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THE POLITICAL ECONOMY OF PROTECTIONISM: THE EVOLUTION OF LABOR PRODUCTIVITY, INTERNATIONAL COMPETITIVENESS, AND TARIFFS IN THE MEXICAN TEXTILE INDUSTRY, 1900-1950

Abstract

This paper compares prices, costs, and productivity levels c.1911 of a Mexican textile mill with those of mills in the United States and Great Britain and studies the evolution of textile tariff protection. Surprisingly by 1911 CIVSA proved to be relatively competitive. However its international standing deteriorated since then. Two institutional factors explain why CIVSA's productivity levels lagged behind. The first were rigid wage-lists that first appeared in 1912 and remained unchanged for several decades, which prevented the industry from adopting new technology. The second was a protectionist tariff policy that allowed the *status-quo* imposed by the wage-lists to prevail.

Resumen

Este trabajo compara los precios, costos, y niveles de producción c.1911 de una fábrica textil mexicana con aquellos de fábricas en Estados Unidos y Gran Bretaña y estudia la evolución de la protección arancelaria textil. Sorprendentemente hacia 1911 CIVSA era relativamente competitiva. Sin embargo su posición internacional se deterioró de ese momento en adelante. Dos factores institucionales explican por qué los niveles de productividad de CIVSA se rezagaron a lo largo del tiempo. El primero fue las rígidas tarifas salariales mínimas, que aparecieron por primera vez en 1912 y permanecieron sin cambios por varias décadas, transformándose después en contratos-ley, que impidieron a la industria adoptar nueva tecnología. El segundo fue la política proteccionista que permitió que el *status-quo* que imponían las tarifas mínimas (y luego los contratos-ley) prevaleciera.

Introduction

After several years of closing up their economics from international trade as a means of fostering industrial development, several Latin American nations realized that the industrial sectors that 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 nation to continue pursuing protectionist policies, which among other mischiefs, caused recurrent balance of payments crisis, it also appeared that the sacrifices the nations had undertaken to acquire industrial development had been in vain.

The backwardness of Latin American industry has generally been blamed to protectionist policies, which, on their part, have been generally considered the result of ideology. In particular a result of the development of the dependentist and structuralist schools of economic thought sponsored by the ECLA from the 1940s to the 1970s. This explanation has often been complemented with the development of economic models describing how a government can be captured by interest groups to generate such policies. However very few historical work has been undertaken to find out how protectionist policies and industrial backwardness came about.

In this paper I am going to study the evolution of international competitiveness and protection levels in Mexican textile manufactures, which is a paradigmatic example of an over-protected 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? Which were the causes of its demise? Was it always as non-competitive 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. Although operating until the present time with great struggle, it is not 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 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 standing. 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 production relative cost level is carried out to get a full picture of CIVSA's competitive situation from an international perspective c. 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 competitiveness level.

CIVSA's International Competitiveness

How competitive were CIVSA's selling prices compared with English and American prices for similar products? Because yarn was produced using 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 names and qualities. Yet because CIVSA did not sell yarn, no information on yarn costs and sale prices exists in its archives to produce pertinent comparisons. Thus it was necessary to find information on types of cloth made in foreign countries similar to those produced by CIVSA. Table 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%, 8%, or 10% (see Table 1).

Table 1. Prices and Production Costs of Cloth: CIVSA, England, and the United States, 1911 (current pesos).

American Brand	m²/kg	U.S. Price (pesos/m²)	Eng. Price (pesos/m²)	CIVSA's Brand	m²/kg	Production Cost (pesos/m²)	Cost * (5%) (pesos/m²)	Cost * (8%) (pesos/m²)	Cost * (10%) (pesos/m²)	Price (pesos/m²)
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 fantasia*	15.63	$0.12	$0.17	$0.18	$0.19	$0.21

Notes: In order to calculate the additional cost represented by general expenses, depreciation and return on capital, the following data were used: general expenses reported by CIVSA for 1911 were $350,000, depreciation according to calculations explained in chapter 7 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. Source of English and U.S. data: House of Representatives, *Cotton Manufactures, Report of the Tariff Board* (Washington, 1912), 1, 443-444; Source of Mexican data: CV, *Libros de Precios y Costos,* January-December, 1911.

Table 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* (U.S)	Tariff Required* (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 fantasia	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

Notes: * 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. Sources: See Table 1, and Table 4.

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As Table 2 shows CIVSA's prices were 64% higher than American prices and 28% higher than English prices on average. However, once the tariff is added to foreign prices, CIVSA's prices were only 1% higher than American prices and 14% 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 3. Cloth imported by Mexico from the U.S. and the U.K. as a percentage of total cloth imports.

	U.S.		England	
	% Imports (quantity)	*% Imports (value)*	*% Imports (quantity)*	*% Imports (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%

Notes: Tariff schedule paragraphs considered were 458-461 from 1903 to 1905 and 333-336 from 1906-1908. Sources: México, SIICP, *Boletín de Estadística Fiscal,* various years.

