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The Political Economy
of Protectionism
The Mexican Textile Industry,
1900–1950

Aurora Gómez-Galvarriato

10.1 Introduction

After several years of closing up their economies from international trade as a means of fostering internal industrial development, several Latin American nations realized that their industrial sectors, which had prospered under protection, were not capable of surviving international competition. Once it became clear that it was too costly or even impossible for a country to continue pursuing protectionist policies, it also appeared that the sacrifices they had undertaken to acquire industrial development had been in vain.

The backwardness of Latin American industry has generally been blamed on protectionist policies, which, for their part, have been generally considered the result of ideology. In particular, this backwardness is said to be a result of the development of the dependentist and structuralist schools of economic thought sponsored by the Economic Commission for Latin America (ECLA) from the 1940s to the 1970s. This explanation has often been complemented by the development of economic models describing how a government can be captured by interest groups to generate such

policies. However, very few historical studies have been undertaken to find out how protectionist policies and industrial backwardness came about.

From Coatsworth and Williamson (2002) we know that Latin American tariffs were far higher than anywhere else in the century before the Great Depression. Yet they experienced a huge surge during this period, as they did in the rest of the world. However, while most countries decreased tariffs earlier on, Latin America persisted in its protectionism for several decades after World War II. What were the forces driving this process?

This paper addresses this question from a microperspective, by studying the evolution of international competitiveness and protection levels in Mexican textile manufactures, which is a paradigmatic example of an overprotected industry unable to compete internationally. By 1990 most mills in the traditional Mexican textile regions of Puebla, Tlaxcala, and Veracruz were on the verge of bankruptcy, if they had not already closed. A visit to several of them evidenced the use of outdated technology, which in some cases dated back to the nineteenth century.

What happened to the Mexican textile industry? What were the causes of its demise? Was it always as noncompetitive internationally as it appeared by the mid-1980s? If not, how did it evolve to become so? Why?

Because data on the textile industry at the national level are not rich and accurate enough to provide answers to many of these questions, I am going to study the case of a particular firm, the Compañía Industrial Veracruzana S.A. (CIVSA). This firm owned one of the biggest and most modern mills operating in Mexico during Porfirian times (1880–1910). Although operating until the present time with great struggle, it is but a shadow of what it used to be. Through this study CIVSA's archival material will be complemented with information available on a national basis, in order to set it in a more general context.

The plan of the paper is the following: First, a brief overview of the textile industry of the period is provided to give an idea of how representative CIVSA was. Then, CIVSA's prices, costs, and productivity levels will be contrasted with those of the United States and Great Britain, to make an assessment of CIVSA's international stature. Information to carry out this comparison was available for 1911, providing an accurate picture of CIVSA's situation at the end of the Porfiriato. An analysis of the reasons behind CIVSA's relative production cost level is carried out to get a full picture of CIVSA's competitive situation from an international perspective around 1911. Then, the evolution of CIVSA's labor productivity from 1900 to 1930 will be explored. This will give an idea of how the institutional changes that came about with the Revolution affected this variable. A study of the evolution of tariff protection for the textile industry will be undertaken in order to understand how levels of protection changed and interacted with productivity and the level of competitiveness.

10.2   CIVSA and the Mexican Textile Industry: A General Background

The Compañía Industrial Veracruzana S. A. was founded in 1896. Its textile mill, Santa Rosa, started working in 1898 (by that time there were around 120 cotton textile mills operating in Mexico). The first textile mills were established in Mexico in the 1830s and slowly developed through the nineteenth century, having to face Mexico's difficult political and economic conditions. Between 1890 and 1910 the textile industry experienced an era of rapid modernization and expansion as a result of political stability, greater economic growth, and the modernization in communications and transportation that the arrival of railroads and the telegraph in the previous decade had brought about. During this period, several textile corporations like CIVSA were founded. They built new mills and modernized old ones, enlarged the scale of production, introduced hydroelectric power to run the mills, and introduced state-of-the-art technologies of production.

This process also meant a concentration of the industry, since due to a slow development of the financial sector only a few companies could undertake the investment required to carry out such transformation.[1] Eight textile conglomerates founded by the turn of the century owned only 12 percent of the mills but 41 percent of the spindles, 45 percent of the looms, and 60 percent of the printing machines of the entire industry. These companies employed 38 percent of the labor force in the industry and paid 40 percent of the taxes. CIDOSA (13.5 percent) and CIVSA (6.3 percent) alone accounted for 20 percent of the total sales in the industry and employed 18 percent of the labor force. In 1912, CIVSA's Santa Rosa mill was the second largest mill operating in Mexico (after only the Compañía Industrial de Orizaba S.A., Río Blanco mill), working with 40,184 spindles, 1,685 looms, and 1,560 workers, compared to a national average of 6,299 spindles, 229 looms and 254 workers per mill. The average mill in the United States in 1910 operated with 20,714 spindles, 502 looms and 286 workers. By 1912 only 23 percent of the textile mills were corporations (*sociedades anónimas*) and only six of them traded stock in the stock market. CIVSA was one of them. As this makes clear, CIVSA was representative only of the fraction of the textile sector that had modernized their mills during the period (roughly 12 percent of the mills, but which made 40 percent of the cotton textile production). The Santa Rosa mill is still operating today, but it has recently been declared bankrupt.

10.3   CIVSA's International Competitiveness

How competitive were CIVSA's selling prices, compared with English and American prices for similar products? Because yarn was produced us-

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1. See Stephen Haber (1997).

ing standard measures throughout the world, it is usually easier to compare its costs and prices than those for cloth, produced in a myriad of different brands and of varying qualities. Yet because CIVSA did not sell yarn, no information on yarn costs and sale prices exists in its archives. Thus, it was necessary to find information on types of cloth made in foreign countries similar to those produced by CIVSA. Table 10.1 shows a list of American and English fabrics, which by weight and type were similar to those CIVSA manufactured. Because CIVSA's cloth was generally narrower than American and English cloth, all prices were transformed into pesos per square meter. Data on production costs provided by CIVSA's records did not include general expenses, depreciation, and a return on capital. Thus these items were estimated and added to the original cost figures, assuming returns on capital of 5 percent, 8 percent, or 10 percent (see table 10.1).

As table 10.2 shows, CIVSA's prices were 64 percent higher than American prices and 28 percent higher than English prices on average. However, once the tariff is added to foreign prices, CIVSA's prices were only 1 percent higher than American prices and 14 percent below British prices, on average. If transportation costs for foreign cloth were added, CIVSA's relative prices would have been even lower. Foreign competition, tariffs included, seems to have been an important benchmark for defining CIVSA's prices, which were basically the same as those of its domestic competitors (e.g., CIDOSA). This was true because there was not much domestic competition in the Mexican market for higher-quality cloth.

Table 10.2 also shows that CIVSA required much lower tariffs than those established to compete with American competitors and practically none to compete with the British for most of the types of cloth in the sample. Assuming a return on capital of 8 percent, in 1911 several of the types of cloth shown in table 10.1 could have competed with English imports, but practically none with American imports. However, much lower tariffs than those established would have sufficed to enable CIVSA to compete with foreign imports (on average only 41 percent of the tariff was necessary for CIVSA to compete with American cloth and no tariff to compete with English weaves). Because Mexico imported fabrics mostly from England, cloth prices from this country were more relevant for the Mexican industry (see table 10.3).[2] Thus a great part of the tariff served merely to provide CIVSA with higher profit margins. It would be revealing to make a similar comparison for some year in the 1920s, but the relevant information is not available.

Although the Mexican cotton textile industry enjoyed high protection

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2. It is difficult to understand why Mexican textile imports came mostly from England, given that American goods of similar qualities had lower prices. I believe this situation resulted from the commercial networks England had already established in these type of products, which must have taken some time for Americans business to build.

Table 10.1   Prices and production costs of cloth: CIVSA, England, and the United States, 1911 (current pesos)

American brand	Price (pesos/m²)			CIVSA's brand	m²/kg	Production cost (pesos/m²)	Cost (pesos/m²)			Price (pesos/m²)
	m²/kg	U.S.	England				5%	8%	10%	
Denim	3.97	0.32	0.40	Dril necoxtla blanco	3.92	0.34	0.39	0.40	0.41	0.55
Canton flannel	4.58	0.24	0.33	Franela velours	4.17	0.21	0.26	0.27	0.28	0.43
Brown drills	5.22	0.20	0.27	Dril kaki	4.95	0.32	0.37	0.39	0.39	0.52
				Dril palmita blanco	5.59	0.20	0.25	0.27	0.27	0.31
Shirting	7.30	0.20	0.24	Toile sublime	7.25	0.19	0.24	0.25	0.26	0.33
Table damask	7.08	0.31	0.27	Bramante 7/4	7.63	0.17	0.22	0.23	0.24	0.34
Madras	8.23	0.18	0.23	Santa rosa 1	8.26	0.14	0.19	0.20	0.21	0.24
				Flor de lys 1	8.26	0.13	0.18	0.19	0.20	0.21
				Tela francesa 1	8.26	0.16	0.21	0.22	0.23	0.28
Calico print	10.89	0.14	0.23	Nansu mulhouse	10.10	0.17	0.22	0.23	0.24	0.30
Printed percale	11.74	0.15	0.17	Percal un color	11.90	0.13	0.18	0.19	0.20	0.21
Printed lawn	15.47	0.12	0.16	Cotelina fantasía	15.63	0.12	0.17	0.18	0.19	0.21

Source of English and U.S. data: House of Representatives, Cotton Manufactures, Report of the Tariff Board (Washington, 1912), I, 443–444.

Source of Mexican data: Archive of the Compañía Industrial Veracruzana S.A.

Notes: In order to calculate the additional cost represented by general expenses, depreciation, and return on capital, the following data were used: general expenses for 1911 were $350,000, depreciation according to calculations explained in chapter 7 (Gómez-Galvarriato, 1999) was $217,254.08, equity and reserves were $6,765,678.63, and meters of cloth produced in that year were 17,744,142. Prices for English and American goods are prices in the home country.

Table 10.2   **Tariffs, comparative prices, and production costs of cloth: CIVSA, England, and the United States, 1911**

CIVSA brand	Fraction	Specific tariff (pesos/mt2)	Tariff required[a] U.S.	Tariff required[a] U.K.	Mex. price – U.S. price + tariff	Mex. price – U.K. price + tariff	Mex. price/ U.S. price	Mex. price/ U.K. price	Mex. price/ Cost (8%)
Dril necoxtla blanco	334b	$0.14	$0.08	$0.00	1.20	1.01	1.73	1.36	1.37
Franela velours	335	$0.11	$0.04	-$0.05	1.23	0.98	1.79	1.31	1.56
Dril kaki	336	$0.17	$0.18	$0.11	1.41	1.18	2.61	1.92	1.36
Dril palmita blanco	333a	$0.10	$0.07	-$0.01	1.02	0.83	1.53	1.13	1.16
Toile sublime	334a	$0.11	$0.04	$0.01	1.06	0.95	1.63	1.38	1.34
Bramante 7/4	333a	$0.10	-$0.08	-$0.04	0.83	0.90	1.10	1.23	1.47
Santa Rosa 1	333a	$0.10	$0.02	-$0.03	0.84	0.71	1.31	1.01	1.18
Flor de lys 1	333a	$0.10	$0.01	-$0.05	0.76	0.64	1.18	0.92	1.14
Tela francesa 1	334a	$0.11	$0.04	-$0.01	0.98	0.83	1.57	1.22	1.30
Nansu mulhouse	335a	$0.14	$0.09	-$0.01	1.08	0.81	2.17	1.29	1.33
Percal un color	335	$0.11	$0.04	$0.02	0.80	0.75	1.38	1.23	1.08
Cotelina fantasía	335	$0.11	$0.06	$0.02	0.92	0.79	1.73	1.33	1.18
Average		$0.12	$0.05	$0.00	1.01	0.86	1.64	1.28	1.29

Sources: See table 10.1 and table 10.4.

[a]Tariff required by CIVSA to compete with those foreign products in the Mexican market. It is overestimated because the prices for English and American prices are those effective in the home country and transportation costs would have to be added to them.

Table 10.3   **Cloth imported by Mexico from the United States and the United
Kingdom as a percentage of total cloth imports**

	U.S. (% imports)		England (% imports)	
Year	Quantity	Value	Quantity	Value
1903	11.00	11.87	77.28	71.63
1904	17.51	18.28	70.85	66.25
1905	16.93	16.62	66.82	61.70
1906	13.20	14.91	70.79	64.73
1907	10.91	13.66	70.64	63.53
1908	8.03	8.52	72.30	67.83

Sources: México, SHCP, Boletín de Estadística Fiscal, various years.

