.

[82] Mexico, "Estadísticas Históricas de México", ed. Geografía e Informática Instituto Nacional de Estadística (INEGI, 1986), II, 569-570.

[83] See Marcello Carmagnani, *Estado y mercado. La economía pública del liberalismo mexicano, 1850-1911* (El Colegio de México and Fondo de Cultura Económica, 1994), 191-234.

[84] Edward Beatty, "Commercial Policy in Porfirian Mexico: The Structure of Protection", in *The Mexican Economy, 1870-1930*, ed. Jeffrey L. Borzt and Stephen Haber (Stanford Ca.: Stanford University Press, 2002), 225-6.

[85] Marichal, "Obstacles to the Development of Capital Markets in Nineteenth-Century Mexico", 127-132.

throughout the nation. Whereas until 1880 there had only been one commercial bank operating in Mexico, the Banco de Londres y México, founded in 1864, in the course of the next two years, several banks opened.[86] Unfortunately, the political circumstances faced by the Porfirian administration during the period when the fundamental characteristics of the Mexican banking system were being defined produced an institutional arrangement detrimental to the future growth, efficiency, and competitiveness of the banking system.[87] A concentrated and under-developed financial system remained as an Achilles heel to economic growth.[88]

Tariff protection during the Porfiriato became part of a cogent policy to promote industrialization. Through this period "tariff reforms were increasingly designed to favor developmental rather than fiscal objectives."[89] After the tariff reform of 1891, tariffs were generally reduced, but selectively changed in order to protect Mexican manufacturing. Thus, between 1890 and 1905, implicit protection fell by 50% across the tariff schedule, but several products that were the object of import-substituting policies gained a nominal increase in protection from 68% to 73%. In general, the tariff schedule gave effective protection to industry through higher rates for finished goods than for the imported raw materials needed to produce them.[90]

Nominal duties on cotton cloth were 96% on average in 1890, declining to 65% in 1905. Although this rate was still substantial, the reduction shows that government policy was to gradually promote competitiveness, and that industry was keeping pace. These high rates for cotton cloth combined with lower rates for raw cotton (30% in 1890 and 20% in 1905) provided substantial, effective protection. This policy had a significant effect on the industry. Protection to the industry was enhanced during most of the period by an important depreciation of the Mexican peso that was not accompanied by an equal rise in domestic prices. Mexico underwent a real currency depreciation of 137 percent between the mid 1870s and 1902, and a real currency appreciation of 24 percent between 1902 and 1913.[91]

An important fall in terms of trade that Mexico experienced during the Porfiriato stimulated manufacturing in general, and textile manufacturing in particular, since textile goods represented a large share of Mexican imports. In contrast with most countries in the periphery, Mexican terms of trade fell

[86] The Banco Nacional Mexicano and the Banco Mercantil Mexicano were founded in 1881, the Banco Internacional Hipotecario was established in 1882. The first two banks merged in 1884 to form the Banco Nacional de México.
[87] This argument is developed in Noel Maurer, *The Power and the Money. The Mexican Financial System, 1876-1932* (Stanford, Ca.: Stanford University Press, 2002).
[88] This argument is developed in Stephen Haber, "Financial Markets and Industrial Development: A Comparative Study of Governmental Regulation, Financial Innovation, and Industrial Structure in Brazil and Mexico 1840-1930," in *How Latin America Fell Behind*, ed. Stephen Haber (Stanford, Ca.: Stanford University Press, 1997).
[89] Beatty, "Commercial Policy in Porfirian Mexico: The Structure of Protection.", 206.
[90] Ibid., 220-221.
[91] Aurora Gómez-Galvarriato, and Jeffrey Williamson, "Was It Prices, Productivity or Policy? Latin American Industrialization after 1870," in *NBER Working Paper* (2008)., 6.

by 37.2% between 1870-1874 and 1910-1913. Moreover, in spite of the decline of the terms of trade, a rapid productivity advance in Mexican mining during this period generated an increase in total export values and foreign exchange earnings, creating and export-led growth.[92] This encouraged manufacturing further by increasing domestic demand, and the supply of investment capital. Despite considerable population and income growth, cloth imports fell at an average rate of 4.3% per year between 1895 and 1908, substituted by domestic production.[93] By 1908 around 78% of cotton texile consumption was supplied by domestic production.[94]

As we have seen, a fundamental change in the economic environment took place in Mexico during the Porfirian regime. The principal obstacles that had hindered the development of the textile industry during the nineteenth century had disappeared. As a result, the textile industry, like most other sectors, grew at an unprecedented rate (see Tables 1 and 2). Furthermore, in response to the new systems of communications and transportation in the country, a dramatic transformation in both distribution and production of textiles took place.

[92] *Ibid.*, 15-17; and Edward Beatty, "The Impact of Foreign Trade on the Mexican Economy: Terms of Trade and the Rise of Industry 1880-1923", *Journal of Latin American Studies* 32 (2000).

[93] Beatty, "Commercial Policy in Porfirian Mexico: The Structure of Protection", 232.

[94] Aurora Gómez Galvarriato and Jeffrey Williamson, "Was it Prices, Productivity or Policy? Latin American Industrialization after 1870", in *NBER Working Paper* (May 2008), 20-21.

TABLE 2. THE MEXICAN COTTON TEXTILE INDUSTRY (1878- 1913)

YEAR	MILLS	ACTIVE MILLS	COTTON CONSUMED (TONS)	CLOTH (1000 PIECES)	YARN (TONS)	ACTIVE SPINDLES	ACTIVE LOOMS	PRINT. MACH.	WORKERS	SALES (NOMINAL)	SALES (REAL)
1879	89	89	12,064	3,255	2,925	253,594	8,885		12,118		
1893	98	93	21,298	4,941	2,361	355,456	11,827		19,515		
1895	110		20,208	7,554	1,566	411,090	12,386	30	18,208	$21,906	$24,193
1896	112	101	23,771	9,123	2,015	428,560	12,974	30	19,575	$23,658	$25,338
1899	125	120	26,518	10,240	1,896	479,995	14,352	28	22,846	$29,753	$32,564
1900	144	134	28,990	11,553	1,884	557,391	17,202	35	26,764	$35,459	$35,459
1901	152	133	30,262	11,582	1,837	602,223	18,885	33	27,663	$33,877	$35,553
1902	155	124	27,628	10,429	1,879	575,304	17,974	35	25,316	$28,780	$27,939
1903	139	115	27,512	11,587	2,146	630,201	20,124	35	26,249	$36,907	$31,339
1904	145	119	28,841	12,407	1,689	632,018	20,326	37	27,033	$42,511	$34,646
1905	147	127	31,230	13,732	1,538	666,659	21,932	38	29,483	$51,214	$46,097
1906	150	130	35,826	15,456	2,163	683,739	22,776	39	31,673	$51,171	$44,894
1907	142	129	36,654	18,929	2,118	693,842	23,507	41	33,132	$51,686	$41,326
1908	145	132	36,040	16,281	2,421	732,876	24,997	42	35,816	$54,934	$45,303
1909	146	129	35,435	13,888	1,953	726,278	25,327	40	32,229	$43,370	$36,656
1910	142	123	34,736	13,936	2,768	702,874	25,017	41	31,963	$50,651	$39,119
1911		119	34,568	15,091	2,767	725,297	24,436	30	32,147	$51,348	$39,286
1912	148	127	32,366	13,471	2,843	762,149	26,801	50	32,128	$52,847	$38,804
1913	148	123	34,260	13,810	3,313	746,370	26,391	51	32,086	$56,941	$38,637
1879-1913	66%	38%	184%	324%	13%	194%	197%		165%		
1895-1913								70%		160%	60%

Sources: 1878: México, Secretaría de Hacienda [Emiliano Busto], Estadística de la República Mexicana, (Mexico City, 1880); 1893: México, Dirección General de Estadística, Anuario Estadístico de la República Mexicana (Mexico City, 1894); 1895-1911: México, SHCP, Boletín de Estadística Fiscal, several issues, México, Mexican Year Book 1908¸1912: AGN, DT 5/4/4 "Manifestaciones presentadas por los fabricantes de hilados y tejidos de algodón durante enero a junio de 1912"; 1913: AGN, DT 31/2/4, "Estadística semestral de las fábricas de hilados y tejidos de algodón de la República Mexicana correspondiente al semestre de 1913". Real sales were deflacted with a price index AB II gold. Tons are metric tons.

2.1. The Porfirian Modernization of the Commercialization and Production of Textiles

The coming of modern transportation and communications —the railroad, the telegraph, the steamship and cable— brought about major changes in the production and distribution of goods and in firms' strategies and structure around the world. Enterprises grew in size and scope and they had to adapt both their management and finance to the new situation.