Table 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%, in 1911 several of the types of cloth shown in Table 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% 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 3).[1] 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 twenties, but information is not available.

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[1] 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 American business to build.

Table 4. Tariffs for Coarse Unbleached and White Cloth

Year	Pesos/ mts2 or KL	Specific Tariff	Nominal Tariff	Raw Cotton Nominal Tariff	ERP (1)b	ERP (2)b	Year	Pesos/ mts2 or KL	Specific Tariff	Nominal Tariff	Raw Cotton Nominal Tariff	ERP (1)b	ERP (2)b
1901*	$0.22	$0.09	41.5%	19.6%	72.2%	78.8%	1927	$2.63	$5.05	186.3%	10.7%	411.1%	414.8%
1902*	$0.24	$0.09	38.2%	16.7%	67.8%	73.5%	1928	$2.63	$5.10	177.9%	10.4%	392.4%	396.0%
1903*	$0.32	$0.09	28.5%	13.6%	49.3%	53.9%	1929	$2.59	$5.10	183.5%	48.0%	362.5%	378.8%
1904*	$0.25	$0.09	36.1%	13.8%	66.3%	71.0%	1930	$2.75	$2.15	76.4%	27.2%	142.8%	152.0%
1905*	$0.27	$0.10	36.3%	18.6%	61.4%	67.7%	1931	$3.34	$2.15	73.2%	38.5%	122.5%	135.7%
1906*	$0.32	$0.10	30.0%	16.4%	49.5%	55.1%	1932	$2.77	$2.15	76.7%	39.2%	129.9%	143.2%
1907*	$0.23	$0.10	41.6%	15.1%	77.5%	82.7%	1933	$3.21	$2.15	72.2%	52.4%	104.5%	122.3%
1908*	$0.36	$0.10	27.2%	15.7%	44.0%	49.4%	1934	$4.39	$2.15	48.8%	24.9%	82.6%	91.1%
1909*	$0.31	$0.10	30.7%	13.0%	55.0%	59.5%	1935	$3.86	$2.15	58.0%	23.6%	105.1%	113.1%
1910*	$0.40	$0.09	22.4%	10.6%	38.9%	42.5%	1936	$4.05	$2.15	52.7%	21.4%	95.5%	102.8%
1911*	$0.45	$0.09	20.1%	12.5%	31.4%	35.7%	1937	$4.35	$2.15	50.7%	20.4%	91.9%	98.9%
1912*	$0.35	$0.09	26.0%	15.1%	41.9%	47.1%	1938	$4.91	$2.15	51.5%	20.3%	94.0%	101.0%
1913*	$0.49	$0.05	10.3%	13.2%	8.3%	12.8%	1939a	$4.72	$2.15	51.9%	26.0%	88.4%	97.2%
1914*	$0.58	$0.05	8.7%	7.9%	10.7%	13.4%	1939b	$4.19	$2.21	62.5%	26.0%	112.5%	121.3%
1915*	$1.54	$0.05	3.2%	2.9%	4.0%	5.0%	1940	$6.31	$2.21	36.0%	16.7%	63.0%	68.7%
1916*	—	$0.08	---	12.4%	—	---	1941	$5.96	$2.21	50.5%	20.6%	91.4%	98.4%
1917a*	---	$0.08	---	8.0%	---	---	1942	$6.79	$2.21	40.7%	12.8%	78.0%	82.3%
1917b*	---	$0.04	—	0.0%	---	---	1943	$6.43	$2.21	41.1%	10.2%	81.8%	85.3%
1918*	$0.37	$0.05	13.1%	1.6%	27.9%	28.4%	1944	$6.16	$2.21	41.2%	13.2%	78.7%	83.2%
1919*	$0.52	$0.05	9.4%	1.4%	19.9%	20.4%	1945	$12.84	$2.21	33.1%	4.7%	69.8%	71.4%
1920*	$0.71	$0.05	6.9%	1.3%	14.2%	14.6%	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%	1947	$9.73	$2.21	22.7%	9.6%	40.7%	44.0%
1922*	$0.40	$0.10	23.5%	25.9%	24.0%	32.8%	1948	$18.97	$13.96	73.6%	32.7%	130.1%	141.2%
1923*	$0.46	$0.11	24.1%	14.9%	37.9%	43.0%	1949			forbidden	10.0%		
1924	$3.17	$0.96	28.3%	32.0%	28.0%	38.9%	1950			forbidden	16.7%		
1925	$3.11	$0.96	30.1%	8.2%	59.0%	61.8%	1951	$58.01	$23.42	40.4%	12.3%	77.8%	82.0%
1926	$2.87	$0.96	32.5%	11.1%	61.4%	65.2%	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%	1927-1933			129.0%	32.4%	237.9%	249.0%
1911-1920			12.2%	6.9%	19.8%	22.2%	1934-1947			46.3%	17.7%	81.2%	87.2%
1921-1926			26.6%	20.2%	37.4%	44.3%	1948-1955			45.4%	16.7%	83.0%	89.1%