Notes: Tariff schedule paragraphs considered were 458–61 from 1903 to 1905 and 333–36
from 1906–08.

levels during the Porfiriato (see tables 10.4 and 10.5), they were not higher
than those of the United States. A comparison of Mexican and American
tariff levels indicates that levels of protection for cloth in Mexico were ac-
tually lower than in the United States in 1911. In that year the American
ad valorem equivalent duty for coarse unbleached cloth, similar to those
table 10.4 describes (paragraphs 315–17 of the U.S. tariff schedule), rose
from 20.68 percent to 52.22 percent, depending on the particular kind of
cloth. The simple average of all duties for unbleached cloth in paragraphs
315–17 was 34.9 percent. American tariffs for fine unbleached cloth com-
parable to that described in table 10.5 (paragraphs 318–19 of the U.S. tariff
schedule) ranged from 36.45 percent to 48.05 percent; its simple average
was 41.8.[3] In Mexico the comparable ad valorem equivalent tariffs for 1911
were 20.1 percent and 26 percent, respectively. American tariffs for
1911 were even higher than the average Mexican duties for 1900–1910 of
33.3 percent and 40.5 percent, respectively. Because raw cotton was tariff-
free in the United States, effective protection rates[4] were even higher in that

3. The American tariff schedule was far more specific than the Mexican one, providing for
several duties, depending on square yards per pound, threads per square inch, and value per
square yard, whereas the Mexican tariff schedule provided for a single duty (House of Repre-
sentatives, *Cotton Manufactures,* I, 69). The Mexican duty only divided unbleached and white
cloth between that with fewer than 30 threads per 5 square millimeters and that with more
than 30 threads in that area; that is, with fewer or more than 152.28 threads per square inch.

4. The effective rate of protection (EPR) is the percentage excess of the domestic price of
the value-added unit over its world market price. The effective rates of protection are calcu-
lated using the following formula: ERP = $(W_i - V_i)/V_i$, where W_i is the percentage excess of do-
mestic value added and V_i is the world market value added. The numerator can be calculated
either as a difference between domestic and world market value added, or as the difference be-
tween the tariff on the product and the tariff on the material input weighted by the latter's
share in the product price on the world market. Thus it is calculated as: ERP = $(T_t - A_{ct}T_c)/$
(V_t), where T_t is the nominal tariff for cloth, T_c is the nominal tariff for cotton, A_{ft} is the coeffi-
cient of cotton as a share of the value of cloth under free trade, and V_t is the world market value
added for the textile industry. See Bela Balassa and Associates (1971, 5–6, 315–18). I am grate-
ful to Graciela Márquez for her explanations of this subject.

Table 10.4   Tariffs for coarse unbleached and white cloth

Year	Pesos/m² or KL	Specific tariff ($)	Nominal tariff (%)	Raw cotton nominal tariff (%)	ERP (%) (1)	ERP (%) (2)
1901	0.22	0.09	41.5	19.6	72.2	78.8
1902	0.24	0.09	38.2	16.7	67.8	73.5
1903	0.32	0.09	28.5	13.6	49.3	53.9
1904	0.25	0.09	36.1	13.8	66.3	71.0
1905	0.27	0.10	36.3	18.6	61.4	67.7
1906	0.32	0.10	30.0	16.4	49.5	55.1
1907	0.23	0.10	41.6	15.1	77.5	82.7
1908	0.36	0.10	27.2	15.7	44.0	49.4
1909	0.31	0.10	30.7	13.0	55.0	59.5
1910	0.40	0.09	22.4	10.6	38.9	42.5
1911	0.45	0.09	20.1	12.5	31.4	35.7
1912	0.35	0.09	26.0	15.1	41.9	47.1
1913	0.49	0.05	10.3	13.2	8.3	12.8
1914	0.58	0.05	8.7	7.9	10.7	13.4
1915	1.54	0.05	3.2	2.9	4.0	5.0
1916		0.08		12.4		
1917a		0.08		8.0		
1917b		0.04		0.0		
1918	0.37	0.05	13.1	1.6	27.9	28.4
1919	0.52	0.05	9.4	1.4	19.9	20.4
1920	0.71	0.05	6.9	1.3	14.2	14.6

Year	Pesos/m² or KL	Specific tariff ($)	Nominal tariff (%)	Raw cotton nominal tariff (%)	ERP (%) (1)	ERP (%) (2)
1927	2.63	5.05	186.3	10.7	411.1	414.8
1928	2.63	5.10	177.9	10.4	392.4	396.0
1929	2.59	5.10	183.5	48.0	362.5	378.8
1930	2.75	2.15	76.4	27.2	142.8	152.0
1931	3.34	2.15	73.2	38.5	122.5	135.7
1932	2.77	2.15	76.7	39.2	1229.9	143.2
1933	3.21	2.15	72.2	52.4	104.5	122.3
1934	4.39	2.15	48.8	24.9	82.6	91.1
1935	3.86	2.15	58.0	23.6	105.1	113.1
1936	4.05	2.15	52.7	21.4	95.5	102.8
1937	4.35	2.15	50.7	20.4	91.9	98.9
1938	4.91	2.15	51.5	20.3	94.0	101.0
1939a	4.72	2.15	5.19	26.0	88.4	97.2
1939b	4.19	2.21	62.5	26.0	112.5	121.3
1940	6.31	2.21	36.0	16.7	63.0	68.7
1941	5.96	2.21	50.5	20.6	91.4	98.4
1942	6.79	2.21	40.7	12.8	78.0	82.3
1943	6.43	2.21	41.1	10.2	81.8	85.3
1944	6.16	2.21	41.2	13.2	78.7	83.2
1945	12.84	2.21	33.1	4.7	69.8	71.4
1946	8.76	2.21	27.3	15.4	44.5	49.7

1921	0.36	0.08	20.9	29.2	14.2	24.2
1922	0.40	0.10	23.5	25.9	24.0	32.8
1923	0.46	0.11	24.1	14.9	37.9	43.0
1924	3.17	0.96	28.3	32.0	28.0	38.9
1925	3.11	0.96	30.1	8.2	59.0	61.8
1926	2.87	0.96	32.5	11.1	61.4	65.2
1947	9.73	2.21	22.7	9.6	40.7	44.0
1948	18.97	13.96	73.6	32.7	130.1	141.2
1949			forbidden	10.0		
1950			forbidden	16.7		
1951	58.01	23.42	40.4	12.3	77.8	82.0
1952	56.36	23.42	41.6	13.0	79.6	84.1
1953	62.44	22.41	35.9	20.6	58.2	65.2
1954	57.92	23.42	40.4	15.4	74.4	79.6
1955	57.38	23.42	40.8	13.1	77.9	82.3
1901–1910			33.3	15.3	58.2	63.4
1911–1920			12.2	6.9	19.8	22.2
1921–1926			26.6	20.2	37.4	44.3
1927–1933			129.0	32.4	237.9	249.0
1934–1947			46.3	17.7	81.2	87.2
1948–1955			45.4	16.7	83.0	89.1

Table 10.5   Tariffs for fine white and unbleached cloth

Year	Pesos/m² or KL	Specific tariff ($)	Nominal tariff (%)	Raw cotton nominal tariff (%)	ERP (%) (1)	ERP (%) (2)
1901	0.22	0.11	50.7	19.6	93.1	99.8
1902	0.24	0.11	46.7	16.7	87.0	92.7
1903	0.32	0.11	34.8	13.6	63.7	68.3
1904	0.25	0.11	44.1	13.8	84.5	89.2
1905	0.27	0.12	43.8	18.6	78.4	84.7
1906	0.32	0.12	36.2	16.4	63.6	69.2
1907	0.23	0.12	50.2	15.1	97.1	102.2
1908	0.36	0.12	32.8	15.7	56.8	62.1
1909	0.31	0.12	37.1	13.0	69.4	73.9
1910	0.40	0.12	29.0	10.6	53.9	57.5
1911	0.45	0.12	26.0	12.5	44.9	49.2
1912	0.35	0.12	33.7	15.1	59.4	64.5
1913	0.49	0.07	13.4	13.2	15.3	19.8
1914	0.58	0.07	11.3	7.9	16.6	19.3
1915	1.54	0.07	4.2	2.9	6.3	7.3
1916		0.11		12.4		
1917a		0.11		8.0		
1917b		0.11		0.0		
1918	0.37	0.10	25.6	1.6	56.4	56.9
1919	0.52	0.10	18.5	1.4	40.5	41.0
1920	0.71	0.10	13.5	1.3	29.3	29.7
1921	0.36	0.11	31.3	29.2	37.9	47.9
1922	0.40	0.14	33.4	25.9	46.5	55.3
1923	0.46	1.52	30.6	14.9	52.6	57.7
1924	3.90	1.52	38.9	32.0	52.1	63.0
1925	4.06	1.52	37.5	8.2	75.8	78.6
1926	3.71	1.52	40.8	11.1	80.2	84.0
1901–1910			40.5	15.3	74.8	80.0
1911–1920			18.3	6.9	33.6	36.0
1921–1926			35.4	20.2	57.5	64.4

Year	Pesos/m² or KL	Specific tariff ($)	Nominal tariff (%)	Raw cotton nominal tariff (%)	ERP (%) (1)	ERP (%) (2)
1927	3.46	7.33	215.0	10.7	476.5	480.1
1928	3.64	8.38	228.4	10.4	507.3	510.8
1929	3.52	8.38	241.5	48.0	494.2	510.6
1930	4.09	3.42	84.5	27.2	161.1	170.3
1931	4.02	3.42	86.9	38.5	153.6	166.8
1932	4.19	3.42	83.1	39.2	144.3	157.6
1933	5.15	3.42	70.3	52.4	100.1	118.0
1934	6.57	3.42	53.3	24.9	92.9	101.4
1935	6.11	3.42	55.6	23.6	99.6	107.6
1936	5.64	3.42	59.8	21.4	111.6	118.9
1937	5.90	3.42	59.6	20.4	112.2	119.1
1938	7.48	3.42	46.7	20.3	83.0	90.0
1939a	8.61	3.42	40.0	26.0	61.3	70.1
1939b	9.66	3.68	40.5	26.0	62.6	71.4
1940	11.68	3.68	36.2	16.7	63.4	69.1
1941	10.42	3.68	36.2	20.6	58.9	65.9
1942	14.65	3.68	25.3	12.8	42.9	47.3
1943	16.79	3.68	22.7	10.2	40.1	43.5
1944	19.98	3.68	20.7	13.2	32.0	36.5
1945	20.28	3.68	18.1	4.7	35.8	37.5
1946	23.98	3.68	17.9	15.4	23.2	28.5
1947	31.87	3.68	12.1	9.6	16.5	19.8
1948	18.97	13.96	73.6	32.7	130.1	141.2
1949	24.30	forbidden	forbidden	10.0		
1950	30.78	forbidden	forbidden	16.7		
1951	58.01	23.42	40.4	12.3	77.8	82.0
1952	56.36	23.42	41.6	13.0	79.6	84.1
1953	62.44	22.41	35.9	20.6	58.2	65.2
1954	57.92	23.42	40.4	15.4	74.4	79.6
1955	57.38	23.42	40.8	13.1	77.9	82.3
1927–1933			156.5	32.4	291.0	302.0
1934–1947			38.4	17.7	62.4	68.4
1948–1955			45.4	16.7	83.0	89.1

Sources: See sources for table 10.4.

Notes: See notes for table 10.4.

country with respect to Mexico than the difference suggested by their ad valorem tariffs.

10.4   Explaining CIVSA's Higher Costs during the Porfiriato

Part of the difference in prices between Mexico and the United States resulted from the cost of raw cotton, which on average was 20 percent more expensive at CIVSA than in the United States during the Porfiriato. CIVSA purchased its raw cotton from either New Orleans or the Laguna region in Mexico, depending on its price and availability. Generally, Mexican cotton reached CIVSA at almost the same price as the New Orleans cotton, with a variation of only a few cents.[5]

Since cotton represented between 57 percent (shirting) and 79 percent (brown drills) of the cost of cloth in the United States, if the U.S. industry had paid the extra 20 percent cotton cost in Mexico it would have faced an additional cost of between 11 and 15 percent in these fabrics. Considering machinery costs were approximately 20 percent more in Mexico due to transportation costs, we can assume that erecting a mill in Mexico would cost 20 percent more than in the United States.[6] If this was true, and because depreciation and return on capital (of 8 percent) were 12 percent of the cost of cloth per yard in the United States,[7] the extra cost of the mill would represent an additional 2.4 percent over the American cost of cloth production. Together, the extra cost of cotton and of mill establishment would have accounted, at the most, for an extra cost of 17.4 percent. Yet CIVSA's costs of producing these fabrics (assuming an 8 percent return on capital) were on average 28 percent above U.S. prices for such fabrics. An important part of the difference was the result of labor productivity, partly determined by technology.