In the United States, businesses personally managed by their owners gave way to the managerial business enterprise. Ownership and management separated, and the expanded enterprises came to be operated by teams of salaried managers who had little or no equity in the firms. Mass marketing and modern mass production appeared.[95] In other countries, such as Great Britain, different types of firms and strategies emerged which adapted better to their

[95] This was particularly the case in the capital-and technology-intensive sectors where throughput efficiencies and economies of speed, standarization, and mass markets could be achieved. The textile industry was not one of those sectors. , 1-2; 235-294 and 322-34. However, the emergence of large-scale manufacture in the New England textile industry, carried out by limited liability corporations, has been considered part of the same process. William Lazonick, *Competitive Advantage on the Shopfloor* (Cambridge, Ma.: Harvard University Press, 1990).

institutional, social, political, and cultural environments in contrast to the American large-scale corporate model.[96] One salient characteristic of the transformation of Mexico's business institutions during this period was the important role played by entrepreneurial networks.[97]

A firm's institutional environment crucially affects the transaction and information costs that firms face.[98] When circumstances are hazardous, and the institutional environment weak in protecting property rights, "transaction costs will be reduced within firms when control is on the basis of shared attitudes, goals and aspirations, either through a shared background or the creation of a business culture, rather than rules and regulations."[99] This would also hold for the relations between firms. Social networks thus becomes key to understand the development, strategy, and structure of business.

Networks reduce transaction and information costs as well as the dangers and uncertainties of business activities because they are based on social norms. These social norms both create and are established by trust. The basic network of any individual is his or her family, but its boundaries vary; they might include an extended group of cousins, in-laws, and connections in the local business community, especially from within religious or ethnic groupings that share cultures and values. These groups represent an internal market for managerial labor, a source of funds for establishment and expansion, and a source of market information.[100] The wider a network of trust can expand beyond the family circle the more succesful it becomes, as members possess a growing number of "weak ties" through which more and more relevant information can flow.[101]

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96 Mary B. Rose, *Firms, Networks, and Business Values: The British and American Cotton Industries since 1750* (Cambridge Cambridge University Press, 2000). This was also the case also in the United States for some specific textile sectors. See Phillip Scranton, *Proprietary Capitalism: The Textile Manufacture at Philadelphia 1800-1885* (Cambridge: Cambridge University Press, 1983).

97 See for example, Noel and Tridib Sharma Maurer, "Enforcing Property Rights Through Reputation: Groups in Mexico's Early Industrialization, 1878-1913", *Journal of Economic History* 61, no. 4 (2001),925-955;Noel and Stephen Haber Maurer, "Institutional Change and Economic Growth: Banks, Financial Markets, and Mexican Industrialization, 1878-1913", in *The Mexican Economy, 1870-1913*, ed. Jeffrey Borzt and Stephen Haber (Stanford, Ca.: Stanford University Press, 2002); and Aldo and Ian Read Musacchio, "Bankers, Industrialists, and their Cliques: Elite Networks in Mexico and Brazil during Early Indutrialization", *Enterprise and Society* 8, no. 4 (2007).

98 Davis, *Institutional Change and American Economic Growth*; and North, *Institutions, Institutional Change and Economic Performance*., 1-5; Mark Casson, "Institutional Economics and Business History: A Way Forward?", *Business History* 39 (October, 1997), 151-71.

99 Rose, *Firms, Networks, and Business Values: The British and American Cotton Industries since 1750,* 9.

100 Mark Casson, *The Entrepreneur* (London: Mark Robertson, 1982), 302-7; ———, *The Economics of Business Culture: Game Theory, Transaction Costos and Economic Performance* (Oxford: Oxford University Press, 1991).

101 Mark Granovetter, "The Strength of Weak Ties", *American Journal of Sociology* 78, no. 6 (May, 1973), 1360-80.

2.2. A Crucial Entrepreneurial Network: The Barcelonnettes

In Mexico the revolution in the production and distribution of textiles was carried out largely by several French entrepreneurs from the valley of Ubaye,[102] who had established themselves in Mexico in previous decades and developed important companies in the dry-goods trade supported by a network of fellow countrymen, many of whom they had helped to bring to Mexico to work in their businesses. By the 1890s the network had grown large enough to provide for a wide range of loose ties among its members. Many of them had built their own firms and become rich enough to be able to invest important sums of capital. The Barcelonnette network was ruled by strict social norms, reassuring entrepreneurs that their partners, customers, and employees would not defraud them to a much larger extent than formal institutions could. It was thus crucial in the transformation of small dry-goods shops into large wholesale and retail department stores, as well as in the transformation of the small and outdated textile mills prevailing until the 1880s into the large, vertically integrated state-of-the-art factories that began to appear in the 1890s.

Three types of interrelated investments —in production, distribution and management— had to be created in order to benefit from the cost advantages of the new high-volume technologies of production and the facilities provided by the new communication and transportation systems. Production facilities needed to be expanded in order to exploit a technology's potential economies of scale and scope. The national and international marketing and distributing network had to be modernized so that the volume of sales could keep pace with the enlarged volume of production. Finally, entrepreneurs also had to invest in management. "They had to recruit and train managers, not only to administer the enlarged facilities and increased personnel in both production and distribution, but also to monitor and coordinate those two basic functional activities and to plan and allocate resources for future production and distribution".[103]

In the Porfirian textile industry, this three-pronged investment did not take place as it did in the United States, through the coordination of anonymous investors linked through financial markets. Instead, textile modernization was mainly undertaken within a network of French immigrants from the valley of Barcelonnette. It was these businessmen who made the major investments in the industry to acquire the new technologies that provided economies of scale and scope. They also established new distribution networks for textile products. Finally, they invested in management, hiring and training personnel almost exclusively within the Barcelonnette community.

[102] Although immigrants came from several villages from the valley of Ubaye, they have been called Barcelonnettes because this was the most important village in the area.
[103] Chandler, *Scale and Scope. The Dynamics of Industrial Capitalism*, 332-334.

The valley of Barcelonnette, located in southeastern France at the foot of the Alps, had by the end of the nineteenth century approximately 17,500 inhabitants, and was one of the poorest regions in France. Sheep and cattle raising and the spinning and weaving of wool in family shops were the basis of the economy. From the beginning of the nineteenth century, peddling (*colportage)* became an important economic activity in the region. Each fall between 1,500 and 2,000 young men left the valley to travel through France, Italy, Belgium, and Holland to sell dry goods in small rural villages during the winter. By 1850, the development of mechanized textile mills made craft production of textiles unprofitable, severely affecting the Barcelonnette economy and increasing the number of young men ready to migrate.[104] The population of Barcelonnette was relatively well educated. Already in the eighteenth century, elementary education was widespread throughout the valley and female literacy had reached 100%.[105]

The first immigrants from Barcelonnette, the Arnauds from Jausiers, came to Mexico in 1821, and opened dry-goods shop retailing imported French textiles in Mexico City, "Las siete puertas". Gradually other young men from Barcelonnette followed in their wake. By 1850 there were already nine such Barcelonnette-owned dry-goods shops in the country.[106] Political circumstances, including the establishment of the French-protected empire of Maximilian from 1863 to 1867 and the Franco-Prussian war of 1870-71, enabled the Barcelonnettes to take control not only of retail but also of the wholesale textile business in most of Mexico.[107] By 1890 there were already 110 Barcelonnette commercial houses established in Mexico, 214 in 1910.[108]

From textiles, the Barcelonnettes moved into other lines. By the end of the nineteenth century Barcelonnettes had become major stockowners and top managers of the most important banks and manufacturing companies in Mexico. Recent research on the development of commercial networks in pre-industrial economies has underscored the importance of their success to the cohesion of the social group that integrates the networks. "The scarce guarantee that the legal system offered for compliance with contracts gave an advantage to cohesive communities that could exert sufficient internal control

104 Patrice Gouy, *Péregrinations des "Barcelonnettes" au Mexique* (Grenoble: Presses Universitaires de Grenoble, 1980), 21-38.

105 *Ibid.*, 39-42; Jean Meyer, "Les Français au Mexique au XIXe Siècle", *Cahiers des Ameriques Latines* 9-10 (1974), 57.

106 Meyer, "Les Français au Mexique au XIXe Siècle", 62.

107 Maurice Proal, and Martin Charpenel, *L'Empire Barcelonnette au Mexique* (Marseille: Editions Jean Laffitte, 1986), 9-16. The northern states of Mexico formed a distinct market where the role of Barcelonnettes was not important. In that region a commercial network centered in Monterrey was formed by Mexicans and Spanish immigrants tied together by intermarriages between prominent families. See Cerutti, *Burguesía, capitales e industria en el norte de México*; and Alex M. Saragoza, *The Monterrey Elite and the Mexican State, 1880-1940* (University of Texas Press, 1988).