Sources: See footnote 2.[2]

[2] Notes and Sources for Tables 4 and 5. *Notes*: a) The value added in the industry was 44% it was calculated by subtracting the cost of materials, fuels, and purchased electric energy from the value of products. It is reported as a percentage of the value of the final product. b) The ERP was calculated as indicated in footnote 5, c) Two coefficients for raw cotton were used for the ERP calculation. The first coefficient for raw cotton .50 was that which prevailed in the U.S. industry in 1905, the second .35 was the 1900-10 average of cotton expenses as a percentage of net sales at CIVSA. The first was used for ERP1 and the second for ERP2 d) 1917a goes from January to July 18, 1917, e) 1917b goes from July 19 to December 14, 1917. e) Given that the number of tariff schedules increases with time they were weighted after 1924 according to the share of kilos imported of each kind in three periods 1924-1929, 1931-1939, and 1939-1955. 1939 appears twice because the first was calculated using both shares. *Sources*: Data for the value added and raw cotton coefficient

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Although the Mexican cotton textile industry enjoyed high protection levels during the Porfiriato (see Tables 4 and 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 actually 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 4 describes (paragraphs 315-317 of the U.S. tariff schedule) rose from 20.68% to 52.22%, depending on the particular kind of cloth. The simple average of all duties for unbleached cloth in paragraphs 315-317 was 34.9%. American tariffs for fine unbleached cloth comparable to that described in Table 5 (paragraphs 318-319 of the U.S. tariff schedule) ranged from 36.45% to 48.05%; its simple average was 41.8%.[3] In Mexico the comparable *ad valorem* equivalent tariffs for 1911 were 20.1% and 26% respectively. American tariffs for 1911 were even higher than the average Mexican duties for 1900-1910 of 33.3% and 40.5% respectively. Because raw cotton was tariff-free in the United States, effective protection rates[4] were even higher in that country with respect to Mexico than the difference suggested by their *ad valorem* tariffs.

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are taken from the U.S. Manufacturing Census of 1905. The U.S. industry was chosen as a proxy of the world's industry for lack of other data. In order to transform nominal into ad-valorem tariffs, information on prices were necessary. This was obtained for the period 1900-1923 from United States, *Foreign Commerce and Navigation of the United States* (Washington, D.C.), various years. Cloth prices were obtained by dividing the total value of U.S. exports to Mexico by its total quantity. It was transformed from square yards to square meters. (1 mt^2 = 1.196 yd^2). For the rest of the period both prices and tariffs were in terms of pesos per kilo. The sources are: Estados Unidos Mexicanos, Departamento de la Estadística Nacional, *Anuario Estadístico. Comercio Exterior y Navegación.* Estados Unidos Mexicanos, Secretaría de la Economía Nacional, *Estadística del Comercio Exterior.* and Estados unidos Mexicanos, *Anuario Estadístico del Comercio Exterior de los Estados Unidos Mexicanos.* I am indebted to Edward Beatty for his help in the calculation of these figures and for providing me very valuable information.

[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 Representatives, *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 calculated using the following formula: $ERP= (W_i - V_i)/V_i$ where W_i is the percentage excess of domestic 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 between 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_{ct} is the coefficient 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. Bela Balassa and Associates, *The Structure of Protection in Developing Countries* (Baltimore and London, 1971), 5-6, and 315-318. I am grateful to Graciela Márquez for her explanations of this subject.