In the category of spinning, the low wages in Mexico relative to those in the United States and the United Kingdom allowed CIVSA to enjoy lower costs of labor per pound of yarn spun than in American or English mills.[8]

5. This is an upper-bound estimate, because the average value of the cotton used in the American mill reported by the Tariff Board in 1911 was 15.568 cents per pound, instead of 13 cents as indicated by the historical statistics of the United States and used in table 10.4. Because the price of cotton at CIVSA in 1911 was 16.203 cents per pound, the Tariff Board figure would make the price difference only 4.1 percent instead of 25 percent (as table 10.4 indicates). See House of Representatives (1912, 410). Prices compared were spot prices of "Upland Middling" at New York, from U.S. Department of Commerce (1975, 208). Prices for CIVSA come from company documents, including inventories, purchase invoices, and the cost of cotton reported in its books for *Movimientos Generales.* CIVSA bought American Strict Middling and Good Middling cotton, Mexican cotton of similar qualities to the American cotton it purchased, and Egyptian cotton.

6. This corresponds to the average cost of importing machinery from England to Mexico in the 1900s. See Aurora Gómez-Galvarriato, *The Impact of Revolution,* 156.

7. Ibid., 467.

8. This disagrees with Gregory Clark's conclusions that once the efficiency of the local labor is taken into account, "real labor costs turn out to be as high as those in Britain in most

Table 10.6   **Pounds per spindle and cost of labor per pound: CIVSA, the United States, and the United Kingdom**

Yarn	CIVSA (ring spindles)		U.S. (ring spindles)		U.K. (mule spindles)	
	Pounds per spindle (11 hrs)	Cost of labor per pound ($)	Pounds per spindle (10 hrs)	Cost of labor per pound ($)	Pounds per spindle (10 hrs)	Cost of labor per pound ($)
Warp 29	0.1951	0.0080	0.2440	0.0151	0.1940	0.0126
Warp 36	0.1339	0.0106	0.1730	0.0212	0.1440	0.0170
Weft 30	0.1673	0.0088	0.2590	0.0142	0.1810	0.0135
Weft 36	0.1121	0.0098	0.2060	0.0178	0.1370	0.0168

Yarn	CIVSA vs U.S. mill (%)		CIVSA vs U.K. mill (%)	
	Pounds per spindle	Cost of labor per pound	Pounds per spindle	Cost of labor per pound
Warp 29	80	53	101	64
Warp 36	77	50	93	62
Weft 30	65	62	92	65
Weft 36	54	55	82	58

Sources: CV, Payrolls 1911 (Week 6) and U.S. House of Representatives, Cotton Manufactures (Washington, 1912), I, 410–12.

Notes: Costs presented here are the costs per pound of yarn as spun, excluding spooling or other processes beyond spinning. Because pounds of yarn at CIVSA were not reported per spindle but per worker, pounds per spindle were calculated using the reported average number of spindles per warp spinning frame (380.27) and per weft spinning frame (428.74) at CIVSA in 1911, considering that one spinner tended one spinning frame. Data from England and the United States was taken from the most efficient mill in each country on which the Tariff Board had information. Since there was no information for warp yarn number 29 in England and the United States the figure for warp number 28 was used.

Yet CIVSA produced a considerably lower quantity of yarn per spindle than its American counterpart (see table 10.6). Although CIVSA used ring spindles instead of mule spindles, its pounds per spindle were similar to those produced by the mule-spinning English mill.[9] CIVSA was obviously not taking advantage of using ring spindles. However, while the American mill sold 85.05 pounds of yarn spun from 100 pounds of cotton used, and the English mill 89.21, CIVSA reported production of 90 pounds of yarn per 100 pounds of cotton. If this is true, it might have been that CIVSA was

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countries [including Mexico] except for the very low-wage competitors of Asia." In weaving, however, findings for CIVSA are in accordance with Clark's argument. It is clear, however, that the weaving technologies used were not equal throughout the world (Clark 1987, 51).

9. Output per spindle in Lancashire was considerably higher for ring spindles than for mule spindles, particularly for lower counts of yarn. For example, in 1907, 100 ring spindles produced 167.6 pounds of yarn number 28 weekly, but 100 mule spindles produced only 111.6 pounds (Leunig 1996, 174).

saving on cotton, which was relatively more expensive than in the United States and in England.[10]

A comparison of the number of employees necessary to operate a 40,000-spindle spinning mill in the United States and Japan with the workers employed in CIVSA's spinning department (40,184 spindles) explains how CIVSA paid lower labor costs than U.S. mills in yarn manufacturing. While CIVSA employed almost twice the number of workers U.S. mills did (183 percent), labor costs were only 70 percent of those in the United States (see table 10.7). However, the Japanese industry, paying even lower wages, but not competing with Mexican mills, had lower labor costs than CIVSA (94 percent), in spite of employing more than twice the workers CIVSA did (240 percent).

In weaving, however, lower wages at CIVSA were not enough to counterbalance the extra labor it employed relative to the U.S. industry. As table 10.8 shows, CIVSA (with 1,380 looms) employed almost seven times (676 percent) the number of workers U.S. mills employed to tend a 1,000 loom weaving mill, and paid more than twice the wages (219 percent). Because wages per worker were higher in Mexico than in Japan, CIVSA paid more than twice the total wages Japanese mills did (261 percent), although it employed almost the same number of workers (98 percent). While American weaving mills required only 53 weavers to tend 1,000 looms, Japanese mills required 700 weavers, and CIVSA 613 weavers (to tend 1,380 looms). Thus, although American weavers earned $1.59, weavers at CIVSA $0.45, and Japanese weavers $0.19 per day, their daily cost to the mills was $84.27, $274.08, and $129.50, respectively. Labor costs at CIVSA's weaving department were far higher than in the United States, higher even than in Japan.

The crucial difference between the American mill compared here and the Japanese and Mexican mills is that the U.S. firms used Northrop automatic looms.[11] When tending power looms "the most time-consuming tasks of the weaver were, first, to keep looms supplied with weft shuttles and, second, to piece together broken threads. Both these operations required that the machine be stopped.[12] The Northrop system replaced the weft automatically without stopping the loom, allowing for an increase in the number of looms tended.[13] Additionally, Northrop looms stopped instantly

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10. According to the U.S. Tariff Board, the cotton value at the American mill was so similar to that used by the English mill that the same price was used to make comparisons. U.S. House of Representatives, (410). However, according to Gregory Clark, in 1910 "once the costs of getting the cotton from the port to the mills are included, the major New England textile towns had an advantage of about $0.0015 per pound over Lancashire mills using American cotton." Clark, "Why Isn't the Whole World Developed?" (1987, 144).

11. Whereas in 1911 less than 1 percent of the looms working in England were automatic, more than 30 percent of the American looms were automatic. In other words, 200,000 out of 665,049 looms working in 1910 (House of Representatives, 1912, 11, 169).

12. See Lazonick, *Competitive Advantage,* 163.

13. Anna P. Benson (1983, 27); George Draper & Sons (1896, 174).

Table 10.7   Employees necessary to operate a mill with 40,000 spindles in the United States, Japan, and CIVSA (40,184 spindles), 1911

Occupation (English)	Occupation (Spanish)	U.S. (southern mill)			Japan			CIVSA		
		No. of workers	Approx. total daily earnings (10 hrs)	Approx. daily earnings per worker (10 hrs)	No. of workers	Approx. total daily earnings (11 hrs)	Approx. daily earnings per worker (11 hrs)	No. of workers	Approx. total daily earnings (11 hrs)	Approx. daily earnings per worker (11 hrs)
Card room										
Overseer		1	3.50	3.50	1	0.45	0.45	5	6.08	1.22
Second hand		1	1.75	1.75						
Assistants					4	1.20	0.30			
Grinders		2	3.00	1.50	4	1.20	0.30			
Strippers	Abridora	4	4.60	1.15	4	1.20	0.30	6	1.58	0.26
Card minders	Carderos	4	5.00	1.25	6	1.80	0.30	15	4.00	0.27
Section hands		1	1.25	1.25						
Scutchers	Batientes							9	2.86	0.32
Mixing (cotton selectors)	Mezcla				20	2.50	0.13	3	0.76	0.25
Can boys	Cajonero				4	1.02	0.26	5	1.26	0.25
Lap carriers					4	1.10	0.28			
Draw-frame tenders	Estirador	10	7.00	0.70	48	8.40	0.18	20	7.31	0.37
Slubber tenders	Pabilador	12	14.70	1.23	15	1.48	0.10	10	4.56	0.46
Intermediate tenders	Intermedio	14	27.60	1.97	34	5.44	0.16	15	4.79	0.32
Fine-frame tenders	Fino y Super fino	24	57.76	2.41	49	7.35	0.15	29	22.88	0.79
Oilers	Aceitador	2	2.00	1.00	2	0.30	0.15	1	0.37	0.37
Sweepers		2	1.80	0.90	7	1.05	0.15			
General spare hands	Ayudantes	4	a		a			12	1.65	0.14
	Cepillador							4	1.33	0.33

Ring spinning room										
Overseer	Cabo	1	3.50	3.50	2	1.00	0.50	1	1.13	1.13
Second hand	Cabos	1	1.75	1.75	3	1.05	0.35	4	3.48	0.87
Section hands		4	6.00	1.50						
Spinners	Troxiles	50	37.50	0.75	300	55.80	0.19	118	68.14	0.58
Roving carriers		4	3.60	0.90	3	0.68	0.23	2	0.95	0.48
Oilers		4	4.00	1.00	2	0.45	0.23	6	1.78	0.30
Sweepers	Barrendero	3	2.40	0.80	[a]			19	3.17	0.17
Doffers	Mudadores	30	21.00	0.70	[b]			1	0.81	0.81
Band boy	Bandero									
Scrubber		2	1.80	0.90						
	Torzal							2	0.38	0.19
	Cuendero							3	0.75	0.25
	Maq. Cuendera							1	0.78	0.78
	Not defined							37	6.13	0.17
Yarn preparation room										
Overseer					1	0.50	0.50			
Assistants					2	0.70	0.35			
Reelers	Rodillero				260	41.50	0.16	2	1.93	0.96
Balers					4	1.30	0.33			
Bunding press hands					15	2.10	0.14			
Total		180	211.51	1.18	794	139.57	0.18	330	148.87	0.45

Sources: House of Representatives, Cotton Manufactures, Report of the Tariff Board on Schedule I of the Tariff Law (Washington, 1912), 524, and CV. Payrolls, 1911 (Week 6). Data from the Report of the Tariff Board were compiled from figures obtained from typical Japanese mills for seven months in 1911, similar U.S. mills were chosen by the Tariff Board to make the comparison.

Table 10.8   Employees necessary to operate a mill with 1,000 looms: The United States, Japan, and CIVSA (1,380 looms), 1911

Occupation (English)	Occupation (Spanish)	U.S. (southern mill)			Japan			CIVSA		
		No. of workers	Approx. total daily earnings (10 hrs)	Approx. daily earnings per worker (10 hrs)	No. of workers	Approx. total daily earnings (11 hrs)	Approx. daily earnings per worker (11 hrs)	No. of workers	Approx. total daily earnings (11 hrs)	Approx. daily earnings per worker (11 hrs)
Yarn preparation room										
Overseer	Cabo				1	0.30	0.30	1	2.26	2.26
Assistants					2	0.46	0.23			
Spoolers	Cañoneros	15	15.50	1.03	60	7.80	0.13	57	18.52	0.32
Warpers	Urdidor	10	11.97	1.20	20	3.20	0.16	20	10.62	0.53
Weft builder	Tramero							7	3.17	0.45
Slasher room										
Overseer		[a]			1	0.50	0.50			
Slasher tenders	Engomadores	6	7.50	1.25	[b]			13	9.75	0.75
Drawing-on hands	Repasador	[b]			50	5.00	0.10	21	10.60	0.50
Warp dressing	Peine							2	0.89	0.45
Folders (doublers)	Doblador							4	2.97	0.74
	Devanado							3	1.08	0.36
Weave room										
Overseer	Pagador	1	5.00	5.00	1	0.60	0.60	1	2.49	2.49
Second hand	Receptor de Mantas	2	5.50	2.75	10	3.50	0.35	1	1.58	1.58
	Receptor de Mantas (Ayudantes)							3	3.32	1.11
	Apuntador							2	3.47	1.73

Weighter	Pesador							4	3.15	0.79
Stamper	Revisador							4	2.63	0.66
Loom fixers	Correiteros	16	25.60		1.60			16	23.84	1.49
Loom fixer helpers	Ayudantes Correiteros							5	4.82	0.96
Weavers	Tejedor[c]	53	84.27	700	1.59	129.50	0.19	613	274.08	0.45
Filling carriers	Carretero	3	3.42	5	1.14	0.70	0.14	15	3.57	0.24
Extra day hands	Aviaduras	4	4.01	[b]	1.00			1	0.38	0.38
Smash hands		1	1.58	[b]	1.58					
Oilers	Aceitador	3	4.06	[b]	1.35			9	3.88	0.43
Sweepers (loom cleaners)	Barrenderos	8	10.50	[b]	1.31			6	2.33	0.39
	Limpia							1	0.32	0.32
Quill man		1	1.33		1.33					
Cloth carrier	Cargador de Telas							3	1.19	0.40
General spare hands	Ayudantes							18	3.78	0.21
Waste handlers	Desperdicio							2	0.64	0.32
Total		123	180.24	850	1.47	151.56	0.18	832	395.31	0.48

Sources: See table 5, House of Representatives, Cotton Manufactures, Report of the Tariff Board on Schedule I of the Tariff Law (Washington, 1912), 526.