108 Gouy, *Péregrinations des "Barcelonnettes" au Mexique*.., 60.

so as to dissuade its members from any lack of compliance under the penalty of exclusion from business."[109]

Through ethnic cohesion the Barcelonnettes built a bridge from the Basses Alpes to Mexico, crossed by two thousand young men from the mid nineteenth to the mid twentieth century. Letters from several young Barcelonnette immigrants tell the story. Their trips were paid for by fellow countrymen who had already established some sort of business in Mexico. The businessman financing the trip was normally well known to the family of the person who made the trip, but not necessarily a relative. Young men were housed and fed by their employers in Mexico. Letters from several immigrants reveal that a well-established recruiting system was in place by the turn of the century. Immigrants worked for at least a year in menial tasks, such as sweeping and packaging, every day of the week including Sunday mornings, for very low wages. When they had acquired sufficient knowledge of Spanish and business operations, and had established a good reputation with their employers, they were upgraded to work at the shop's counter. Then, they could be further upgraded to work as accountants or traveling salesmen. Finally, four, five, or six years later, they could become partners of the business, or establish their own business —often regional branches of the company they worked for. If they were lucky, after fifteen or twenty years, they returned to France, married a French woman, and lived off their rents.[110]

The importance of reputation and business networks is clear in the writings of Chabrand, a Barcelonnette merchant. He wrote that "a Barcelonnette last name was equal, in a wholesale house, to a credit eight or ten times higher than normal." He said that when Barcelonnette young men were introduced by agents (*couriers*) to wholesale merchants, often not Barcelonnettes themselves, they said: "It is enough that you introduce him and that he is a Barcelonnette for our house to be at his service."[111] Within the Barcelonnette community strict rules had to be complied with, but this had its rewards. "No Barcelonnette could buy supplies from anyone outside the commercial networks of the colony, [but] as a counterpart the suppliers gave them good facilities for payment and helped them to enlarge or open new commercial houses."[112] This type of behavior can be explained as a form of relational contracting, in which "the relation takes the form of a minisociety with a vast array of norms beyond those centered in the exchange and its immediate processes".[113]

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109 Carles Sudriá, "Los orígenes de la empresa industrial: Algunas reflexiones", in *La Empresa en la Historia de España*, ed. Francisco Comín and Pablo Martín Aceña (Madrid: Editorial Civitas, 1996), 65

110 See for example: "L'aventure du départ", "Les difficultés rencontrées au Mexique", "Les Lavergans à Morelia" and "Extraits de lettre et entretiens", in Proal, *L'Empire Barcelonnette au Mexique*, 104-121; Meyer, "Les Français au Mexique au XIXe Siècle", 58-59.

111 Quoted by Meyer, "Les Français au Mexique au XIXe Siècle", 59.

112 Gouy, *Péregrinations des "Barcelonnettes" au Mexique*, 60.

113 Oliver Williamson, "The Governance of Contractual Relations", in *The Economic Nature of the Firm*, ed. Louis Putterman and Randall S. Kroszner (Cambridge: Cambridge University Press, 1996).

2.3. From the "Cajones de Ropa" to Department Stores

In Mexico, the expansion and modernization of the textile industry during the Porfiriato occurred both after the transformations in commercial distribution and as a result of them, for the capital required to expand and modernize the mills came from commercial undertakings. Dry-goods commerce evolved into department stores that acquired a major share of the retailing and wholesaling textile business, and later became founders and major shareholders of the most important textile manufacturing firms in Mexico.

In preindustrial economies with underdeveloped markets, accumulated knowledge in the areas of distribution and commercialization were even more important than technical knowledge for the creation of modern industrial enterprises. In these societies there are "costly systems of allocation of goods in which the knowledge of consumer preferences and the establishment of a network of commercial relations and reputation are as important or even more important than the price to assure the sale of a product." [114] In the case of Mexico's textiles, this network was the Barcelonnettes.

During the second half of the 19th century in the North America and Western Europe the new instruments of transportation and communication transformed the way manufactured products were distributed. In the 1870s and 1880s the modern mass retailer —the department store, the mail-order house, and the chain store— appeared.[115] In Mexico, railroads and telegraph also brought about significant changes in the way commerce operated at the end of the nineteenth century, although, of course, the changes were much more limited because of the nature of Mexican markets.

Most Barcelonnette textile business until the 1870s was undertaken by small retail stores located all over the country. Each of them bought directly from textile mills spread throughout Mexico and from traveling salesmen who worked on commission.[116] A crucial factor in French commercial preeminence was the establishment of a direct transatlantic steamship line between Veracruz and Saint Nazaire in 1865, during Maximilian's Empire. The steamers of the Compagnie Générale Transatlantique that sailed from Saint Nazaire to Veracruz were the fastest connection between European ports and Mexico.[117] This line reduced transportation costs for merchandise to 6% of what they had previously been.[118] After the establishment of this line, French merchants began to import directly from Europe, instead of buying from German

[114] Cerutti, *Burguesía, capitales e industria en el norte de México*, 64.
[115] Alfred Jr. Chandler, *The Visible Hand. The Managerial Revolution in American Business* (Cambridge, Ma.: The Belknap Press of Harvard University Press, 1977), 224-239.
[116] United States, "Commercial Relations of the U.S. Cotton Goods Trade to the World. The Cotton Goods Trade in Mexico", ed. Department of State (October, 1885).
[117] British Parliament, "Report of the Year 1906 on the Trade and Commerce of Mexico", ed. Diplomatic and Consular Reports (August, 1907), 57.
[118] From 320 francs to 20 francs the 100 kg. of merchandise. Meyer, "Les Français au Mexique au XIXe Siècle", 63. This is a greater saving than the railroads achieved in land transport. (One of the lines of this company made a stop at Santander, which explains the important migration of Basques to Mexico then).

merchants as they had done previously. This process gained strength during the Franco-Prussian war in 1870, when Barcelonnettes boycotted German wholesale stores. Several Barcelonnette companies established their own export houses in Paris and Manchester. Of over forty German wholesale import stores in Mexico in 1870, only one third were left by 1889. In 1892 the last one closed.[119] From 1880 to 1890, French merchants succeeded in establishing a well-developed entrepreneurial network, which connected international to local businesses, linked through wholesale trade located mainly in Mexico City. Barcelonnettes also undertook a major transformation on the way goods were sold.

A description of the Barcelonnettes' retail stores c.1880 gives us a clear idea of their pre-modern ways of operating, in that they used few modern managerial or accounting techniques. They were simple open rooms divided in two by a large counter. "In front, the boiling and chirping crowd of Indians ... behind, the salesmen (*les commis*), busy, always in a hurry..." Cloth was displayed on shelves without glass. No hierarchy or specialization. "There were no accounting books that recorded the sales of the day, or any control; there was total trust, which rarely, very rarely, was disappointed."[120]

A French journalist in 1904 described the great transformation that had taken place in distribution in Mexico. If by a miracle, he wrote, a Parisian was instantly transported from the Louvre to El Palacio de Hierro, Mexico's first and biggest department store, he would not believe he was so far from the Seine river.

> *The astonishment ... would be greater if he could have an idea of what the commercial houses in Mexico had been like thirteen years before. (...) They were small shops without air or light, like those we can still find in some Spanish provinces, where clients in semi-darkness spent two hours to buy the article they desired, having frequently to come back five or six times in order to get it.*[121]

But in Mexico, just as in Paris, progress arrived. "Those old shops were progressively transformed, when they did not disappear completely, in order to give way to the new establishments."[122]

Old-style retail continued to exist, but by the last decade of the nineteenth century, in larger cities, it disappeared before department stores, similar to those in Europe and the United States, Bon Marché, Harrods, Macys. (Most of the early Mexican companies are still the dominant department stores in Mexico.) Department stores thus evolved from small retail shops

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119 *Ibid.*, 63.

120 François Arnaud, "Description des Magasins", quoted by Proal, *L'Empire Barcelonnette au Mexique*, 104.

121 "Le Premier Grand Magasin Contruit a Mexico", *Le Mexique,* 1904, quoted by Gouy, *Péregrinations des "Barcelonnettes" au Mexique..,* 60-62.

122 *Ibid.*

(*cajones de ropa*) founded decades before and gradually entering wholesale trade. All of them were owned and run by Barcelonnettes (See Table 3).