Table 5. Tariffs for Fine White and Unbleached Cloth

Year	Pesos/ mts2 or KL	Specific Tariff	Nominal Tariff	Raw Cotton Nominal Tariff	ERP (1)	ERP (2)	Year	Pesos/ mts2 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%	1927	$3.46	$7.33	215.0%	10.7%	476.5%	480.1%
1902*	$0.24	$0.11	46.7%	16.7%	87.0%	92.7%	1928	$3.64	$8.38	228.4%	10.4%	507.3%	510.8%
1903*	$0.32	$0.11	34.8%	13.6%	63.7%	68.3%	1929	$3.52	$8.38	241.5%	48.0%	494.2%	510.6%
1904*	$0.25	$0.11	44.1%	13.8%	84.5%	89.2%	1930	$4.09	$3.42	84.5%	27.2%	161.1%	170.3%
1905*	$0.27	$0.12	43.8%	18.6%	78.4%	84.7%	1931	$4.02	$3.42	86.9%	38.5%	153.6%	166.8%
1906*	$0.32	$0.12	36.2%	16.4%	63.6%	69.2%	1932	$4.19	$3.42	83.1%	39.2%	144.3%	157.6%
1907*	$0.23	$0.12	50.2%	15.1%	97.1%	102.2%	1933	$5.15	$3.42	70.3%	52.4%	100.1%	118.0%
1908*	$0.36	$0.12	32.8%	15.7%	56.8%	62.1%	1934	$6.57	$3.42	53.3%	24.9%	92.9%	101.4%
1909*	$0.31	$0.12	37.1%	13.0%	69.4%	73.9%	1935	$6.11	$3.42	55.6%	23.6%	99.6%	107.6%
1910*	$0.40	$0.12	29.0%	10.6%	53.9%	57.5%	1936	$5.64	$3.42	59.8%	21.4%	111.6%	118.9%
1911*	$0.45	$0.12	26.0%	12.5%	44.9%	49.2%	1937	$5.90	$3.42	59.6%	20.4%	112.2%	119.1%
1912*	$0.35	$0.12	33.7%	15.1%	59.4%	64.5%	1938	$7.48	$3.42	46.7%	20.3%	83.0%	90.0%
1913*	$0.49	$0.07	13.4%	13.2%	15.3%	19.8%	1939a	$8.61	$3.42	40.0%	26.0%	61.3%	70.1%
1914*	$0.58	$0.07	11.3%	7.9%	16.6%	19.3%	1939b	$9.66	$3.68	40.5%	26.0%	62.6%	71.4%
1915*	$1.54	$0.07	4.2%	2.9%	6.3%	7.3%	1940	$11.68	$3.68	36.2%	16.7%	63.4%	69.1%
1916*	---	$0.11	---	12.4%	---	---	1941	$10.42	$3.68	36.2%	20.6%	58.9%	65.9%
1917a*	---	$0.11	---	8.0%	---	---	1942	$14.65	$3.68	25.3%	12.8%	42.9%	47.3%
1917b*	---	$0.11	---	0.0%	---	---	1943	$16.79	$3.68	22.7%	10.2%	40.1%	43.5%
1918*	$0.37	$0.10	25.6%	1.6%	56.4%	56.9%	1944	$19.98	$3.68	20.7%	13.2%	32.0%	36.5%
1919*	$0.52	$0.10	18.5%	1.4%	40.5%	41.0%	1945	$20.28	$3.68	18.1%	4.7%	35.8%	37.5%
1920*	$0.71	$0.10	13.5%	1.3%	29.3%	29.7%	1946	$23.98	$3.68	17.9%	15.4%	23.2%	28.5%
1921*	$0.36	$0.11	31.3%	29.2%	37.9%	47.9%	1947	$31.87	$3.68	12.1%	9.6%	16.5%	19.8%
1922*	$0.40	$0.14	33.4%	25.9%	46.5%	55.3%	1948	$18.97	$13.96	73.6%	32.7%	130.1%	141.2%
1923*	$0.46	$1.52	30.6%	14.9%	52.6%	57.7%	1949	$24.30	forbidden	forbidden	10.0%		
1924	$3.90	$1.52	38.9%	32.0%	52.1%	63.0%	1950	$30.78	forbidden	forbidden	16.7%		
1925	$4.06	$1.52	37.5%	8.2%	75.8%	78.6%	1951	$58.01	$23.42	40.4%	12.3%	77.8%	82.0%
1926	$3.71	$1.52	40.8%	11.1%	80.2%	84.0%	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			40.5%	15.3%	74.8%	80.0%	1927-1933			156.5%	32.4%	291.0%	302.0%
1911-1920			18.3%	6.9%	33.6%	36.0%	1934-1947			38.4%	17.7%	62.4%	68.4%
1921-1926			35.4%	20.2%	57.5%	64.4%	1948-1955			45.4%	16.7%	83.0%	89.1%

Sources: See footnote 2.

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 was on average 20% more expensive at CIVSA than in the U.S. 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 did, with a variation of only a few cents. [5]

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

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[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 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% instead of 25% (as Table 4 indicates). House of Representatives, *Cotton Manufactures, Report of the Tariff Board* (Washington, 1912), 410. Prices compared were spot prices of "Upland Middling" at New York, from U.S. Department of Commerce, *Historical Statistics of the United States* (Washington 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.

Table 6. Pounds per Spindle and Cost of Labor per Pound: CIVSA, the U.S., and the U.K.

| Yarn | CIVSA (ring spindles) | | U.S. (ring spindles) | | U.K. (mule spindles) | |
	Pounds per spindle (11 hours)	Cost of Labor per pound	Pounds per spindle (10 hours)	Cost of Labor per pound	Pounds per spindle (10 hours)	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%

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 U.S. 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 U.S. the figure for warp number 28 were used. Sources: CV, Payrolls 1911 (Week 6) and U.S. House of Representatives, *Cotton Manufactures* (Washington, 1912), I, 410-412.

In spinning, the low wages in Mexico relative to those in the U.S. and the U.K. allowed CIVSA to enjoy lower costs of labor per pound of yarn spun than American or English mills.[8] Yet CIVSA produced a considerably lower quantity of yarn per spindle than its American counterpart (see Table 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

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[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 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 weaving technologies used were not equal throughout the world. Gregory Clark, "Why Isn't the Whole World Developed? Lessons from the Cotton Mills," *Journal of Economic History*, XIVII/1, (March 1987), 151.