[a]The slasher room was supervised by the weaving-room overseer.

[b]Note obtained.

[c]Northrop looms used in the United States.

[d]Oiling done by weavers.

when a thread was broken, reducing imperfections in the cloth that appeared whenever a weaver failed to repair a broken warp yarn immediately.[14]

While American weavers were tending an average of 18.87 automatic looms each, CIVSA's were only tending 2.25 power looms,[15] and Japanese weavers 1.43. At CIVSA, as in the English mills, weavers seldom tended more than four plain power mills, while in the United States a weaver generally tended twenty automatic looms.[16]

In the United States, however, weavers working with plain power looms rarely tended fewer than six, more often eight, and even twelve, if equipped with warp-stop motions, which made work much easier.[17] A U.S. weaver tended so many looms because he (or she) tended strictly to the skilled work of weaving, and all the other work was performed by other, less skilled workers;[18] this way of operating was called the "American System."[19] Although there were many unskilled workers helping weavers at CIVSA and the Japanese textile mill, they represented only 26 percent and 18 percent, respectively, of the total labor force in the weaving department, compared to 57 percent in the American mill. A significant part of the difference between the number of looms tended in the United States and CIVSA may also have been due to the fact that CIVSA's weavers were not relieved of unskilled chores to the same extent that American weavers were. Although it is difficult to know which other tasks CIVSA's weavers performed besides strictly weaving, it is clear that cleaning the looms was part of their weekly duties, since quarrels with employers on this issue often arose at the mill. Some of the difference in labor productivity levels could also have resulted from the fact that CIVSA produced a broader range of fabrics than American mills, which usually specialized in certain types. CIVSA payrolls indicate that the same weaver could produce as many as four kinds of different fabrics in a single week, which implied much additional work in resetting the loom for the different types of weave.

Overall, one can conclude that in 1911 CIVSA was less productive than the best English or American textile mills. While lower wages for spinning helped CIVSA offset its greater labor and machine requirements per pound of yarn, this was not the case in weaving, particularly when compared with the American industry. This, together with its greater cotton and machinery costs, made it produce at higher costs than those of the

14. See George Draper & Sons, 163–73.

15. On week six of 1911, 15 percent tended one loom, 60 percent two looms, 3 percent three looms, and 22 percent four looms. (CV), Payrolls, 1911 (Week 6).

16. See House of Representatives (1912, 11).

17. Ibid.

18. Such as bringing the weft from the storeroom, sweeping, oiling, cleaning, examining the roll of cloth, repairing imperfections, trimming the edges, picking off threads, and carrying cloth to cloth room (House of Representatives, 1912, 480).

19. Ibid.

American and British industries. Yet CIVSA's production costs, even considering rates of return of 8 percent or 10 percent, were fairly similar to the sales prices of English cloth of similar kinds. CIVSA would have thus required much lower duties than it had to be able to compete internationally.

The comparison between CIVSA and American and Japanese spinning and weaving mills indicates that by 1911 CIVSA and the Japanese mills had an important labor productivity gap with the United States. While labor productivity was greater in CIVSA's spinning department than in the Japanese spinning mills, it was about the same in the case of weaving. U.S. weaving mills appear to have been enjoying by then a huge advantage vis-à-vis the rest of the world by their early employment of Northrop automatic looms, helped by a better organization of labor within the mills. Whereas Japanese low wages allowed its mills to produce at competitive costs in spite of their low productivity of labor, this was not the case for CIVSA, particularly in weaving.

As we will see in the following section, the development of future events in Mexico would pose serious problems for CIVSA's ability to compete internationally, by creating greater disadvantages in two aspects of the problem: real wages and the ability to introduce new technology and devise changes in the ways labor is organized at the shop floor.

10.5   The Industry's Secular Decline in International Competitiveness

During the Mexican Revolution (1910–20) a major transformation in the relative power of workers and employers took place in the Orizaba textile mills, which would become an important factor to explain changes in productivity and competitiveness from then on. From a laissez-faire regime, where employers dealt with an unorganized labor force, which prevailed until 1905, a totally different situation emerged. The labor movement grew stronger as a consequence of weaker governments and the need for those groups seeking to establish themselves as governments to co-opt the labor movement, whose support had become necessary to reestablish peace (Gómez-Galvarriato 2002). Textile workers, and particularly those in the Orizaba valley, acquired particular strategic relevance for the revolutionary armies, given that they were the largest organized group along the corridor that goes from the port of Veracruz to Mexico City (where most textile mills were located and on which the railroad line Orizaba lies). This corridor was the main commercial route that linked the capital to foreign nations, and the port of Veracruz collected the major share of import and export duties, a substantial share of Mexico's fiscal revenues. This gave textile workers an important leverage in obtaining substantial improvements in their living conditions and to substantially improve their relative power vis-à-vis their employers.

By 1925 CIVSA workers were organized in powerful unions and work-

ers' confederations, with an important role in the way work was done on the shop floor. Labor was now hired through collective contracts negotiated between unions and employers, and it was now unions, rather than employers, who made the major hiring and firing decisions among blue collar workers. The government, previously totally supportive of employers, was by then divided between the interests of employers and workers, and in many crucial turning points it gave decisive support to labor at the expense of company owners (see Gómez-Galvarriato 2002).

Although the levels of international competitiveness and comparative productivity attained in 1911 by CIVSA were modest, as time passed they deteriorated. A similar situation probably prevailed across the Mexican textile industry as a whole. Thus, at least until the late 1980s, when the Mexican economy opened up to international trade, the Porfiriato would become the period when the industry had reached its peak in terms of international competitiveness.[20]

Productivity levels at Santa Rosa, measured as machine per worker and production per worker, remained virtually unchanged from 1900 to 1950. Looms per worker remained constant throughout the period, while meters per worker produced weekly diminished by a small amount from the first decade of the century to the 1920s and a little more during the Revolutionary decade; the same was true for spinning. However, because working hours diminished and production per worker did not, productivity per hour worked increased (see tables 10.9 and 10.10).[21] Whereas real wages increased substantially after 1917, productivity did not; therefore, real wages per meter of output rose notably after that date (see figure 10.1). This result explains, in part, the deterioration in profitability rates that the firm experienced after that date (see table 10.11).

After 1930 the number of looms tended per weaver gradually increased, reaching almost four. This implied an improvement in productivity rates in terms of meters per worker, although with a concomitant small reduction in meters per loom. Yet this represents a minor increase in productivity when compared to what was attainable by introducing automatic looms.

In the spinning department there was no parallel productivity improvement after 1930. On the contrary, data shows a reduction in productivity after 1940. Further research must be undertaken to understand its causes.

Given the radical change experienced on the shop floor from control by

20. From 1984 to 1988 a substantial reduction of the tariff fractions subject to import permits was carried out. Whereas in June 1985 88.4 percent of yarn and cloth imports were subject to import permits, these were reduced to 3.4 percent in December 1985 and to 1.9 percent in May 1988. Average ad valorem tariffs went down from 42.5 percent in December 1985 to 13.8 percent in December 1987 (Carlos Márquez Padilla, 1994, 110–11).

21. This would be in accordance with factual evidence introduced by Karl Marx that, when the workday was shortened from twelve to eleven hours, output per workday actually increased "entirely as a result of steadier application to the work and a more economical use of time on the part of the workers." Karl Marx, in Lazonick, *Competitive Advantage on the Shop Floor* (63).

Table 10.9　　　　　**Weavers' productivity, 1900–30**

Year	Meters per worker Weekly	Meters per worker Hourly	Meters per loom (weekly)	Looms per worker	Real wage per meter ($)	Real wage per week ($)	Meters per loom per hour
1900	533.3	7.4	231.9	2.30	0.008	3.66	3.09
1901	676.8	9.4	294.3	2.30	0.008	3.99	3.34
1902	683.4	9.5	298.4	2.29	0.008	4.37	4.40
1903	540.5	7.5	229.0	2.36	0.008	3.55	3.22
1904	527.4	7.3	211.0	2.50	0.008	3.48	3.70
1905	723.1	10.0	292.7	2.47	0.008	4.81	3.28
1906	623.4	8.7	238.9	2.61	0.009	3.83	2.74
1907	663.9	9.2	257.3	2.58	0.009	4.44	3.51
1908	634.5	8.8	275.9	2.30	0.010	5.68	3.85
1909	712.6	9.9	300.7	2.37	0.009	5.43	3.93
1910	561.5	8.2	257.6	2.18	0.009	4.78	4.41
1911	418.4	6.3	181.1	2.31	0.009	3.71	3.82
1912	694.3	11.0	276.6	2.51	0.010	7.91	5.01
1913	615.6	9.8	218.3	2.82	0.011	7.62	4.30
1914	774.6	12.3	289.0	2.68	0.008	6.72	5.03
1915	598.2	10.5	229.2	2.61	0.004	3.35	4.43
1916	703.2	12.4	236.0	2.98	0.008	6.46	4.85
1917	572.9	11.3	220.3	2.60	0.013	10.61	4.33
1918	542.3	10.7	203.9	2.66	0.012	8.19	4.58
1919	421.8	8.3	160.4	2.63	0.012	7.25	4.18
1920	535.1	10.5	209.0	2.56	0.011	8.52	4.74
1921	627.7	12.3	266.0	2.36	0.012	10.19	4.84
1922	558.3	11.0	229.8	2.43	0.017	13.23	4.25
1923	548.2	10.8	227.5	2.41	0.018	13.56	3.69
1924	542.6	10.7	220.6	2.46	0.015	11.52	5.04
1925	592.7	11.7	248.0	2.39	0.014	12.70	4.96
1926	628.5	12.4	265.2	2.37	0.013	12.68	5.18
1927	572.0	11.3	239.3	2.39	0.018	15.33	4.86
1928	631.0	12.4	251.4	2.51	0.018	15.49	4.52
1929	617.2	12.1	250.9	2.46	0.018	16.09	4.74
1931	824.1	16.6	240.0	3.43	0.016	13.48	4.85
1932	537.0	16.8	157.9	3.40	0.017	9.38	4.94
1933	929.9	19.4	275.5	3.38	0.015	13.74	5.74
1934	928.4	19.3	269.8	3.44	0.014	13.02	5.62
1935	842.5	17.0	248.4	3.39	0.016	13.54	5.02
1936	681.6	15.6	201.0	3.39	0.018	12.18	4.59
1937	559.2	12.2	165.0	3.40	0.020	11.01	3.59
1938	624.8	14.2	183.8	3.40	0.019	11.85	4.18
1939	680.1	14.2	200.5	3.39	0.023	15.85	4.18
1940	527.5	13.9	155.1	3.40	0.024	12.65	4.08
1941	761.5	14.6	216.0	3.53	0.022	16.88	4.15
1942	760.7	15.8	195.0	3.90	0.020	14.95	4.06
1943	773.1	16.1	196.5	3.93	0.019	14.60	4.09
1944	787.0	16.4	200.9	3.92	0.016	12.47	4.19
1945	595.5	15.3	151.4	3.93	0.018	10.49	3.88
1946	794.1	16.5	201.9	3.93	0.018	13.93	4.21
1947	732.9	15.3	199.9	3.66	0.019	13.61	4.16

(continued)

Table 10.9   (continued)

Year	Meters per worker		Meters per loom (weekly)	Looms per worker	Real wage per meter ($)	Real wage per week ($)	Meters per loom per hour
	Weekly	Hourly					
1948	745.6	15.5	209.5	3.56	0.017	12.33	4.37
1949	776.9	16.2	213.8	3.63	0.019	15.15	4.45
1950	788.8	16.4	207.6	3.67	0.018	14.19	4.32
1900–10	625.5	8.7	262.5	2.39	0.009	4.36	3.59
1911–20	587.6	10.3	222.4	2.64	0.010	7.03	4.53
1921–29	590.9	11.6	244.3	2.42	0.016	13.42	4.68
1931–40	713.5	15.9	209.7	3.40	0.018	12.67	4.68
1941–50	751.6	15.8	199.3	3.77	0.018	13.86	4.19

Sources: Meters per loom and wage per meter was obtained from a sample of thirty weavers from CV, Payrolls, June and November 1900–30 and looms per workers were taken from CV, Payrolls Week 6, 1900–30. From 1900 to 1929 wages deflated with Index I AB, Aurora Gómez-Galvarriato, *The Impact of Revolution,* 700, 703, with Index I AB. From 1929 to 1942 wages were deflated with Federico Bach and Margarita Reyna (1943, 1–63). From 1943 to 1950 the price index came from NAFINSA (1963, 109).

managers to a situation where the union had great influence, it might seem surprising that productivity levels did not fall as a result of the Revolution. The fact that they did not means that the Santa Rosa union was effective at guaranteeing workers' discipline and effort. Moreover, workers were able to produce more per hour as the shift was reduced, despite the fact that they were performing their tasks with basically the same machinery they had worked with during the Porfiriato. The intensity of labor was higher during the shorter working day, perhaps because workers were not as tired. Since they were paid per piece, they tried to produce as much as their strength allowed. In addition, once the shift was reduced, companies became more strict about arrival and departure times.[22]

However, this was not all that was required to keep the industry's international competitiveness at the levels it had maintained during the Porfiriato, let alone improve them. The reduction in investment rates at CIVSA described in figure 10.2 were partly a consequence of the decline in profit rates. A regression of Santa Rosa's fixed assets growth on the average of the previous three years' profit rates yields the following relationship.[23]

22. Once the eight-hour shift was established punctually became very important for the company, since it considered that the shift should consist of eight effective hours. Thus the gates were closed strictly on time. On June 12, 1917, for example, Rio Blanco shut out between sixty and seventy workers who had arrived late. At first, this factory policy elicited complaints, but then workers apparently became used to it Archive of the Compañía Industrial de Orizaba S.A. (CD) correspondence, letter from Río Blanco office to the governor of Veracruz, Cordoba, June 13, 1917.