In Mexico City, then a city of over 300,000 inhabitants,[123] El Palacio de Hierro, El Puerto de Liverpool, Las Fábricas Universales, El Puerto de Veracruz, El Correo Francés and El Centro Mercantil, changed the commercial and even architectural scene. They were the highest buildings in Mexico City in that era.

Around the turn of the century, department stores also opened in other Mexican cities, such as Guadalajara (Las Fábricas de Francia and La Ciudad de Londres), San Luis Potosí (La Ciudad de Londres), and Puebla (Nuevos Almacenes de la Ciudad de México).[124] Some of these were branches of Mexico City stores, others were independent businesses. The former traveling agents who worked on commission (*commis-voyageurs*) became representantives of Mexico City companies.

[123] Mexico, "Estadísticas Históricas de México", I, 24.
[124] Proal, *L'Empire Barcelonnette au Mexique*, 34-60.

TABLE 3. FROM THE "CAJONES DE ROPA" TO DEPARTMENT STORES

	Owner	Type	Founded	Capital	Dissolved
El Palacio de Hierro					
	J. Tron y Cía.	Dry-goods store [a]	1888		
	J. Tron y Cía.	Dry-goods store	Apr/1892	$100,000	May/1898
	El Palacio de Hierro S.A.	Large department stores [b]	1898	$4,000,000	
El Puerto de Liverpool					
Cajón del Puerto de Liverpool	Jean-Baptiste Ebrard	Dry-goods store	1847		
El Puerto de Liverpool	J.B. Ebrard y F. Fortolis	Clothing and Linen [c]	1851		
	Eduardo Ebrard y Cía.	Dry-goods store	Nov/1887	$5,000	Jul/1891
	J.B. Ebrard y Cía.	Dry-goods store	May/1894	$20,000	
	J.B. Ebrard y Cía. Sucesores	Dry-goods store	Apr/1896	$20,000	Jun/1896
	J.B. Ebrard y Cía.	Clothing stores [d]	Apr/1907	$935,000	
Las Fábricas Universales					
	A. Reynaud y Cía.	Dry-goods store	May/1896	$45,000	
	A. Reynaud y Cía.	Dry-goods store	mar/1906	$40,000	
	A. Reynaud y Cía.	Dry-goods store	feb/1910	$102,000	
	Compañía Comercial e Industrial	Business concerns in Paris, Mexico, and Cuba [e]	feb/1909	$967,500	
El Centro Mercantil					
	S. Robert y Cía.	Dry-goods store	May/1897	$150,000	Jun/1901
	S. Robert y Cía. Sucesores	Dry-goods store	Apr/1899	$240,000	Jun/1900
	S. Robert y Cía. Sucesores	Dry-goods store	jul/1908	$2,000,000	
El Nuevo Mundo					
	Max Ma Chaubert	Clothing and Linen	c.1867		
	Max Chauvert y Cía.	Dry-goods store	Jan/1889	$30,000	
	Max Chauvert y Cía.	Dry-goods store	Ago/1893	$222,422	Jul/1894
	Hijas de Max Chauvert	Dry-goods store	jul/1908	$150,000	
	El Nuevo Mundo S.A.	Large department stores	nov/1910	$2,000,000	
La Ciudad de Londres					
	Jauffred y Ollivier	Large Dry-goods stores	c.1867		
	Ollivier y Cía.	Dry-goods store	Abr/1887	$3,000	
	J. Ollivier y Cía.	Linen [f]	Apr/1895	$81,000	May/1899
	J. Ollivier y Cía.	Dry-goods store	Apr/1889	$40,000	
	J. Ollivier y Cía.	Dry-goods store	May/1899	$166,000	
	D. Ollivier y Cía.	Trading businesses	Mar/1899	$200,000	Aug/1900
El Puerto de Veracruz					
	Signoret, Honnorat y Cía.	Dry-goods store	Aug/1888	$12,000	
	Signoret, Honnorat y Cía.	Dry-goods store	Jun/1892	$100,000	
	Signoret, Honnorat y Cía.	Large department stores	Mar/1897	$100,000	Mar/1902

Notes: a) cajón de ropa, b) grandes almacenes, c) ropa y lencería, d) almacenes de ropa, e) casas comerciales, f) lencería, g) negocios mercantiles. Sources: México, SHCP, "Noticia de las Sociedades que se han registrado en la Oficina del Registro Público de la Propiedad y del Comercio, desde el 15 de enero de 1886 hasta el 31 de diciembre de 1910," (Mexico City, 1911), 46-287; Eugenio Maillefert, *Directorio del Comercio del Imperio Mexicano* (Mexico City, 1867); *Almanaque Bouret* (Mexico City, 1897); Patrice Gouy, *Pérégrinations des "Barcelonnettes" au Mexique* (Grenoble, 1980), 135.

The creation of the Palacio de Hierro was very influential in the evolution of commerce in Mexico City, as others soon followed in its path. The Palacio he Hierro was founded in 1888 as a joint-stock company *(sociedad anónima)* by Joseph Tron, who had owned a novelty store in the Portal de las Flores. At first it operated on a small property, but very soon the company began the construction of a huge building, of dimensions previously unknown in Mexico, designed by a French architect. Its name, "the Iron Palace" was a consequence of the deep impression that the first building constructed in Mexico on a steel framework made on the public. Its construction lasted from 1888 to July 1891, and once its doors opened, it appears to have been a highly

profitable enterprise. In 1904, for example, the Societé Financière pour l'Industrie du Mexique, one of its major shareholders, reported that it had generated a profit of 15% (although since most of this was reinvested, the dividend paid was only 6%).[125]

At first, El Palacio de Hierro's directors wanted to organize the company exactly according to the practices followed by the most important department stores in Paris. However, they later decided that it was not a good idea to break so drastically with Mexican traditions. Thus, they decided to keep a counter that separated the employee from the client on the ground floor. But one important innovation was introduced: the fixed price, "a system that was applied and maintained with rigor." It was not easily accepted by the clientele, even though "it is so practical and simple," and helped save so much time otherwise lost in bargaining. "The directors of El Palacio de Hierro had to deploy patience and tenacity in order for this new practice to be adopted."[126]

Despite the modernizing spirit of El Palacio de Hierro's businessmen, they maintained the old recruiting procedures, almost exclusively employing young Barcelonnettes, who were housed and fed on company premises. The fourth and fifth floors of the company's building were used to lodge its employees, most of whom lived and dined there.

In the center of the building, in a huge glass hall, all the operations of receipt and delivery of merchandise were undertaken. Hundreds of packages arrived each day. The reception department took note of the merchandise that arrived and sent it immediately to the various floors and departments where it belonged by elevator. The delivery department organized the orders placed by merchants from all over the country and quickly packaged the products and sent them off. The company owned several horse-pulled-wagons that took goods from the store to the railway station, or any other place in Mexico City, on the day of purchase.[127]

In addition to the main department store building, the Palacio de Hierro owned four other buildings in Mexico City for its workshops. El Palacio de Hierro vertically integrated the production of several articles. Women's clothing and lingerie, ties, shirts, parasols, umbrellas, and furniture were manufactured on its own premises. Furthermore, in 1889 El Palacio de Hierro became the major partner of the Compañía Industrial de Orizaba S.A. (CIDOSA), Mexico's largest textile firm, which owned four textile mills in the Orizaba Valley.

Following the example of El Palacio de Hierro, another major department store, Las Fábricas Universales, opened. It was established in 1887 in Mexico City by Alexandre Reynaud as a wholesale and retail store (*grandes*

[125] *El Economista Mexicano,* July 6, 1904, 401.
[126] *Le Mexique,* 1904 quoted in Gouy, *Péregrinations des "Barcelonnettes" au Mexique*, 60-63.
[127] *Ibid.*

almacenes) of clothes and novelties, but was not fully transformed into a department store until 1909, when its new building was inaugurated. As business expanded, it vertically integrated both its imports and several of its national supplies. In 1896, Alexandre Reynaud became the major partner in the creation of the Compañía Industrial Veracruzana S.A. (CIVSA) to supply the store with several lines of cloth. In 1896 A. Reynaud & Cia. opened a trade business (*maison d'achats*) to export directly from France to the Fábricas Universales in Mexico City. This export company later expanded to supply several stores in the Mexican provinces and in other Latin American countries. It was also crucial for supplying CIVSA with machinery, chemicals, and even personnel from Europe. It also facilitated the placement of CIVSA bonds on the European market.