[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

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

A comparison of the 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 workers U.S. mills did (183%), labor costs were only 70% of those in the U.S. (see Table 7). However, the Japanese industry, paying even lower wages, but not competing with Mexican mills, had lower labor costs than CIVSA (94%), in spite of employing more than twice the workers CIVSA did (240%).

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weekly 167.6 pounds of yarn number 28, but 100 mule spindles only 111.6 pounds. Leunig, *op.cit.*, 174.

[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, *op.cit.*, I, 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?" *op.cit.*, 144.

Table 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)	United States (southern mill)			Japan			CIVSA		
		Number of Workers	Approx. total daily earnings (10 hours)	Approx. daily earnings per worker (10 hours)	Number of Workers	Approx. total daily earnings (11 hours)	Approx. daily earnings per worker (11 hours)	Number of Workers	Approx. total daily earnings (11 hours)	Approx. daily earnings per worker (11 hours)
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			
Oilers		4	$4.00	$1.00	2	$0.45	$0.23	2	$0.95	$0.48
Sweepers	Barrendero	3	$2.40	$0.80	(a)			6	$1.78	$0.30
Dollers	Mudadores	30	$21.00	$0.70	(b)			19	$3.17	$0.17
Band boy	Bandera							1	$0.81	$0.81
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			
Bundling press hands					15	$2.10	$0.14			
TOTAL		180	$211.51	$1.18	794	$139.57	$0.18	330	$148.87	$0.45

Notes: a) Not obtained, b) In Japan doffing was frequently done by the spinner and not by separate operatives. 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. Data from CIVSA comes from CV, Payrolls, 1911 (Week 6).

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 8 shows, CIVSA (with 1,380 looms) employed almost seven times (676%) the number of workers U.S. mills employed to tend a 1,000 loom weaving mill, and paid more

than twice the wages (219%). Because wages per worker were higher in Mexico than in Japan, CIVSA paid more than twice the total wages Japanese mills did (261%), although it employed almost the same number of workers (98%). 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 mill was $84.27, $274.08, and $129.50 respectively. Labor costs at CIVSA's weaving department were far higher than in the U.S., and even 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 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 on 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 working with plain power looms seldom tended more than four of them, while in the United States a weaver working on automatic looms generally tended twenty of them.[16]

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[11] Whereas in 1911 less than 1% of the looms working in England were automatic more than 30% of the American looms were automatic. In other words, 200,000 out of 665,049 looms working in 1910. House of Representatives, *op.cit.*, I, 11and 169.

[12] Lazonick, *Competitive Advantage, op.cit.*, 163.

[13] Anna P. Benson, *Textile Machines*, Shire Album 103 (Lowell, Mass., 1983), 27; Geo. Draper & Sons., *Facts and Figures for Textile Manufacturers* (Hopedale, Mass., 1896), 174.

[14] Geo. Draper & Sons., *op.cit.*, 163-173.

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

[16] House of Representatives, *op.cit.*, I, 11.

Table 8. Employees Necessary to Operate a Mill with 1,000 Looms: the United States, Japan, and CIVSA (1380 looms), 1911.

Occupation (English)	Occupation (Spanish)	United States (northern mill)			Japan			CIVSA		
		Number of workers	Approx. total daily earnings (10 hours)	Approx. daily earnings per worker (10 hours)	Number of workers	Approx. total daily earnings (11 hours)	Approx. daily earnings per worker (11 hours)	Number of workers	Approx. total daily earnings (11 hours)	Approx. daily earnings per worker (11 hours)
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	b)			16	$23.84	$1.49
Loom fixer helpers	Ayudantes Correiteros							5	$4.82	$0.96
Weavers	Tejedor e)	53	$84.27	$1.59	700	$129.50	$0.19	613	$274.08	$0.45
Filling carriers	Carretero	3	$3.42	$1.14	5	$0.70	$0.14	15	$3.57	$0.24
Extra day hands	Aviaduras	4	$4.01	$1.00	b)			1	$0.38	$0.38
Smash hands		1	$1.58	$1.58	b)					
Oilers	Aceitador	3	$4.06	$1.35	d)			9	$3.88	$0.43
Sweepers (loom cleaners)	Barrenderos	8	$10.50	$1.31	b)			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	$1.47	850	$151.56	$0.18	832	$395.31	$0.48

Notes: a) The slasher room was supervised by the weaving-room overseer, b) Not obtained, 3) Northrop looms used in the United States, d) Oiling done by weavers.

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

In the United States, however, weavers working with plain power looms rarely tended fewer than six looms, 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

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[17] *Ibid.*

[18] Such as bringing the weft from the storeroom, sweeping, oiling, cleaning, examining the roll of cloth, and repairing imperfections, trimming the edges, picking off threads, and carrying cloth to cloth room. House of Representatives, *op.cit.*, I, 480.