23. Where GROWTH$_t$ is investment in fixed assets in Santa Rosa as a percentage of total assets in the year t, and PROFITRATE$_t$ is CIVSA's return on assets in the year t. Two other versions of regression were run, one using the average of profitrates for two years instead of three and another using the logarithms of the variables. Both closely resembled the one shown.

Table 10.10   Spinners' productivity, 1900–30 (1900 pesos)

Year	Spinners (Warp No. 29)			Spinners (Weft No. 30)		
	Real wage per kilo	Kilos per worker (weekly)	Kilos per worker (hourly)	Real wage per kilo	Kilos per worker (weekly)	Kilos per worker (hourly)
1900	0.029	244.2	3.14	0.038	277.2	3.61
1901	0.029	220.9	3.02	0.037	222.0	3.12
1902	0.027	241.0	3.35	0.035	262.0	3.68
1903	0.027	234.3	3.12	0.035	232.0	3.03
1904	0.026	181.5	2.78	0.034	238.8	2.75
1905	0.026	256.3	3.05	0.034	239.7	2.91
1906	0.012	231.8	3.22	0.034	221.0	2.44
1907	0.036	225.3	3.13	0.038	227.9	2.49
1908	0.035	213.4	2.96	0.034	231.3	3.47
1909	0.030	229.4	3.19	0.034	225.1	3.75
1910	0.026	281.9	4.70	0.031	201.8	3.36
1911	0.027	232.3	4.22	0.029	219.4	3.99
1912	0.028	253.8	4.23	0.032	211.1	4.00
1913	0.028	212.9	3.88	0.032	205.3	3.95
1914	0.021	208.1	3.50	0.024	218.3	3.89
1915	0.011	190.7	3.68	0.012	214.8	3.48
1916	0.021	183.0	3.90	0.33	211.6	4.49
1917	0.037	176.3	3.67	0.040	212.5	4.22
1918	0.032	178.5	4.46	0.035	215.2	4.70
1919	0.034	160.3	4.21	0.035	216.9	5.07
1920	0.029	176.5	4.17	0.032	236.3	4.73
1921	0.036	190.3	4.24	0.037	206.3	4.35
1922	0.045	198.0	5.54	0.044	205.0	4.73
1923	0.044	204.9	3.90	0.046	210.1	3.93
1924	0.043	185.1	4.73	0.046	204.5	5.20
1925	0.037	208.2	4.14	0.044	220.4	4.71
1926	0.038	242.6	4.74	0.043	224.9	5.00
1927	0.048	219.9	3.98	0.049	257.8	5.61
1928	0.053	224.7	4.41	0.056	268.8	5.14
1929	0.051	268.2	5.09	0.054	260.6	5.40
1931	0.052	256.8	5.18	0.047	346.0	6.99
1932	0.059	190.5	4.65	0.057	296.2	5.99
1933	0.047	278.4	5.65	0.056	245.4	5.95
1934	0.046	275.5	5.74	0.045	281.4	6.94
1935	0.052	197.0	4.40	0.057	293.8	5.40
1936	0.049	109.6	2.76	0.062	319.1	2.43
1937	0.047	126.3	2.77	0.052	333.0	4.54
1938	0.054	131.7	3.20	0.050	298.4	3.77
1939	0.058	132.0	2.75	0.074	239.8	3.92
1940	0.076	139.3	3.53	0.061	191.5	4.19
1941	0.058	92.8	3.17	0.060	120.0	5.94
1942	0.055	103.9	3.66	0.065	105.7	4.34
1943	0.050	110.7	4.03	0.057	212.3	6.58
1944	0.048	119.0	4.24	0.049	201.9	3.38

Table 10.10   (continued)

	Spinners (Warp No. 29)			Spinners (Weft No. 30)		
Year	Real wage per kilo	Kilos per worker (weekly)	Kilos per worker (hourly)	Real wage per kilo	Kilos per worker (weekly)	Kilos per worker (hourly)
1945	0.045	99.8	4.27	0.055	154.9	4.00
1946	0.051	107.0	4.46	0.056	198.8	4.55
1947	0.053	91.9	2.83	0.057	188.1	4.20
1948	0.049	146.5	4.89	0.055	190.1	4.91
1949	0.052	107.7	3.88	0.057	165.6	4.38
1950	0.052	119.6	3.93	0.055	138.5	4.90
1900–10	0.028	232.7	3.24	0.035	234.4	3.15
1911–20	0.027	197.2	3.99	0.030	216.2	4.25
1921–29	0.044	215.8	4.53	0.047	228.7	4.90
1931–40	0.054	183.7	4.06	0.056	284.5	5.01
1941–50	0.051	109.9	3.93	0.057	167.6	4.72

Source: A sample was taken from CV, Payrolls, June and November 1900–30. Wages were deflated.
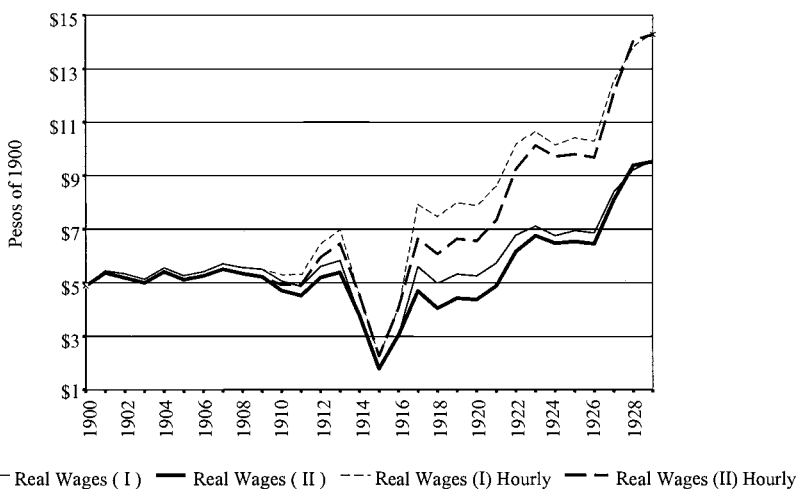
Fig. 10.1   Average weekly and hourly real wages (pesos of 1900)
Source: CV, Payrolls 1900–30.

$$\text{GROWTH}_t = \begin{array}{l} -0.005 + 0.62(\text{PROFITRATE}_{t-1} + \text{PROFITRATE}_{t-2} \\ (-0.29) \quad (2.02) \end{array}$$

$$+ \text{PROFITRATE}_{t-3})/3$$

$$R^2 = 0.14, \text{ adjusted } R^2 = 0.10, N = 28$$

with *t*-statistics in parentheses. Past profits are used as a proxy of expected future profits, of which investment in fixed assets should be a function. Re-

Table 10.11   CIVSA's return on assets and equity, 1899–1929

Year	Price index[c]	Return on assets[a] (%)	Return on equity[a] (%)	Return on assets[b] (%)	Return on equity[b] (%)
1899	92.50	–1.42	–1.63	–1.49	–1.76
1900	100.00	5.67	6.94	5.74	6.94
1901	104.72	4.35	5.29	4.32	5.05
1902	114.89	12.18	14.54	11.39	12.65
1903	115.29	11.73	13.79	11.02	11.96
1904	116.57	12.42	14.46	11.56	12.40
1905	117.94	12.41	14.39	11.41	12.20
1906	117.79	7.75	8.95	7.11	7.60
1907	122.35	8.17	9.47	7.32	7.74
1908	123.97	4.86	5.70	4.31	4.60
1909	132.24	6.34	7.48	5.33	5.66
1910	146.45	5.91	7.14	4.65	4.88
1900–10		7.53	8.88	6.89	7.49
1911	146.05	3.83	4.67	3.02	3.20
1912	148.68	9.28	11.14	7.24	7.50
1913	150.70	6.10	7.19	4.73	4.77
1914	171.90	–0.39	–0.44	–0.27	–0.26
1915	196.09	–2.63	–2.86	–1.63	–1.46
1916	223.68	6.72	7.19	3.68	3.21
1917	255.14	13.61	15.77	7.42	6.18
1918	305.88	8.04	9.21	4.07	3.01
1919	293.42	11.58	12.71	6.14	4.33
1920	319.01	11.01	12.68	5.77	3.97
1911–20		6.72	7.73	4.02	3.45
1921	285.68	14.81	17.49	8.41	6.12
1922	228.96	11.4	13.23	7.42	5.78
1923	200.26	8.96	10.06	6.32	5.02
1924	207.44	1.76	1.89	1.19	0.91
1925	241.69	6.61	6.94	4.04	2.87
1926	238.46	–3.20	–3.33	–1.97	–1.40
1927	210.63	7.23	7.53	4.82	3.57
1928	197.86	2.95	3.13	2.08	1.58
1929	201.44	2.47	2.59	1.71	1.29
1921–29		5.89	6.61	3.78	2.86

Sources: CV, Balances Generales y Estados de Resultados 1898–1910.

[a]Calculated using nominal equity and assets.

[b]Calculated correcting equity and fixed assets for inflation.

[c]Price Index II, AB, Gold. Aurora Gómez-Galvarriato, *The Impact of Revolution,* table A4.15 in Appendix to chapter 4.

[d]Net of depreciation.
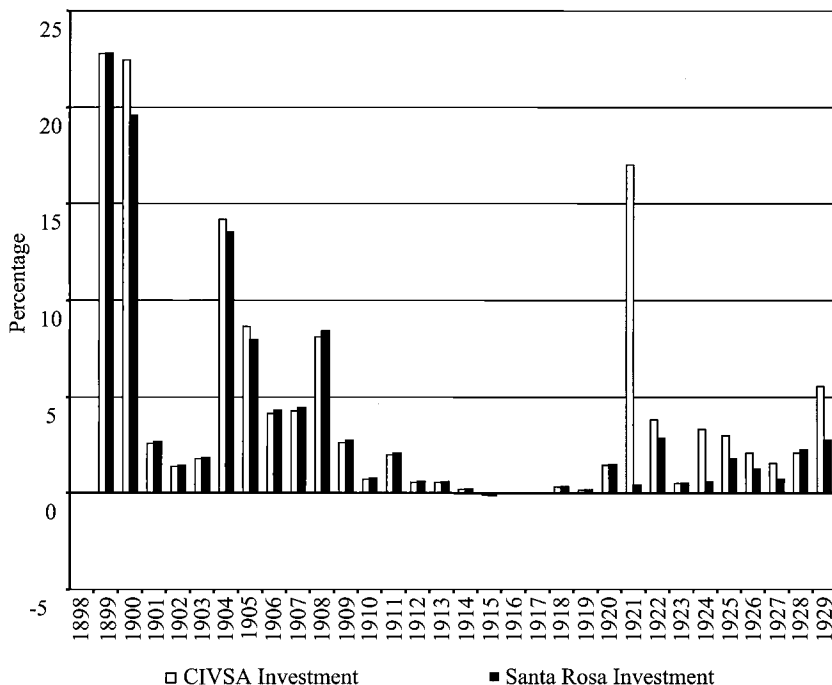
Fig. 10.2 Investments in real estate, machinery, and equipment at CIVSA (as percentage of total fixed assets)

Source: CIVSA and Santa Rosa General Balances 1900–1929.

sults of this regression show a clear association between investment and profits for CIVSA, indicating that the decline in profit rates after the Porfiriato accounts for a significant part of the drop in investment rates after 1912.[24] Yet, there were other forces behind the reduction of investment rates; namely, labor regulation restrictions on the adoption of new technology and the tariff policy adopted in the late 1920s.