In January 1909, Las Fábricas Universales inaugurated its new six-story building, designed by a French architect, "with all the improvements that experience has suggested to the architects of department stores in Europe and the United States."[128] A detailed description of the organization of Las Fábricas Universales shows how closely it followed the pattern set by El Palacio de Hierro. As El Palacio de Hierro, Las Fábricas Universales held in its higher floors several bedrooms (each with its own bathroom) for the companies' employees, as well as a dining room, a library, a bowling hall, and other rooms for their leisure and recreation.[129]

2.4. The Modernization of Production

By the end of the 1880s, it had become clear that the Mexican textile industry was operating with such an outdated technology and organization that those who modernized it would reap great profits. In 1888, the journal "Le Courrier Français" described the situation of the industry and made an appeal to textile manufacturers from Alsace and Lorraine to come to Mexico to install an industry with the perfection and economic organization that existed in France. "We can predict a prosperity greater than they had before the annexation to Germany," since "it would not be difficult to rival the old mills that seek only to survive through merging."[130]

Thus it was clear that investing in more up-to-date textile mills could yield high profits. The problem, as it often is in underdeveloped economies, was to raise the capital to make the new investments. The scant development of Mexico's financial system —both in terms of the banking system and of the stock exchange— despite its Porfirian growth, narrowed the circle of those who could make such investments.[131]

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[128] Proal, *L'Empire Barcelonnette au Mexique*, 34.
[129] "La France au Travail," *Boletín Financiero y Minero de México*, July 14, 1928.
[130] *Le Courier Français,* September 3, 1888.
[131] See Haber, "Financial Markets and Industrial Development: A Comparative Study of Governmental Regulation, Financial Innovation, and Industrial Structure in Brazil and Mexico 1840-1930", 148.

Barcelonnette immigrants, owners of important commercial enterprises, had not only the liquidity necessary to make such investments, but also the right connections with banks to obtain credits. Several Barcelonnettes were members of the board of directors of Mexico's most important banks.[132] Such relationships seem to have been crucial in the Porfirian era to have access to credit, since textile firms that had inside relationships with a bank had higher growth rates than those that did not. [133] Although Porfirian banks do not seem to have financed major textile mill investments, they were important for loosening liquidity constraints on day-to-day operations. The capital necessary for the modernization of textile production came mostly from the profits Barcelonnette dry-good merchants had accumulated from their commercial businesses. Thus, the Barcelonnette network helped ease capital constraints, both through combining resources with Barcelonnette partners at a lower risk due to relational contracting and through easier access to bank credits.

In Mexico's textile sector, in order to obtain the necessary capital and to guarantee enough sales, several wholesale stores joined as partners to create textile mills large enough to take advantage of economies of scale.[134] An increase in the scale in production was coupled with the formation of limited liability joint-stock companies (*sociedades anónimas)*. Companies of this type were considerably larger, in terms of spindles, than those owned by individuals.[135] In general terms, joint-stock companies were also more able to modernize their machinery, since they held a lower proportion of old spindles and looms than individually-owned companies.[136]

The creation of textile conglomerates was not only ruled by efficiency goals, it also involved strategies to obtain monopolistic advantages by excluding competitors. In 1884, attempting to establish a monopoly of purchases and distribution, the most important French dry-goods warehouses in Mexico formed a syndicate to buy the totality of the production of the

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[132] The board of directors of the Banco Nacional de México, the Banco de Londres y México, the Banco Central Mexicano, the Banco Hipotecario de Crédito Territorial Mexicano, the Banco de Morelos, and the Compañía Bancaria de París y México included several prominent Barcelonnettes. Proal, *L'Empire Barcelonnette au Mexique*, 64-65; *Mexican Year Book,* 1914, 38-41.

[133] Maurer, "Institutional Change and Economic Growth: Banks, Financial Markets, and Mexican Industrialization, 1878-1913", 39-40.

[134] Economies of scale exist when increasing all the inputs of production (labor, capital, raw materials) by the same factor causes production to increase by an amount greater than that factor.

[135] In 1912 mills operated by limited liability companies had on average 12,592 spindles each, in contrast to only 4,224 spindles, other mills had. Only 3.4% of the spindles operating in mills owned by limited liability companies were considered old in contrast with 7.5% of spindles in companies of other types. AGN, DT 5/4/4 "Manifestaciónes presentadas por los fabricantes de hilados y tejidos de algodón durante enero a junio de 1912". More detailed information can be found in Aurora Gómez-Galvarriato, "The Impact of Revolution: Business and Labor in the Mexican Textile Industry, Orizaba, Veracruz 1900-1930", (Ph.D. diss. Harvard University, 1999),82.

[136] The Haber and Razo estimates of the effects of having a corporate form on productivity show that joint-stock companies had higher total factor productivity growth when product was measured by its value. Yet, they appeared to have a lower productivity than individually-owned firms when output is measured by units of cloth. This might be so because corporate firms generally produced higher quality products with a higher value per unit of physical output. Razo, "The Rate of Productivity in Mexico, 1850-1933: Evidence from the Cotton Textile Industry".

country's textile mills. Soon after, three smaller French companies, Signoret, Honnorat and Co., Lambert, Reynaud and Co., and Garcin, Faudon and Co., unable to supply their stores, broke the monopoly in 1886, buying the Cerritos mill in Orizaba and establishing the Compañía Manufacturera de Cerritos S.A.[137]

The success of the strategy followed by these companies of getting directly involved in textile production interested the owners of the largest commercial companies, who soon joined them as partners in the creation of the Compañía Industrial de Orizaba S.A. (CIDOSA) in 1889. These were J. Ollivier and Co., J.B. Ebrard and Co., and J. Tron and Co. They invited the Escandón Arango family and Thomas Braniff into their partnership in order to incorporate the two other mills that operated in the Orizaba Valley, Cocolapan and San Lorenzo. The Escandóns did not accept, but Thomas Braniff, a Welsh North American who was one of the richest men in Mexico, did, and San Lorenzo became part of CIDOSA. Brannif's entry into the partnership was very valuable to the company, since he was also the president of the Ferrocarril Mexicano, the railway line that connected Orizaba to the port of Veracruz and Mexico City.[138] In 1900, CIDOSA acquired Cocolapan from the Escandóns for 670,000 pesos. In the following years CIDOSA invested a further 489,167 pesos in rebuilding most of the factory, acquiring new machinery, and adapting the mill to the use of hydroelectric power.[139]

The objective of CIDOSA was not only to acquire and modernize mills already in place, but also to build a new and large one with state of the art technology. The Río Blanco mill was inaugurated in October 1892 by President Porfirio Díaz. Its dimensions, dwarfed all other existing companies, and were large even by international standards. The waters of the Río Blanco river were used to provide hydraulic power for the mill. The company also obtained a concession to use the nearby Rincón Grande waterfall, where it built a hydroelectric power plant, opened in 1897.

As El Palacio de Hierro set an example in commercial practices, so CIDOSA did in production. After CIDOSA was created, several owners of dry-goods stores decided to enter textile production by becoming partners of manufacturing companies. The Compañía Industrial Veracruzana S.A. (CIVSA), a company we shall analyze in more detail in the next chapter, was founded in 1896 by another set of important Barcelonnette dry-goods firms: A. Reynaud and Co., S. Robert and Co., F. Manuel and Co., J. Jacques and Co. and Paulino Richaud. CIVSA built a new factory, the Santa Rosa, inaugurated in 1898. Santa Rosa was then the second largest mill in the country, and, like

[137] Meyer, "Les Français au Mexique au XIXe Siècle."., 64; D' Owler, "Las Inversiones Extranjeras.", 1116; Luis Everaert, Luis Evaraert, *Centenario 1889-1989* (Mexico City: Compañía Industrial de Orizaba S.A., 1989)., 60.
[138] Evaraert, *Centenario 1889-1989*, 64-67.
[139] Nora E. Pérez-Rayón, *Entre la tradición señorial y la modernidad: La familia Escandón Barrón y Escandón Arango* (Mexico City: Universidad Autónoma Metropolitana, Unidad Azcapotzalco, 1995), 140-41.

Río Blanco, had the latest technology, including hydroelectric power (See Table 4). The formation of several other textile companies of a similar nature took place over the following years (see Table 4).

Textile firms profited from gains derived from economies of scale and scope. They integrated spinning, weaving, and finishing, often specializing each of their mills in certain parts of the production process and in the production of specific types of cloth. Their mills ran on hydroelectric power, and produced on a larger scale than the country's average. They acquired an important share of the market, which they supplied through their associate commercial companies that in turn distributed their products on a national scale. They produced a wider variety of cloth than older mills. Whereas until 1878 Mexican mills manufactured almost exclusively yarn and coarse cloth (*manta)*, these new firms introduced the production of higher quality cloth. Their production went from producing the traditional *manta*, to bleached and printed cloth, such as percale, cretonne, muslin, organdy, drill, and flannel.[140]

The new industrial firms were limited liability joint-stock companies, not family enterprises like the mills they acquired. They were operated by managers under the close supervision of a board of directors formed by the leading executives of the commercial companies that were their major shareholders. Since stockowners, leading executives, and managers were mostly Barcelonnettes, ethnic ties and family kinship bound them together.