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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% and 18% respectively of the total labor force in the weaving department, compared to 57% in the American mill. A significant part of the difference between the number of looms tended in the U.S. and CIVSA may also have been due to the fact that CIVSA's weavers were not relieved of unskilled chores to the same extent 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 brands. 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 American and British industries. Yet CIVSA's production costs, even considering rates of return of 8% or 10%, 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 a 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 both aspects of the problem: real wages and the

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[19] *Ibid.*

ability to introduce new technology and device changes in the ways labor is organized at the shop-floor.

The Industry's Secular Decline in International Competitiveness

Although international competitiveness and comparative productivity levels attained in 1911 by CIVSA were modest, as time went by 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 through the period, while meters per worker produced weekly diminished by a small amount from the first decade of the century to the 1920's and a little more during the Revolution; the same was true for spinning. However, because working hours diminished and production per worker did not, productivity per hour worked increased (see Tables 9 and 10).[21] Whereas real wages increased substantially after 1917, productivity did not and therefore real wages per meter of output rose notably after that date (See Figure 1). This result explains in part the deterioration in profitability rates that the firm experienced after that date (See Table 11).

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[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% of yarn and cloth imports were subject to import permits these were reduced to 3.4% in December 1985 and to 1.9% in May 1988. Average ad valorem tariffs went down from 42.5% in December 1985 to 13.8% in December 1987. Carlos Márquez Padilla, " La Competitividad de la Industria Textil" in Fernando Clavijo and José I. Casar (Comps.) *La Industria Mexicana en el Mercado Mundial* (Mexico City, 1994), 110-111.

[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, *Capital* (New York, Vintage, 1977), I, 536n, quoted in Lazonick, *Competitive Advantage on the Shop Floor, op.cit.*, 63

Figure 1. Average Weekly and Hourly Real Wages (Pesos of 1900)
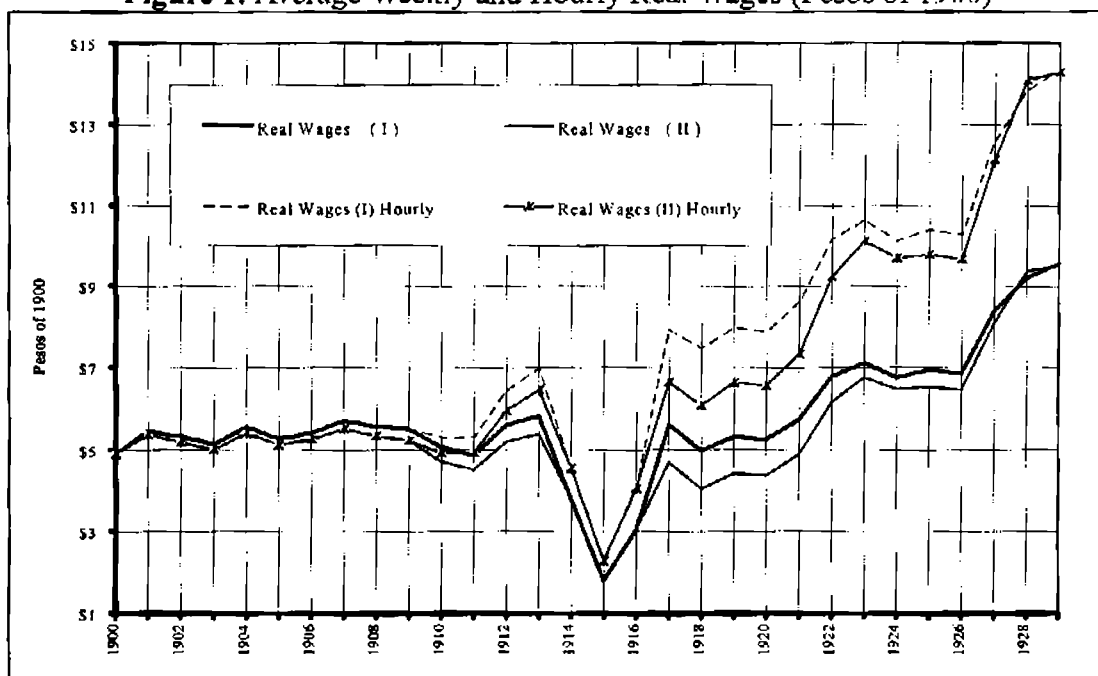
(I) Wages deflated with the Consumer Price Index including all items.

(II) Wages deflated with the Consumer Price Index without CIVSA's rent and electric light.

* From 1914 to 1915 I used the gold value of wages as a proxy for the real wages. Real wage per hour takes into account changes in the length of the workday: 12 hours from January 1900 to July 1910, 11 hours from August 1910 to August 1912, 10 hours from September 1912 to July 1915, 9 hours from August 1915 to April 1917 and 8 hours from May 1917 on.