New technology adopted by the textile industry worldwide was not introduced into Mexican mills. One of the most notable improvements in textile production was the introduction of automatic looms.[25] Other important technological changes that became widespread in the 1920s were the following: (1) double-length looms, which increased weavers' productivity; (2) the one-process picker (*batiente de un solo proceso*), which reduced bale-breaking, lapping, and picking to only one step; (3) high-speed warping

24. A similar regression was run by Susan Wolcott and Gregory Clark for the Indian textile industry (using panel data of several mills from 1907–38), yielding very similar results. Susan Wolcott and Gregory Clark (1999, 407).

25. México, Secretaría de la Economía Nacional (Juan Chávez Orozco) (1933, 66).

(*altos estirajes*), which reduced the number of times yarn was passed through the fly frames (*veloces*); and (4) the use of artificial silk (rayon) to mix with cotton.[26]

Automatic looms were not introduced by CIVSA in the 1900s because they demanded higher investment—their price was two-and-a-half times that of an ordinary power loom. Moreover, at their early stage of development, they required more technical assistance than power looms. Because specialized technical assistance was relatively expensive in Mexico, this meant a significant additional cost.[27] However, because this technology was new and not so widespread at the time, it was not so crucial for the Mexican textile industry to adopt it then as later, when, after being tested and improved, it became standard throughout the world. In the 1920s, certain Mexican textile companies tried to acquire automatic looms, but faced the opposition of unions against this labor-saving machinery.[28]

In the early 1920s, CIVSA attempted to install 100 Northrop automatic looms. However, its union did not permit them and the company was forced to sell them at a discount to several other companies in small sets. Atoyac Textil, one of the mills of the Rivero Quijano family, bought some of them. However, this company was also unable to put them into operation because of problems like those at Santa Rosa. Moreover, according to one of Atoyac Textil's owners, Jesús Rivero Quijano, it was necessary to have at least a hundred automatic looms running for a company to reap the benefits of this new technology; even if they had been adopted at Atoyac there would not have been enough to show what automation could accomplish (Quijano, 278).

In 1923, Atoyac Textil decided to give another chance to automatic looms, buying twenty-four Stafford looms. However, "in order to introduce them it was necessary that the president of Stafford Looms travel to Mexico to have an interview with General Calles and President Obregón, to deal later with Luis N. Morones about the installation and operation of these machines (Quijano, 278). The government accepted the installation of these automatic looms on condition that they were considered an "exhibition." Once they were mounted, however, unions blocked their operation. The worker who ran the looms was stabbed to death. His successor soon started receiving death threats and promptly

26. See Segunda Ponencia de la Companñía Industrial de Orizaba S.A. in *Primera Convención Mexicana de Empresarios Textiles (Rama del Algodón)*, April 9–12, 1945, 176–180; and Jesús Rivero Quijano (1990, 239–48, 257–62, and 279–80).

27. A full discussion of these issues can be found in Aurora Gómez-Galvarriato, *The Impact of Revolution,* 152–56.

28. Graham Clark suggests in his study of the Mexican textile industry of 1909 that opposition from workers to automatic looms was already present then. However, CIVSA managers never referred to labor discontent as a reason for not adopting automatic looms. Moreover, they were able to put some automatic looms in operation in the early 1900s without any problems with workers. (Graham Clark 1909, 22).

resigned. No one else dared to tend the looms, and they were abandoned until some technicians transformed them into ordinary power looms (Rivero, 278).

In the late 1920s, a legal restriction on the adoption of new technologies such as automatic looms, one-process pickers, and high-speed warping was imposed. The wage-list that was designed as a result of the Convention of Workers and Industrialists of 1925–27 fixed the maximum number of machines per worker and established specific wages-per-piece. Under these conditions, industrialists had no incentive to introduce better machinery because it would not enable them to reduce labor costs, since wages-per-piece and the workers-per-machine had to remain invariable.[29]

In spite of the important technological changes that the textile industry had undergone since 1912, no new technical studies were made to define the 1925–27 industrywide labor contract. The same technical principles adopted to build the 1912 Tariff (based on the Blackburn wage-list of 1905) were used for the new wage-list.[30] In spinning, the concept of one worker per machine prevailed, forcing Mexican mills to adopt larger spinning machines than was recommended by their builders, or to join two spinning machines, with several technical problems.[31]

As in England, by lowering piece-rates on larger and faster spinning frames, wage-lists encouraged capitalists to try to maximize spindles per workers.[32] In contrast, in weaving, by setting piece-rates irrespective of the number of speed looms tended, wage schedules encouraged employers to try to minimize the number of looms per weaver. This was so because "for a given intensity of labor, the lower the number of looms per weaver, the faster each loom could be run, the higher the output per loom, and the lower total unit factor costs."[33]

In carding, the 1925–27 wage-list, like the one created in 1912, established that one worker should operate eight carding machines. However, by introducing simple modifications to machinery and organization, it became possible for one worker to tend forty carding machines with no additional effort. The wage-list created no incentive for Mexican mills to introduce these changes since, if they were allowed to implement them, mills would have to pay five times more to the card tender that remained working and give severance pay to the four who would have to be dismissed. These costs, together with the investment required to modernize the card-

29. México, Secretaría de la Economía Nacional (Juan Chávez Orozo, 67).

30. Ibid., 418.

31. Ibid.

32. In England between 1896 and 1914 spinning frames were enlarged in order to maximize effort and at the same time comply with the wage-lists. See Lazonick, *Competitive Advantage* (163).

33. Ibid., 163–64.

ing machines, were greater than the benefits the mills would obtain through cost reductions (Naciones Unidas 1951, 14).

The decision to establish fixed wage schedules per piece and limits on machines per worker was not made unknowingly. In 1926, the Saco-Lowell Shops, fearing that the agreements of the convention would affect demand for their machinery in Mexico, sent a letter to the president of the convention, explaining how detrimental the new regulations were to the adoption of new technology. The letter described the advantages of automatic looms as well as that of machinery specifically designed for the processing of scrap cotton. It explained why these innovations would not be adopted with the new wage-list and regulations proposed by the convention.[34] However, the majority of votes in the convention were in favor of the rigid wage schedule. Workers regarded modern machines as a threat to employment, industrialists as a threat to the survival of their decrepit mills, while government perceived the threat of social discontent. It was easier to raise tariffs and let the industry survive as it was. The overrepresentation of smaller, more old-fashioned mills at the convention may also have contributed to this result.[35]

CIVSA documents show the effects of the convention regulations on the company's investment decisions. In 1927, for example, double-length looms, not considered in the convention's wage-list, were installed in Santa Rosa.[36] However, a year later, the CIVSA board of directors decided to remove them because the wages demanded by the Santa Rosa union for their operators made production too costly.

In May 1929, CIVSA's main engineer presented a cost-benefit analysis, explaining the advisability of installing new high-speed-warping machines, which would generate substantial savings. CIVSA's board of directors decided to postpone their purchase until they were able to get a fair wage rate for operating these new machines. Together with CIDOSA, CIVSA started negotiations with the Ministry of Industry on this matter; at least until the end of 1930, however, they proved fruitless.[37]

Although the effects of rigid regulations on technological innovation must have been worse in those states, such as Veracruz, where the labor movement was strongest, contemporary studies on the textile industry indicate that they prevailed throughout the entire country.[38] Aggregate data

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34. Saco Lowell Shops to Presidencia de la Convención, August 7, 1926, Archivo General de la Nacíon, (AGN), Departamento del Trabajo (DT), 979/3.

35. According to the Convention's rules every mill had a vote regardless of its size. This gave a majority vote to smaller, usually more outdated, mills. México, Secretaría de la Economía Nacional, (Moisés T. de la Peña), (1934, 48).

36. CV, AC, July 12, 1927.

37. CV, Actas del Consejo del Administracíon (Board Meetings Minutes [AC]), May 14, 1929.

38. See México, Secretaria de la Economía Nacional, (Juan Chávez Orozco), (1933, 67), and México, Secretaría de la Economía Nacional (Moisés T. de la Peña), (1934, 187–91).

for Mexico's textile industry show little investment.[39] Although some new factories were built in the 1920s, most of them were small establishments devoted to the production of knitwear (*bonetería*), mainly of artificial silk. This is why, although the number of factories increased by 22 percent from 1921 to 1930, the number of active spindles and looms increased only by 9 percent and 8 percent, respectively (see table 10.12). Machinery per worker (measured in loom equivalents), which increased during the last decade of the Porfiriato by 18 percent, increased by only 7 percent during the twenties. During the Revolution, loom equivalents per worker grew on a per-shift basis because of the reduction in the length of the workday. And labor productivity increased between 1926 and 1930, not only when measured by loom equivalents per shift, but also when measured in sales and production per worker. However, this was the result of (a) the implementation of the Convention's wages per piece, which increased labor intensity, and (b) the reduction of employment and hours worked per mill as a consequence of the Depression. According to contemporary observers, "This increase was by no means the result of an improvement in machinery in the mills."[40]

Increased protection levels were necessary to keep Mexican mills running. As tables 10.4 and 10.5 show, there was a substantial increase in ad valorem tariffs after 1927, which came together with the conclusion of the Workers' and Industrialists' Convention. Before that year, governments that came out of the Revolution had been actually less protectionist than the Porfirian government. After 1916, Carranza's government began to pursue a liberalization tariff policy that drastically diminished tariffs on basic commodities, such as cloth. The rationale behind this policy was twofold. On the one hand, during 1917 Mexico suffered a severe shortage of products, which generated a significant increase in prices. Reducing tariffs was therefore an emergency strategy designed by the government to cope with the enormous scarcity of goods and the rising prices the country was facing (Cosío Villegas, 99). However, there was also a theoretical reason behind the liberalization policy. At the First National Congress of Industrialists held in Mexico City in September 1917, Alberto J. Pani, Minister of Industry and Commerce, made it clear in his inaugural address that

39. National data on the cotton textile industry was obtained from the following sources: For 1900–11: México, SHCP, *Boletín de Estadística Fiscal,* several issues, México, *The Mexican Year Book 1908* (523–31). For 1912: AGN, DT 5/4/4 "Manifestaciónes presentadas por los fabricantes de hilados y tejidos de algodón durante enero a junio de 1912." For 1913: AGN, DT, 31/2/4, "Estadística semestral de las fcas, de hilados y tejidos de algodón de la Reública Mexicana correspondiente al semestre de 1913." For 1914–20: Stephen Haber, (1989, 124); and México, Secretaría de la Economía Nacional, (Moisés T. de la Peña), 14, 126. For 1921–24: México, Poder Ejecutivo Federal, Departamento de Estadística Nacional, *Aspectos Económicos de un Quinquenio: 1921–1925,* 8–29; *Boletín de Estadística,* January 1924, 52–55; *Estadística Nacional,* September 30, 1925, 5–17. For 1925–30: México, SHCP, Departamento de Impuestos Especiales, Sección de Hilados y Tejidos, "Estadísticas del Ramo de Hilados y Tejidos de Algodón y de Lana," typewritten reports.
40. See México, Secretaría de la Economía Nacional (Juan Chávez Orozco), (1933, 63).

Table 10.12   The Mexican textile industry, 1900–1934

Year	Active mills	Spindles	Looms	Workers	Workers (adj)	Cotton Cons.	Sales (nominal; $)	Sales (in 1900 pesos)	Loom equity per worker	Loom equity per shift	Cotton per worker	Sales per worker ($)
1900	134	557,391	17,202	26,764	26,764	28,990	35,459	35,459	0.87	0.87	1,083	1,325
1901	133	602,223	18,885	27,663	27,663	30,262	33,877	35,553	0.92	0.92	1,094	1,285
1902	124	575,304	17,974	25,316	25,316	27,628	28,780	27,939	0.96	0.96	1,091	1,104
1903	115	630,201	20,124	26,249	26,249	27,512	36,907	31,339	1.03	1.03	1,048	1,194
1904	119	632,018	20,326	27,033	27,033	28,841	42,511	34,646	1.01	1.01	1,067	1,282
1905	127	666,659	21,932	29,483	29,483	31,230	51,214	46,097	0.99	0.99	1,059	1,564
1906	130	683,739	22,776	31,673	31,673	35,826	51,171	44,894	0.96	0.96	1,131	1,417
1907	129	693,842	23,507	33,132	33,132	36,654	51,686	41,326	0.94	0.94	1,106	1,247
1908	132	732,876	24,997	35,816	35,816	36,040	54,934	45,303	0.92	0.92	1,006	1,265
1909	129	726,278	25,327	32,229	32,229	35,435	43,370	36,656	1.03	1.03	1,099	1,137
1910	123	702,874	25,017	31,963	31,963	34,736	50,651	39,119	1.02	1.02	1,087	1,224
1911	119	725,297	24,436	32,147	32,147	34,568	51,348	39,286	1.01	1.01	1,075	1,222
1912	127	762,149	26,801	32,128	26,773	32,366	52,847	38,804	1.10	1.31	1,007	1,208
1913	118	752,804	26,791	32,641	27,201	32,821			1.07	1.29	1,006	
1914	90											
1915	84											
1916	93											
1917	92	573,072	20,489	22,187	14,791		64,130	29,974	1.21	1.81		1,351
1918	104	689,173	25,017	27,680	18,453		48,567	19,574	1.18	1.77		707
1919	110	749,237	27,020	33,185	22,123		69,778	25,169	1.06	1.59		758
1920	120	753,837	27,301	37,936	25,291	31,694	120,492	36,890	0.94	1.41	835	972
1921	121	770,945	28,409	38,227	25,485	35,924	93,942	28,329	0.97	1.45	940	741