An important share of the Porfirian textile industry's growth took place as part of this process of organization. The companies listed in Table 5 were responsible for 81% of the national growth in the number of spindles from 1878 to 1893, and for 46% from 1893 to 1912. CIVSA and CIDOSA alone accounted for 45% of the growth in spindles from 1878 to 1893, and 18% of growth from 1893 to 1912.

[140] Archivo de la Compañía Industrial Veracruzana, Ciudad Mendoza, Veracruz (CV), Price List, 1907. It includes 74 different items.

TABLE 4. MAJOR TEXTILE COMPANIES IN 1912

COMPANY	FOUNDED	TEXTILE MILLS	STORES OWNED BY ASSOCIATES.	ASSOCIATES
Compañía Industrial de Orizaba S.A:	1889	Cerritos Cocolapan San Lorenzo Río Blanco	El Palacio de Hierro El Puerto de Liverpool La Ciudad de Londres Francia Marítima El Gran Oriental El Puerto de Veracruz El Correo Francés	Tomás Braniff, J. Ollivier y Cía., J.B. Ebrard y Cía, J. Tron y Cía., Signoret, Honnorat y Cía., Lambert, Reynaud y Cía., Garcin, Faudon y Cía., Juan Quinn.
Compañía Industrial Veracruzana S.A.	1896	Santa Rosa El León (1920)	Las Fábricas Universales La Ciudad de México El Centro Mercantil La Reforma del Comercio	A. Reynaud y Cía, S. Robert y Cía, F. Manuel y Cía, P. y J. Jacques y Cía., y Paulino Richaud.
Compañía Industrial de San Antonio Abad S.A:	1892	San Antonio Abad La Colmena Barrón Miraflores	La Reforma del Comercio	Iñigo Noriega Adolfo Prieto Agustín Garcin Enrique Monjardin
Compañía Industrial de Atlixco S.A.	1902	Metepec	La Reforma del Comercio	B. Rovés y Cía, A. Richaud y Cía, S. de Juanbelz y Cía, Solana Barreneche Cía, Antonio Basagoiti, Luis Barroso Arias, Agustín Garcin, Leopoldo Gavito, Felix Martino, Benjamín Ochoa, Iñigo y Constantino Noriega, Sotero de Juanbelz, Emilio André, Eduardo Vega y Santiago Aréchaga
Compañía Industrial Manufacturera S.A.		Hércules San Antonio La Purísima La Sultana La Teja Río Grande	Las Fábricas Universales La Reforma del Comercio La Ciudad de Londres (Guad.)	Agustín Garcin, Joseph Signoret, Brun, Lerdo de Tejada, (1905) Cuzin, Fortuol Bec, Lèbre and Brun
Compañía Industrial de Jalisco/Compañía Industrial de Guadalajara S.A:	1899	Río Blanco (Jalisco) Atemajac La Escoba	La Ciudad de Londres (Guad.) Las Fábricas de Francia (Guad.)	Fortoul Chapuy y Cía., Gas y Cía., Laurens Brun y Cía., Bellón Agoneca y Cía., E. Lèbre y Cía.
Compañía Industrial de San Ildelfonso S.A:		San Ildelfonso	El Puerto de Liverpool Francia Marítima	J.B. Ebrard, H. Reynaud and E. Pugibet
J. y L. Veyan y Co.	1898	La Magdalena Santa Teresa Río Florido	El Centro Mercantil La Valenciana	Meyrán Donnadieu & Co. (1912) Adrien Jean and Luis Veyan

Sources: See Table 2 and Jorge Durand, *Los Obreros de Rio Grande* (Zamora, 1986), 54-55, 62; Guillermo Beato, "La Formación (y relaciones familiares de la burguesía de Jalisco durante el siglo XIX" (Mimeo, 1981), 48; Mario, Trujillo, "La Fábrica la Magdalena Contreras (1836-1910)," in Carlos Marichal and Mario Cerutti comps., *Historia de las Grandes Empresas* (Mexico City, 1997), 265-270; Luis Everaert, *Centenario 1889-1989* (Querétaro, 1990), 59-67; CIVSA, Actas de la Asamblea General, November 24, 1896.

In the textile industry in the north of Mexico, a similar process seems to have taken place. Modernization, both in terms of an increase in scale and in the formation of limited liability companies, was important there. But in this region, where Barcelonnettes had no influence, the process was undertaken mainly by Mexicans and Spaniards from Santander in the north of Spain. In Coahuila, both industry growth and increase in scale were accompanied by the creation of several joint stock companies, the Compañía Industrial de Parras S.A., the Compañía Industrial Saltillera S.A., the Compañía Manufacturera de Río Bravo S.A., the Buena Fé S.A. and La Fé S.A. These companies owned 85%

of total spindles in the state in 1912. In 1902 the Compañía Industrial del Norte S.A. was created under the leadership of Evaristo Madero to distribute the products of four textile mills in the states of Coahuila and Nuevo León.[141] This company worked as a cartel in which each firm agreed to provide the company weekly with a specific amount of cloth, and not to produce more than the specified amount.[142]

Transformation of the textile industry during the Porfiriato was not universal. In general terms a process where modern mills replaced old-style ones seems to have taken place. In the South and in states such as Colima, San Luis Potosí, and Aguascalientes, where the scale of production was small and no joint-stock companies were formed, textile mills practically disappeared.

Yet many old-style textile mills survived. This is particularly remarkable in the states of Puebla and Tlaxcala, which acquired an important and increasing share of the national industry. All mills in those states, with the exception of Metepec (owned by CIASA), continued to be family-run businesses. As Leticia Gamboa has explained, this remained true until the 1920s. Even when mills in this region became joint stock companies, in the early 1930s, it was more a formal than a real change, since they continued to be family-run.[143] Their size, in terms of spindles per mill, grew modestly. Nonetheless, the industry in the Puebla-Tlaxcala region was able to modernize its machinery.[144]

The Porfirian modernization of textile production had three major characteristics: (1) an increase in scale; (2) a modernization of machinery and utilization of electricity as a major source of power; (3) and a merger of mills into joint-stock companies owned by major textile distribution companies, generally the property of Barcelonnettes, except in the northern states.

Labor productivity and total factor productivity substantially increased in the last two decades of the Porfiriato. According to some estimates, labor productivity grew by 5.5% per year when output is measured in real value, and by 2.6% when measured by physical units of output. Total factor productivity increased by 4.5% and 1.5% per year respectively. The fact that productivity

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141 Cerutti, *Burguesía, capitales e industria en el norte de México*, 231-232.

142 Archivo General del Estado de Nuevo León, protocolo de Francisco Pérez, November 1902, ff. 175-178 quoted in *Ibid.*

143 In 1921 there were only three joint-stock companies in Puebla, besides the Compañía Industrial de Atlixco S.A. (Metepec), the Atoyac Textil S.A. formed in that year by the Quijano y Rivero and the Rivero Quijano y Cia, the small Fábrica de Hilados y Tejidos La Unión S.A., and Fábrica de Hilados y Tejidos La Teja S.A. Nevertheless, their stock continued to be owned, and the companies managed, by family members. Leticia Gamboa, "De las Sociedades de Personas a las Sociedades de Capitales: los Quijano Rivero en la Industria Textil de Puebla, 1864-1921," in *Empresas y Empresarios Textiles de Puebla*, ed. Leticia Gamboa and Rosalinda Estrada (Puebla: Universidad Autónoma de Puebla, 1986), 11-12,34-38.

144 Mills in Puebla and Tlaxcala had only 2.2% of old spindles and 4.1% of old looms operating in 1912 in contrast to a nacional average of 5.5% and 9.2% respectively. AGN, DT 5/4/4 "Manifestaciónes presentadas por los fabricantes de hilados y tejidos de algodón durante enero a junio de 1912". More detailed information can be found in Gómez-Galvarriato, "The Impact of Revolution: Business and Labor in the Mexican Textile Industry, Orizaba, Veracruz 1900-1930", 82.

estimates are higher when measured by the value of production rather than by meters of cloth or kilos of yarn show that companies were improving both the quantity and the quality of their products per unit of input.[145]

Greater mill scale was concomitant with the reduction in transportation costs brought about by the railroad and the abolition of the *alcabalas*. In the 1890s, for the first time in Mexico it became possible to produce for a national market. As a direct result, Río Blanco, Santa Rosa, and Metepec almost tripled the size of the largest mills that existed in 1878. While the number of mills increased, average mill size grew even more.