**Hourly wages are not what workers were actually paid, but a figure that shows what would have workers earned with the new wage rates, assuming they would have continued working a 72 hour shift.

For a detailed explanation of sources used and the methodology followed see: Aurora Gómez Galvarriato and Aldo Musacchio, 1998.

After 1930 the number of looms tended per weaver gradually increased to reach 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.

Table 9. Weavers' Productivity 1900-1930[22]

	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
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
1900-1910	625.5	8.7	262.5	2.39	$0.009	$4.36	3.59
1911-1920	587.6	10.3	222.4	2.64	$0.010	$7.03	4.53
1921-1929	590.9	11.6	244.3	2.42	$0.016	$13.42	4.68
1931-1940	713.5	15.9	209.7	3.40	$0.018	$12.67	4.68
1941-1950	751.6	15.8	199.3	3.77	$0.018	$13.86	4.19

[22] Source: Meters per loom and wage per meter was obtained from a sample of thirty weavers from CV, Payrolls, June and November 1900-1930 and looms per workers were taken from CV, Payrolls Week 6, 1900-1930. 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 y Margarita Reyna "El Nuevo Indice de Precios al Mayoreo en la Ciudad de México de la Secretaría de la Economía Nacional" en El Trimestre Económico,

Given the radical change experienced on the shop-floor from control by 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 get as much done as their strength allowed. In addition, once the shift was reduced, companies became more strict about arrival and exit times.[23]

México 1943, pp.1-63. From 1943 to 1950 the price index came from NAFINSA, *50 años de Revolución en Cifras*, México, 1963, p.109.

[23] Once the eight-hour shift was established punctuality 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, Río 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. CD, CR, Río Blanco office to Governor, Córdoba, June 13, 1917.

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Table 10. Spinners' Productivity 1900-1930 (1900 pesos)[24]

	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	$0.033	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
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
1900-1910	$0.028	232.7	3.24	$0.035	234.4	3.15
1911-1920	$0.027	197.2	3.99	$0.030	216.2	4.25
1921-1929	$0.044	215.8	4.53	$0.047	228.7	4.90
1931-1940	$0.054	183.7	4.06	$0.056	284.5	5.01
1941-1950	$0.051	109.9	3.93	$0.057	167.6	4.72

[24] Source: A sample was taken from CV, Payrolls, June and November 1900-1930. Wages were

Table 11. CIVSA's Return on Assets and Equity, 1899-1929.

	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%
1900-1910		**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%
1911-1920		**6.72%**	**7.73%**	**4.02%**	**3.45%**
1921	285.68	14.81%	17.49%	8.41%	6.12%
1922	228.96	11.44%	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%
1921-1929		**5.89%**	**6.61%**	**3.78%**	**2.86%**

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

deflated

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 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:[25]

$$GROWTH_t = -0.005 + 0.62(PROFITRATE_{t-1} + PROFITRATE_{t-2} + PROFITRATE_{t-3})/3$$

(-0.29) (2.02) $R^2 = 0.14$, 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. Results of this regression show a clear association between investment and profits for CIVSA, indicating that the decline in profit rates after the Porfiriato counts for a significant part of the drop in investment rates after 1912.[26] 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 pursued in the late 1920s.

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[25] 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.

[26] A similar regression was run by Susan Wolcott and Gregory Clark for the Indian textile industry (using panel data of several mills from 1907-1938) yielding very similar results. Susan Wolcott and Gregory Clark, "Why Nations Fail: Managerial Decisions and Performance in Indian Cotton Textiles, 1890-1938", *Journal of Economic History*, 59/2 (June 1999), 407.

Figure 2. Investments in Real Estate, Machinery and Equipment at CIVSA.
(As percentage of total fixed assets)
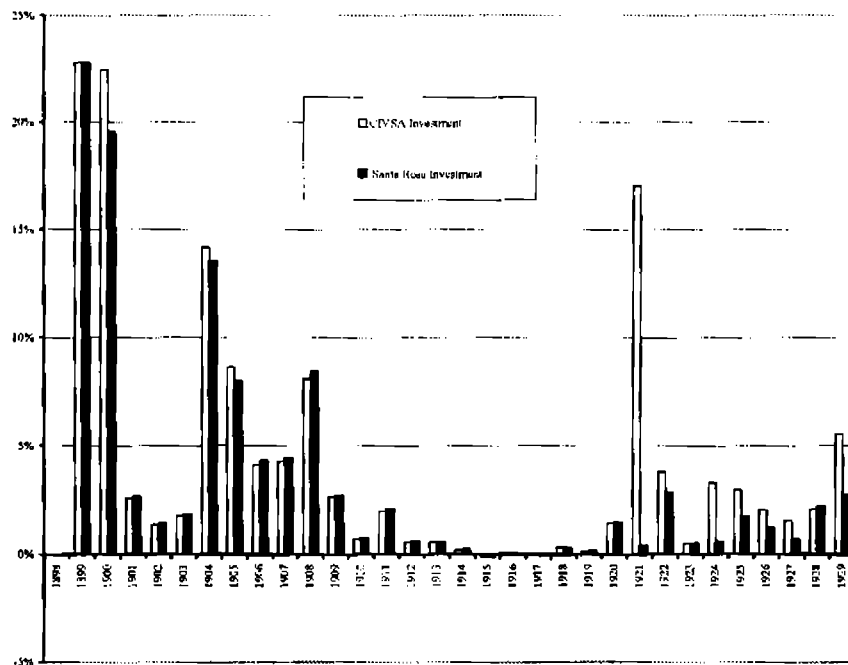
Source: CIVSA and Santa Rosa General Balances 1900-1929.