Table 10.12 (continued)

Year	Active mills	Spindles	Looms	Workers	Workers (adj)	Cotton Cons.	Sales (nominal; $)	Sales (in 1900 pesos)	Loom equity per worker	Loom equity per shift	Cotton per worker	Sales per worker ($)
1922	119	803,230	29,521	39,677	26,451	34,654	85,023	26,766	0.97	1.45	873	675
1923	110	802,363	29,668	39,629	26,419	32,344	97,490	35,376	0.97	1.46	816	893
1924	116	812,165	29,888	37,732	25,155	30,517	96,435	34,429	1.03	1.54	809	912
1925	130	831,524	30,800	43,199	28,799	40,997	108,396	38,038	0.92	1.39	949	881
1926	138	842,793	31,296	44,250	29,500	41,523	95,438	34,111	0.92	1.38	938	771
1927	144	826,702	30,614	41,226	27,484	39,356	91,069	32,520	0.96	1.44	955	789
1928	132	823,862		38,889	25,926	37,031	96,293	36,491			952	938
1929	144	831,486	30,090	38,804	25,869	39,417	97,162	37,233	1.01	1.52	1,016	960
1930	143	842,265	30,625	39,424	26,283	40,582	91,145	37,811	1.01	1.52	1,029	959
1931	146	840,876	30,596	36,989	24,659	34,627	74,244	34,816	1.08	1.62	936	941
1932	141	831,847	29,825	34,095	22,730	34,311	75,977	38,861	1.14	1.71	1,006	1,140
1933	147	855,256	30,878	35,422	23,614	20,614	47,622	22,332	1.14	1.71	582	630
1934	159	863,746	31,602	39,281	26,187	22,842	64,514	29,451	1.05	1.57	582	750
1900–10	–8.2%	26.1%	45.4%	19.4%	19.8%	42.8%	10.3%	0.97	0.97	1,079	1,277	
1911–20	0.8%	3.9%	11.7%	18.0%	–21.3%	–8.3%	134.7%	–6.1%	1.08	1.46	981	1,036
1921–26	15.0%	11.8%	14.6%	16.6%	16.6%	31.0%	–20.8%	–7.5%	0.96	1.44	888	812
1927–34	10.8%	4.5%	3.2%	–4.7%	–4.7%	–42.0%	–29.2%	–9.4%	1.06	1.58	882	888

Source: See footnote 39.

Notes: Loom equivalents have been calculated following Gregory Clark (1987, 19–49). The length of the workday was considered to be twelve hours from 1900 to 1911, ten hours from 1912 to 1916, nine hours in 1917, and eight hours from 1917 to 1930. This is shorter than in reality because workday regulations were not strictly followed in all mills. Prices have been deflated using the Textile (gold) Index.

"free national and international competition" was one of the main principles behind the revolutionary industrial policy (Pani, 46).

Once Obregón came to power the free-trade spirit waned, and duties were gradually increased. However, although specific tariffs for cloth were higher between 1921 and 1926 than during the Porfiriato, ad valorem tariffs were not, since prices had also increased. Moreover, the effective rate of protection for cloth fell, because between the two periods, ad valorem tariffs for raw cotton rose more than those for cloth.[41]

In the Workers' and Industrialists' Convention of 1925–27, the three major actors in the political economy of the textile industry—businessmen, labor, and the government—chose an institutional arrangement that offered no incentives for technological transformation and therefore required high tariffs. Moreover, the depression that affected the textile industry from 1926 onward also created incentives for increased protection throughout the world. This explains the substantial increases in the tariff on cloth from 1927 to 1933, which made them several times higher than those that prevailed during both the Porfiriato and the early 1920s. This enabled most mills to survive, jobs to continue, and social order to endure. However, the lack of technological innovation in an industry sheltered by high rates of protection condemned Mexico's textile industry to become increasingly more outdated and unable to compete in world markets.

From 1933 to 1947, ad valorem tariffs decreased as a result of the increase in cloth prices. However the depreciation of the peso from 2.6 pesos per dollar in 1931 (when Mexico left the gold standard) to 5.5 in 1940 provided the industry with a further margin of protection. World War II generated an exceptional situation, as the Mexican textile industry was even capable of exporting vast quantities of cloth. When the war ended the situation reversed, and the industry demanded a new increase in tariffs. This came about at the end of 1947, when the new tariff schedule was changed to include both an ad valorem and a specific duty. Yet, since an official price list was established, and this list did not change for several years, ad valorem tariffs gradually decreased from 1947 to 1955 as a result of price increases. However, the peso continued depreciating, going from 4.8 pesos per dollar in 1947 to 8.6 in 1940, and then to 12.50 in 1954, providing further protection. Moreover, after 1947 the import of specific items in the tariff schedule were forbidden for some years (see tables 10.4 and 10.5).

The 1925–27 convention agreements may be understandable under the circumstances of worldwide depression in the textile industry. Nevertheless, the precepts adopted there were ratified over and over again. In spite of the efforts made by industrialists in 1932 and 1935 to introduce a more

41. Increased foreign competition must be part of the reason why CIVSA's markup (price/costs) decreased from 96 percent from 1904–1908 to 45 percent from 1923–27.

flexible wage schedule, the Textile Workers' and Industrialists' Convention of 1937–1939 kept it unchanged.[42]

After World War II, when the old equipment was worn out and needed to be replaced, industrialists made another attempt to change the restrictions imposed on the implementation of new technology. In 1945 CIVSA's president explained at the annual shareholders' meeting that it was urgent for Santa Rosa, as well as for Mexican textile industry as a whole, to fully modernize its equipment in order to be able to produce intensely in "conditions of efficient competition." "It is a matter of life and death for the national industry," he argued, "but full modernization generates problems of personnel, wage-lists, etc., that need to be solved uniformly and evenly."[43] According to him, CIVSA and other companies were only waiting for a favorable agreement by the Convention of Workers and Industrialists of the Textile Industry to be held in that year, to carry out the project.[44] However, despite their efforts, they had no success.[45] Only new plants established after the war were exempt from restrictions imposed by the industrywide labor contract, and some modern mills were established (IBRD, 69; CV, AAG, February 28, 1928). Old mills had to replace their worn-out equipment with used equipment. In 1956, for example, a considerable share of the machinery imported was used (29.07 percent of the looms, 38.28 percent of the spinning frames, and 52.98 percent of the carding machines).[46]

In 1950, CIVSA's president explained that after several months of negotiations, restrictions on the modernization of the industry had not been lifted.[47] That same year, a National Union of Industrialists for Textile Modernization (*Unión Nacional de Industriales para la Modernización Textil*), to which CIVSA belonged, was created to fight for the liberalization

42. Segunda Ponencia de la Compañia Industrial de Orizaba S.A. In *Primera Convención Mexicana de Empresarios Textiles (Rama del Algodón),* April 9–12, 1945, 175.

43. CV, Actas de la Asamblea General (Minutes of the General Shareholders Meeting; AAG), February 26, 1927.

44. Ibid.

45. An agreement was reached at the Convention of Workers and Industrialists of the Textile Industry held in May 1946, by which a special commission would undertake a study of the necessary conditions for the modernization of the industry. However this commission did not reach any conclusions and was dissolved. An Arbitration Organism contemplated in the agreement of May 1946 was left in charge of the study but the labor sector members were opposed to participate in the project and it was also dissolved. The Minister of Industry and Labor asked the parties interested in the modernization of the industry to carry out private meetings in order to propose solutions to the problem. As a result of these meetings an agreement was reached on July 7, 1950, that generated "the General Regulation for the Modernization of the Textile Industry," to be included in the collective contract (*Contrato Obligatorio*). It was approved by two-thirds of the labor force in the industry, but according to those firms that had already started modernizing their machinery it only froze the modernization process. The General Regulations for the Modernization of the Textile Industry was effective as of January 25, 1951 (*Diario Oficial,* October 23, 1950, February 6, 1951).

46. See Javier Barajas Manzano, Aspectos de la Industria Textil de Algodón en México (Mexico City, 1959), 51.

47. CV, AAG, March 20, 1950.

of the legal restrictions on the use of new technology. However, a minority of industrialists, who were in favor of continuing to work with outdated machinery, together with the unions were able to prevent any modification of the labor laws and wage-lists.[48]

Early in 1951, employers and workers finally agreed on the general rules to be followed in the modernization of equipment, rationalization of working methods and wage scales, and specialization within the industry. Yet this agreement was only "a preliminary outline of principles to be followed by other agreements to implement specific programs." According to the International Bank of Reconstruction and Development, although the agreement was an important initial step, it was "not expected to have significant consequences for the time being" (IBRD, 69).

From 1951 onward the "General Rules for the Modernization of the Textile Industry" were included as an addendum to the wage-list.[49] These rules allowed more flexibility in the operation of modern machinery,[50] and set rules for the dismissal of excess workers. However, the minority of firms that had already begun a modernization process, of which CIVSA and CIDOSA were part, were opposed to them, considering that the specific criteria the new regulations established in terms of wages, severance fees, and workloads imposed severe restrictions for the modernization of the industry.[51] The members of the National Union for the Modernization of the Textile Industry considered it inadequate that those rules were voted for by the whole industry rather than by only those mills that had begun modernizing their machinery since 1946. They argued that the interests of firms operating with old machinery "that only seek for their indefinite subsistence"[52] was opposed to modernization. Since outdated firms had the majority of votes in the Workers and Industrialists Congress, no set of regulations that would effectively promote modernization could come out from a process that included the whole industry on a basis of one vote per mill. Moreover, outdated firms had allied with labor in their hostility to modernization. Workers, traditionally reticent of modernization, were particularly opposed to it, since most of them worked in antiquated mills.[53] Although these new laws permitted the creation of some modern mills and

48. CV, AAG, March 21, 1951.

49. *Diario Oficial,* February 6, 1951.

50. Modern machinery was defined as that which reduced labor with respect to the machinery considered by the Workers and Industrialist Convention of 1937–1939. *Diario Oficial,* February 6, 1951, 9.

51. *Diario Oficial,* October 23, 1950.

52. *Diario Oficial,* October 23, 1950. Letter from several firms that were members of the Unión de Industriales para la Modernización Textil to the president of the Comisión Mixta Obrero-Patronal de Contrato Colectivo del Trabajo de la Industria Textil del Algodón y sus Mixturas.

53. Ibid. Letter from several firms members of the "Unión Nacional de Industriales para la Modernización Textil" to the president of the Convención Mixta Obrero-Patronal, del Contrato Colectivo de Trabajo de la Industria Textil del Algodón y sus Mixturas, 5.

Table 10.13	Reduction in the labor required to produce the same quantity of coarse cloth in the United States, 1910–1936	
	Yarn preparation (Preparación de Hilados)	49.6%
	Spinning (Tróciles)	26.9%
	Spooling and drawing (Cañoneros y Repaso)	36.3%
	Weaving (Telares)	52.8%
	Cloth reception (Recepción de Manta)	14.2%

Source: Segunda Ponencia de la Compañía Industrial de Orizaba S.A. in Primera Convención Mexicana de Empresarios Textiles (Rama del Algodón), April 9–12, 1945, 196.

the modernization of certain departments of old mills, the restrictions it imposed on the process, together with high rates of protection, generated few investments for the modernization of the industry.

The result was that the textile industry became increasingly more outdated. Whereas in Mexico there had been no major changes in the industry's methods of production since 1912, in the United States the introduction of new technologies between 1910 and 1936 had already generated a significant reduction in labor requirements (see table 10.13).

At the 1945 Textile Convention CIDOSA presented a detailed comparative analysis of productivity levels in the Mexican, American, and English industries.[54] Its results showed the disastrous state of the Mexican industry (see table 10.14). According to CIDOSA, the structure of the collective labor contract for the industry was one of the main reasons. In addition to the rigid wage-list, it forced the industry to keep the same number of workers hired; any worker who left the mill for any reason had to be replaced. Moreover, because it established a promotion system based on seniority, it prevented firms from choosing and promoting personnel on the basis of aptitude and effort.[55] England's productivity levels had also lagged behind those of the United States as a result of a fixed collective labor contract that determined the wages to be paid per unit of production and type of work, the number of workers per machine, and their duties. Nevertheless, in England modernization was gradually phased in, allowing the industry to implement certain technological changes (i.e., installing the warp-stop motion system in plain looms).[56]

A United Nations study on the productivity of the Latin American tex-

54. Data for the Mexican industry were calculated by CIDOSA; data for the United States and England CIDOSA were obtained from a formal report by the English Textile Commission on a visit to the United States in March–April 1944.