In 1880 the average number of spindles per mill in the United States was 14,092, while in Mexico it was 2,918, a small figure even when compared with that of the southern states of the U.S (3,367).[146] In order to produce with technology like that used in the United States and profit from economies of scale, mills had to increase their size. In 1878, 33% of mills had fewer than 1000 spindles, a figure that declined to 21% by 1893 and 2% by 1912.[147]

During the Porfiriato, mills not only grew in size, but also modernized. Whereas in 1893 new spindle represented only 37% of total spindles in the industry, by 1913 they accounted for 96% of them. For looms, these proportions were 43% and 93% respectively.[148] Furthermore, mills underwent a transformation in their power source, changing from water power to electricity. Given the scarcity of coal in the country, hydroelectric power produced important savings, and was therefore rapidly introduced. At first, electricity in the mills was used only for lighting; by 1889, there were already several mills in Mexico using electricity for this purpose. Then mills started using electricity for power.

In 1894, only two years after the installation of the first electric generators to power textile mills in the United States, San Ildefonso in Mexico City began to move its machinery using electric power.[149] Two years later, CIDOSA supplied electric power to its four mills. In Puebla, the San Antonio

[145] Razo's and Haber's panel regressions for the period from 1850 to 1913 show that in fact transportation and communication changes in the 1880s increased the minimum efficient scale of production Razo, "The Rate of Productivity in Mexico, 1850-1933: Evidence from the Cotton Textile Industry", 499.

[146] In New Hampshire, Maine, and Massachusetts, the average number of spindles per mill in 1880 was 25,004. United States, "Cotton Manufactures. Report of the Tariff Board on Schedule I of the Tariff Law", ed. 62nd Congress 2nd Session House of Representatives (1912). Volume I, 169.

[147] Razo, "The Rate of Productivity in Mexico, 1850-1933: Evidence from the Cotton Textile Industry", 507. Their estimates show positive and significant economies of scale for 1893 on the order of 33 per cent, but not for the following years for which data are available. This could mean that those firms that did not increase size went out of business, and no longer appeared in the censuses.

[148] The data available tells whether the machinery was new or old, unfortunately it does not indicate what was precisely understood by those terms. Mexico, "Estadísticas de la República Mexicana"; ———, "Anuario Estadístico de 1893"; México, SHCP, Boletín de Estadística Fiscal, several issues, México, Mexican Year Book 1908; 1912: AGN, DT 5/4/4 "Manifestaciónes presentadas por los fabricantes de hilados y tejidos de algodón durante enero a junio de 1912"; 1913: AGN, DT, 31/2/4, "Estadística semestral de las fábricas de hilados y tejidos de algodón de la república mexicana correspondiente al semestre de 1913".

[149] Keremitsis, *La industria textil mexicana en el Siglo XIX*, 102 and Ernesto Galarza, *La industria eléctrica en México* (Mexico City, 1941) 12.

Abad mill and the Compañía Industrial de Atlixco began to run on electricity in 1896 and 1899 respectively. In 1898, when Meyran, Donnadieu and Co. acquired La Magdalena Contreras, they built a hydroelectric power plant that provided electricity not only for its mill, but also to supply La Hormiga, La Alpina, and the Loreto paper mill.[150]

Many other mills followed. Textile mills soon became a major producer of electricity in the country. San Ildefonso, CIVSA, and CIDOSA, like most other textile mills in Mexico, produced their own electricity mainly through hydroelectric generators installed at the waterfalls they held under concession.[151] By 1900 textile mills owned 44% of the country's total installed capacity in electricity, which was 22,340 kws. The Orizaba Valley textile industry alone owned 29% of this capacity (6530 kws).[152]

Modernization and an increase in scale followed the merging of textile mills into conglomerates and concentration in the industry's structure. The eight textile conglomerates founded by the turn of the century owned only 12% of the mills but 41% of the spindles, 45% of the looms, and 60% of the printing machines of the entire industry.[153] These companies employed 38% of the labor force in the industry, and paid 40% of the taxes. CIDOSA and CIVSA alone accounted for 20% of the total sales in the industry, and employed 18% of the labor force. Barcelonnettes held the majority of the shares in most of these. By 1901 the Barcelonnettes owned 28 out of a total of 125 mills (19%); and paid more than one third of the industry's taxes.[154] México's textile industry concentrated from 1878 to 1902. Whereas in 1879 the four biggest mills produced 16% of total sales, by 1902 this figure had risen to 38%. Thereafter a slight deconcentration seems to have occurred, since this figure declined to 27% by 1912.[155]

In spite of the concentration of the textile industry in terms of its industrial structure, the process of geographic concentration was not very strong, and seems to have slowed down after 1893, as the industry showed the same degree of geographic dispersion in 1909 and 1893. Compared to its American counterpart, the Mexican textile industry continued to be relatively dispersed. While in the United States we see a great number of small firms clustered around specific regions, in Mexico we find a smaller number of firms that are geographically scattered.

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150 Trujillo, "La Fábrica Magdalena Contreras (1836-1910)", 265-270.

151 Ernesto Galarza, *La industria eléctrica en México* (Mexico City: Fondo de Cultura Económica, 1941), 12-14.

152 Fernando Rozenzweig, *El desarrollo económico en México 1800-1910* (Mexico City: El Colegio Mexiquence and ITAM, 1989), 425.

153 These include the companies listed in Table 4 except La Compañía Industrial de San Ildefonso, that produced woolens, and adding up La Hormiga S.A. AGN, DT 5/4/4 "Manifestaciónes presentadas por los fabricantes de hilados y tejidos de algodón durante enero a junio de 1912".

154 Gouy, *Péregrinations des "Barcelonnettes" au Mexique*,64.

155 Herfindahl index was 0.209, rose to 0.0637 in 1902, and then declined to 0.0343 in 1912. Haber, "Financial Markets and Industrial Development: A Comparative Study of Governmental Regulation, Financial Innovation, and Industrial Structure in Brazil and Mexico 1840-1930",163.

Reduction in transportation costs generated a more radical transformation in cotton production than in textile manufactures in terms of geographical distribution. After 1892, between 80% and 90% of cotton produced in Mexico was grown in La Laguna district, a region located in the states of Durango and Coahuila, linked to the rest of the country in 1888 by the Mexican Central Railway.[156] Once railways were built, irrigation improvements, together with the introduction of the American cotton seed, enabled this region to profit from its comparative advantages for cotton production, including climatic conditions unsuitable for the development of the boll weevil that damaged cotton crops elsewhere in Mexico. [157]

Data on manufacturing machinery imports to Mexico from the United States and Great Britain tells of an extraordinary growth of industrial investment in Mexico during the Porfiriato, compared to the other major Latin American countries. The pace of Mexico's industrial growth was faster than that of Brazil, Argentina and Chile up to 1902, after that year Mexico's growth rate of manufacturing machinery imports became negative, while it rose in the other three countries. This must have been a result of the end of the secular depreciation of the price of silver in 1902, the adoption of the gold standard in 1905, the 1907 financial crisis, and political troubles starting in 1906, turning into a civil war by 1910.[158] Mexico's cotton textile industry continued being the most important in Latin America until 1905 when it was surpassed by Brazil.[159]

[156]Manuel Plana, *El reino del algodón en México* (Monterrey: Universidad Autónoma de Nuevo León, Unversidad Iberoamericana, Plantel Laguna, Centro de Estudios Sociales y Humanísticos de Saltillo, 1996), 123-128.
[157] Graham W.A. Clark, *Cotton Goods in Latin America, Part I*, ed. U.S. Bureau of Foreign and Domestic Commerce, vol. 31, *Special Agent Series* (Washington D.C.: Washington Printinting Office, 1909), 27.
[158] Gómez Galvarriato, "Was It Prices, Productivity or Policy? Latin American Industrialization after 1870",9-10.
[159] Stephen Haber, "The Political Economy of Industrialization", in *The Cambridge Economic History of Latin America*, ed. John H. Coatsworth Bulmer-Thomas Victor, and Roberto Cortés Conde (New York: Cambridge University Press, 2006), 542.

Conclusions

Very few countries in the world share with Mexico such a long and continuous history of textile manufacturing. Mexico is one of the two present-day Latin American countries where *obrajes* acquired large economic importance during the 16th century, the other being Ecuador. When *obrajes* began to falter, a putting-out system, similar to that which flourished in pre-industrial Europe, appeared in Mexico, Tlaxcala and Guadalajara, but nowhere on more solid grounds than in Puebla. Colonial regulations granted substantial protection to New Spain's textile manufacturing.