55. See Segunda Ponencia de la Compañía Industrial de Orizaba S.A., 195.

56. Ibid., 188 and 197. "In 1892, at the peak of prosperity in the weaving industry, a Uniform List covering all the weaving districts was adopted on terms very favorable to wages. In late 1932 the Uniform List was modified to accommodate the 'more-looms' system; but in 1935 it was altered again, this time to discourage the practice of giving weavers more than four powerlooms to tend. To ensure that all employers would adhere to the 1935 list, it was given the force of law by Act of Parliament" (Lazonick, *Competitive Advantage,* 56).

Table 10.14   **Productivity comparisons, c. 1945**

	U.S.	England	Mexico	Mexico vs. U.S. (%)	Mexico vs. England
Spinning					
Warp No. 9[a]					
Kilograms per worker per hour	10.45	7.22	2.61	25	36
Total labor	226	327	904	400	276
Warp No. 31, Filling No. 43[b]					
Kilograms per worker per hour	4.45	2.32	1.13	25	49
Total labor	101	195	399	395	205
Weaving					
Coarse unbleached cloth[c]					
Meters per worker per hour	32.4	12.8	9.8	30	77
Total labor	890	2,252	2,941	330	131
Medium quality unbleached cloth[d]					
Meters per worker per hour	44.5	14	9.4	21	67
Total labor	337	1,072	1,599	474	149

Source: Segunda Ponencia de la Compañía Industrial de Orizaba S.A. in Primera Convención Mexicana de Empresarios Textiles (Rama del Algodón), April 9–12, 1945, 175–90. Data for spinning and weaving are the sum of the different parts of both processes, including yarn preparation and cloth preparation and reception.

[a]Spinning mills that manufactured 13,605 kilos of No. 9 warp yarn in 48 hours.

[b]Spinning mills that manufactured 13,605 kilos of warp yarn No. 31, plus 8,154 kilos of No. 43 weft (filling) yarn in 48 hours.

[c]Weaving mills that produced 1,385,316 meters of coarse unbleached cloth in 48 hours.

[d]Weaving mills that produced 720,540 meters of medium quality, unbleached cloth in 48 hours.

tile industry, published in 1951, indicated that as many as 85 percent of the spindles and 95 percent of the looms working in Mexico were out of date; that is, built during the first quarter of the century or earlier (Naciones Unidas, 87). Likewise, a Mexican public financial study (Nafinsa) reported that in 1957, 34.4 percent of the spindles, 46 percent of the carding machines, and 33 percent of the looms operating that year had been built before 1910. Technological backwardness was worst in states such as Veracruz, where labor regulations were more strictly implemented because of their stronger labor movements,[57] and where the mills were older. In this state, 67 percent of the spindles, 72 percent of the carding machines, and 73 percent of the looms working in 1957 had been manufactured before 1910 (Barajas, 1959, 67–74, 97–99). The industry gradually moved away

57. Legal wages and regulations were only important where the labor movement was strong enough to enforce them. In 1959 Javier Barajas Manzano explained that wages established by the wage-schedule (*contrato colectivo de trabajo*) could not be taken as the wages workers were actually paid. "It is well known," he explained, "that this document is not complied with by most mills, especially by those established at the beginning of the century, but that wages are set through bilateral agreements between workers and employers" (Barajas, 28).

from those states where the labor movement was strongest, wages highest, and labor regulations most effective. In 1923, 20.8 percent of spindles and 22.37 percent of looms in Mexico were in Veracruz, but by 1950 these figures had declined to 14.81 percent and 17.81 percent, respectively.[58] In the end, the strength of Veracruz' labor movement was the cause of its own demise.[59]

According to the United Nations study, the number of man-hours-per-kilogram of production was 269 percent higher in the Mexican cotton textile industry than in a standard modern industry. Modernization of equipment could increase productivity by 260 percent in spinning and 281 percent in weaving. Yet this would have caused the displacement of more than 15,000 workers and would have required an investment of over one hundred million 1950 dollars (Naciones Unidas 1951, 87). In contrast, according to the Nafinsa study, the modernization of the industry was feasible, since its calculations indicated that in 1958 it would have required 103,394,800 pesos, which represented only 0.67 percent of the annual aggregate investment made in Mexico in 1957. If the process had taken place over ten years, it would have generated an annual displacement of 896.53 workers, who could have been relocated to other sectors (Barajas 1959, 149).

The consistent opposition of textile trade unions to the introduction of labor-saving methods and machinery was mirrored by the wage-list imposed by the labor law (*contrato-ley*), which rigidly limited the possibilities of modernizing and rationalizing the industry (IBRD, 69; Naciones Unídas, 87). Yet it is difficult to assess whether the unions' policy of keeping the wage-schedule unchanged responded to the wishes of their rank and file. Lack of investment in the textile industry generated a decline in the real wages of cotton textile workers that was greater than the reduction experienced by workers in other manufacturing sectors. Whereas between 1939 and 1954 real wages in the Mexican manufacturing industry as a whole declined by 11 percent, wages in the cotton textile industry fell by 38 percent (Barajas, 31). Moreover, wages paid by old mills were far lower than those established by law for modern ones. The 1955 wage-list (*contrato ley*) established, for example, a daily wage of $12.70 for a card tender working in an old mill, but $26.02 for one working in a plant with modern equipment (Barajas, 33).

58. Ibid., 44.

59. This result is similar to that of Przeworski's model of accumulation and legitimation, when the economic militancy of organized wage earners (*r* in the model) is high. Capitalists stop investing and wages cannot be maintained at the high level. However, the situation of the Mexican textile industry is more complex. Given that *r* is different in different regions, this lowers the level of *r*, which in the long run reduces wages in a region with a relative higher *r*, also shortening the length of time within which wages will decrease. An increase in tariffs does the opposite, allowing for a greater increase in *r* without lowering wages, and extending the time before this takes place. I am currently working to expand Przeworski's model in this direction. See Przeworski 1985, 148–59, 179–96.

The government's protectionist policy placed incentives to maintain the status quo indefinitely. "Since the high protective tariff has made it possible to operate profitably in spite of technical inefficiency, management and labor have become complacent about the prevailing state of affairs in the industry" (International Bank of Reconstruction and Development, 69). However, modernization of the industry could not be postponed forever, and as time went by and the industry became more outdated, the problem became increasingly difficult to solve.

Mexico was not alone in this difficult quandary. In Brazil and in Ecuador the textile industries in 1951 were in a similar or worse situation, facing restrictions on the adoption of new technology caused by a rigid organization of labor comparable to that in Mexico.[60] Because nothing like the Mexican Revolution had happened in these countries, we should be careful about the extent to which we attribute the growth of labor organization in Mexico and its consequences for industrial development to the Revolution.

10.6   Conclusions

As we have seen, CIVSA's international competitiveness and productivity levels during the Porfiriato, although modest, did not improve for most of the rest of the century, until the late 1980s, when the Mexican economy was opened up to world markets and most textile mills went bankrupt. In 1911, CIVSA's costs and technology were not so different from those prevalent in England, or the United States, although closer to the former than to the latter. This conclusion can be generalized to the Mexican cotton textile industry as a whole. As time went by, the gap between Mexican costs and productivity levels and those that prevailed in cloth-exporting countries increased.

Why did this happen? Whom should we blame? The deterioration of relative productivity and competitiveness that the Mexican industry suffered does not appear to have been caused by the action of either the unions, industrialists, or government alone.

What took place was a complex interaction in which unions, industrialists, and government found themselves better off in the short run by maintaining—unchanged—the technology employed by the industry. Unem-

60. It is interesting to note that in São Paulo, these restrictions were less important than in Rio de Janeiro. The United Nations report indicated that the excess of personnel in Brazil's old mills was not due to the incapacity of managers to recognize it, but by the perpetuation of a traditional organization of labor dating from the end of the nineteenth century or the beginning of the twentieth century, when most of the mills were founded. Because the textile industry developed later in São Paulo in Rio de Janeiro, restrictions on the organization of labor were less important. In Chile and Peru, where the textile industry developed after the 1930s, there was less excess labor and fewer institutional restrictions on reducing it (Naciones Unidas 1951, 1–17, 20, 55, 74, 112).

ployment, widespread bankruptcies, and social unrest were the alternatives. Yet every time the decision to change the textile labor contract and to start modernization was postponed, the problem for the future worsened. If, at a given moment, the status quo was maintained for fear of unemployment and of mills' bankruptcies, as the gap between the technology used by the Mexican industry and that in the industry's leaders elsewhere in the world widened, the danger of widespread unemployment and bankruptcies in the industry only increased. In the late 1980s, when the decision to modernize the industry and open up the economy was finally taken, the industry was hard hit.[61]

Thus the agreements reached in 1925–27, explainable on the verge of the Great Depression, were maintained without any changes until at least 1951, and with few modifications until 1972.[62] For those workers employed at textile mills, this was perhaps not a bad choice, as long as they trained their children to be something other than textile workers. Although industrialists faced important constraints on modernizing equipment, they could reap large enough profits from the mills to keep them operating without making any major investment in them; they could also diversify their interests into other sectors. The government could maintain a relatively peaceful and long-lasting regime for several decades without much trouble. Yet the country as a whole was not able to grow at the rates that a buoyant, exporting industry could have allowed, and for decades most Mexicans were forced to dress in expensive, poor-quality cloth.

The analysis of productivity levels in Mexican textile mills indicates that the relative power of workers to control the relation between effort and pay is a crucial factor in determining the technology employed and therefore lev-

61. Whereas manufacturing production increased by an annual rate of 4.60 percent between 1986 and 1990, textile industry production rose only by 0.97 percent. This hides the even worse performance of the weaving and spinning sector of the industry, which did worse than other subsectors in the textile industry. Its production in terms of real pesos declined by 13 percent from 1980 to 1991, and its employment by 8 percent. In 1998, only a third of textile mills in Mexico were considered capable of producing at the level of quality, volume, and prices required by the U.S. market. Sandra Martinez (1994, appendix, table 12). Gary Gerreffi and Jennifer Bair, "En Búsqueda del Desarrolo Integrado en México," in *Trabajo,* 1 (2) December 1998, 160; Márquez (1994, 98–100).

62. December 31, 1972, was the due date to implement a new operating system based on workloads (*Diario Oficial,* September 15, 1980, 15, chapter 6, article 45. The wage-list of 1966 was the first to allow that plain loom weavers tended more than four looms, on the condition that the union agreed to it and that the weaver was paid 45 percent of the wages set for the normal load on the extra quantities produced with the additional machinery (*Diaro Oficial,* December 24, 1966, chapter 6, article 45b, 7 and paragraph 190, 55). In the National Convention of the Textile Industry, held in October 1987, industrialists continued to complain about the wage-lists (*Contrato-Ley*), claiming that there was always a lag between the technology they contemplated and the state of the art technology necessary to compete internationally, and that it was erroneous to set a general contract for all the industry when it was very heterogeneous (Martínez 1994, 117–26). By 1994 the industrywide collective contract (*Contrato-Ley*) of the textile industry had recently been suppressed (Márquez 1994, 123).

els of competitiveness and productivity, as Lazonick has pointed out.[63] In accordance with the Wolcott and Clark findings for the case of India, it is clear that in Mexico the poor performance of the textile industry, particularly after the Revolution, was a problem of "the low labor input per mill worker" (Wolcott and Clark, 421). Yet it is also evident that this did not result from a "low taste for effort on the job," or from managerial incompetence, but from a more complex situation, caused in part by the power exercised by workers in the labor market to block manpower reductions for fear of unemployment. However, it was also determined by the power exerted by the owners of smaller mills, who were either unwilling or unable to make new investments and were fearful of going bankrupt. The power of these two actors, however, would probably have not been enough to shape the evolution of the industry without the support of a government that valued social and political stability above economic development, and therefore pursued the tariff and labor policies that maintenance of the status quo required.

This study suggests that structures of social power are important variables in explaining the various development paths taken by countries (or regions). The institutions that govern the social relations of production are not, however, determined solely by unions, employers, or the government, but by the interaction between them, in arrangements that are greatly influenced by path dependency, and therefore difficult to change.

This study also indicates that the protectionist policy for the Mexican textile industry carried out from the late 1920s on was not the result of an import substituting strategy. Protection was not meant to foster the creation of a nonexistent domestic industry. Rather, it was put into place to allow the subsistence of an industry that was forced by labor regulations to exist in technological and organizational terms as a frozen picture of the 1900s. Moreover, high levels of protection were not the result of a *dependentist* ideology, but the consequence of a self-perpetuating situation in which all deciding actors were better off in the short run by promoting such a policy.

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63. This conclusion supports the views of William Lazonick on the importance of the institutions of social power and workers' power on the relationship between effort and pay. However, it challenges his idea that British entrepreneurs could have taken skills off the shop floor simply by investing in management and following a different managerial strategy. Lazonick, *Competitive Advantage on the Shop Floor.*

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