After 1802 the good times for domestic cotton textile manufacturing ended as Spanish imports arrived once again to the colony. Hardship for domestic cotton grew following 1805 when Spanish policy allowed neutral powers to trade directly with the Indies, allowing textile imports to surge. The wars of Independence (1810-1821) further increased the problems. Mexican textile manufacturers had to cope with even though actual violence rarely struck those regions in which the industry was located. Although the cotton textile sector was heavily damaged, it survived the three decades of foreign competition and Insurgencia. Even in the midst of foreign competition some 6,000 looms were in operation in Puebla.

Important changes had been taking place in the world since 1750, to which New Spain became suddenly exposed. First, European policy moved away from anti-global mercantilism and towards pro-global free trade. Second, a world-wide transport revolution reduced transport costs and integrated world commodity markets. An third, important technological changes in the manufacturing production, first in England and latter in other core economies, led to a rapid expansion of their industrial output and productivity, sharply reducing their production costs. The price of manufactures relative to agriculture and other natural-resource based products fell everywhere. The cost of British cottons fell by as much as 70% between 1790 and 1812.[160]

While Mexico had to deal, like the rest of the poor periphery with the de-industrialization forces that came about as a result of the Industrial Revolution, it did better on this score than most countries around the periphery. In fact, Mexico's textile industry was able to survive, and even prosper. Five conditions explain Mexico's early industrial growth, relative to other countries in the periphery. First, its relatively large population provided the consumer market necessary for industry to develop. Second, during this period, there was a relatively small improvement in Mexican terms of trade, compared to those experienced by most nations in the periphery, remained stagnant through out this time. Third, in comparison with other countries in

[160] Salvucci, *Textile and Capitalism in Mexico: An Economic History of the Obrajes*, 156

the periphery, Mexico maintained better wage competitiveness *vis* a *vis* the core, based on a better relative agricultural productivity performance. Fourth, a tradition of artisan textile production was able to generate political support for protectionist policies. And Mexico had the autonomy to implement these policies, unlike many other countries in the periphery that cold not as a result of their colonial status. Finally, the high transport costs resulting from the concentration of population far from the sea in rugged terrain provided additional protection.

Between 1830 and 1840, the national government, under the influence of statesmen such as Lucas Alamán and industrialists such as Estevan de Antuñano provided both tariff protection and means of finance through a public development bank, the Banco de Avío. Mexico's industrialists established the first mechanized mills in the 1830s, around the same time that the Lowell mills were built, and only twenty years after the first mechanized mill was established in the United States. Mechanized textile mills appeared in Mexico earlier than any other country outside of Europe and British North America, with Egypt as a notable exception. Brazil, the other early industrializer in Latin America during this period, established its first mills in the 1840s. Yet by 1853 it had only 8 mills with 4,500 spindles, whereas ten years earlier, Mexico's textile manufacture included 59 mills with more than 100,000 spindles.

Alamán's industrial policy required lasting, stable political conditions established on the basis of well-organized public finances, and effective system of tax collection, and a gradual transition to an era of steady economic growth. Unfortunately, political instability, cause and consequence of a permanent disorder in public finances, made these requirements impossible to attain in Mexico during most of the 19th century. Political instability generated institutional frailty under which it was impossible for the government to implement a cogent industrial policy.

The Mexican government's fiscal and military weakness and the concomitant constant changes of government made it impossible to undertake a trade policy focused on the promotion of industry. The weakness of national governments, both in terms of their capacity to implement policies and in terms of their lack of control over regional governments, made smuggling inevitable. For governments in this period, short-term objectives always prevailed over long-term goals. Given the precarious situation the government faced, it was not in a strong enough of a place to foster policies that would have increased government revenues in the long run, such as promoting industry and economic growth. It needed resources immediately in order to survive, and tried to obtain them at whatever cost was necessary.

Another problem the textile industry faced during this period was the backwardness of financial institutions. In addition to the problems industrial expansion faced from the supply-side, the slow growth of domestic demand

must also have placed a considerable constraint on the growth of the textile industry. Despite these difficulties, the cotton industry was still able to growth during this period.

The industry of cotton cultivation dispersed throughout Mexico, from only five states in 1843 to twelve states by 1879. The geographically scattered nature of Mexico's textile industry development contrasted not only with that of the United States but also with that of Great Britain or Spain, where the industry also expanded in a more regionally concentrated pattern. Regions with comparative advantages over others in Mexico in terms of cotton, energy, and labor costs, did not concentrate the industry as they did in the United States. Relatively efficient mills coexisted with highly inefficient ones. Furthermore, regional dispersion reduced the externalities a "big push" might have generated if the industry had concentrated in particular regions.

A more effective government could have allowed a stronger industrialization process in Mexico during the first three quarters of the 19th century. However, what Mexico achieved was substantial when placed in comparative terms with other countries in the periphery. In 1879 Mexico produced around 60 million square meters of cloth, and import 40 million squares meters. Domestic production thus claimed 60% of the local market, which compares well to that figures from countries like India (35-45% in 1887) or the Ottoman empire (11-38% in the 1870s), which had been important textile producer at the beginning of the 19th century.

A fundamental change in the economic environment took place in Mexico during the Porfirian regime. The principal obstacles that had hindered the development of the textile industry during the nineteenth century had disappeared. As a result, the textile industry, like most other sectors, grew at an unprecedented rate. Furthermore, in response to the new systems of communications and transportation in the country, a dramatic transformation in both distribution and production of textiles took place.

The coming of modern transportation and communications—the railroad, the telegraph, the steamships, and cable—brought about major changes in the production and distribution of goods and in firm's strategies and structure around the world. Enterprises grew in size and scope and they had to adapt both their management and finance to the new situation. In the United States, businesses personally managed by their own gave way to the managerial business enterprise. Ownership and management separated, and the expanded enterprises came to be operated by teams of salaried managers who had little or no equity in the firms. Mass marketing and modern mass production appeared. In other countries, such as Great Britain, different types of firms and strategies emerged which adapted better to their institutional, social, political, and cultural environments in contrast to the American large-scale corporate model. One salient characteristic of the transformation of

Mexico's business institutions during this period was the important role played by entrepreneurial networks.

In Mexico the revolution in the production and distribution of textiles was carried out largely by several French entrepreneurs from the valley of Ubaye, who had established themselves in Mexico in previous decades and developed important companies in the dry-goods traded supported by a network of fellow countrymen, many of whom they had helped to bring to Mexico to work in their businesses. By the 1890s the network had grown large enough to provide for a wide range of loose ties among its members. Many of them had built their own firms and become rich enough to be able to invest important sums of capital: The Barcelonnette network was ruled by strict social norms, reassuring entrepreneurs that their partners, customers, and employees would not defraud them to a much larger extent than formal institutions could. It was thus crucial in the transformation of small dry-goods shops into large wholesale and retail department stores, as well as in the transformation of the small an outdated textile mills prevailing until the 1880s into the large, vertically integrated state-of-the-art factories that began to appear in the 1890s.

In Mexico, the expansion and modernization of the textile industry during the Porfiriato occurred both after the transformation in commercial distribution and as a result of them, for the capital required to expand and modernize the mills came from commercial undertakings. Dry-goods commerce evolved into department stores that acquired a major share of the retailing and wholesaling textile business, and later became founders and major shareholders of the most important textile manufacturing firms in Mexico. From 1880 to 1890, French merchants succeeded in establishing a well-developed entrepreneurial network, which connected international to local businesses, linked through wholesale trade located mainly in Mexico City. Barcelonnettes also undertook a major transformation on the way goods were sold.

The Porfirian modernization of textile production had three major characteristics: (1) an increase in scale; (2) a modernization of machinery and utilization of electricity as a major source of power; (3) and a merger of mills into joint-stock companies owned by major textile distribution companies, generally the property of Barcelonnettes, except in the northern states.

Mexico's industrial growth was faster than that of Brazil, Argentina and Chile up to 1902, after that year Mexico's growth rate of manufacturing machinery imports became negative, while it rose in the other three countries. This must have been a result of the end of the secular depreciation of the price of silver in 1902, the adoption of the gold standar in 1905, the 1907 financial crisis, and political troubles starting in 1906, turning into a civil war by 1910. Mexico's cotton textile industry continued being the most important in Latin America until 1905 when it was surpassed by Brazil. By

1908 around 78% of cotton textile consumption was supplied by domestic production.

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