New technology adopted by the textile industry worldwide was not introduced in Mexican mills. One of the most notable improvements in textile production was the introduction of automatic looms.[27] Other important technological changes that became widespread in the 1920s were the following: a) double-length looms which increased weavers' productivity; b) the one-process picker *(batiente de un solo proceso)*, which reduced bale-breaking, lapping, and picking to only one step; c) high-speed warping *(altos estirajes)*, which reduced the number of times yarn was passed through the fly frames *(veloces)*; and d) the use of artificial silk (rayon) to mix with cotton.[28]

Automatic looms were not introduced by CIVSA in the 1900s because they demanded higher investment because their price was two-and-a-half times that of an ordinary power loom. Moreover, at their early stage of development,

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[27] México, Secretaría de la Economia Nacional [Juan Chávez Orozco], "Monografía Económico-Industrial de la Fabricación de Hilados y Tejidos de Algodón" (Mimeo, Mexico City, 1933), 66.

[28] Segunda Ponencia de la Compañía 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, *La Revolución Industrial y la Industria Textil en México* (Mexico City, 1990), II, 239-248, 257-262, and 279-280.

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they required more technical assistance than power looms. Because specialized technical assistance was relatively expensive in Mexico, this meant a significant additional cost.[29] 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 through 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.[30]

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 they would not have been enough to show what "automation" could do.[31]

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 General Obregón, to deal later with Luis N. Morones about the installation and operation of these machines."[32] 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 treats and promptly resigned.

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[29] A full discussion of these issues can be found in Aurora Gómez-Galvarriato, " The Impact of Revolution," pp.152-156.

[30] 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, U.S. Bureau of Foreign and Domestic Commerce, Special Agents Series No. 31, *Cotton Goods in Latin America*, Part I (Washington, 1909), 22.|

[31] Rivero Quijano, *op.cit.*, 278

[32] *Ibid.*

No one else dared to tend the looms, and they were abandoned until some technicians transformed them into ordinary power looms.[33]

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 1925-1927 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.[34]

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 industry-wide 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.[35] 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. [36]

As in England, by lowering piece-rates on larger and faster spinning frames, wage-lists encouraged capitalists to try to maximize spindles per workers.[37] 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."[38]

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

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[33] *Ibid.*

[34] México, Secretaría de la Economía Nacional [Juan Chávez Orozco], *op.cit.*, 67

[35] *Ibid*, 418.

[36] *Ibid.*

[37] 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. Lazonick, *Competitive Advantage, op.cit.*, 163.

[38] *Ibid.*, 163-164.

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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 carding machines, were greater than the benefits the mills would obtain through cost reductions.[39]

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.[40] 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 over-representation of smaller, more old-fashioned mills in the Convention may also have contributed to this result.[41]

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.[42] 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, that would generate substantial savings. CIVSA's board of directors decided to

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[39] Naciones Unidas, Departamento de Asuntos Económicos, *Productividad de la Mano de Obra en la Industria Textil Algodonera de Cinco Países Latinoamericanos* (New York, 1951), 14.

[40] Saco Lowell Shops to Presidencia de la Convención, August 7, 1926, AGN, DT, 979/3.

[41] 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], *La Industria Textil en México: El Problema Obrero y los Problemas Económicos* (Mexico City, 1934), 48

[42] CV, AC, July 12, 1927.

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, but at least until the end of 1930 they proved fruitless.[43]

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.[44] Aggregate data for Mexico's textile industry show little investment.[45] Although some new factories were built in the twenties, most of them were small establishments devoted to the production of knitwear (*boneteria*), mainly of artificial silk. This is why, although the number of factories increased by 22% from 1921 to 1930, the number of active spindles and looms increased only by 9% and 8% respectively (see Table 3). Machinery per worker (measured in loom equivalents), that increased during the last decade of the Porfiriato by 18%, increased by only 5% 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 (1) the implementation of the Convention's wages per piece, which increased labor intensity, and (2) 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."[46]

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[43] CV, AC, May 14 1929.

[44] México, Secretaria de la Economía Nacional, [Juan Chávez Orozco], *op.cit.*, 67, and México, Secretaria de la Economía Nacional [Moisés T. de la Peña], *op.cit.*, 187-191.

[45] National data on the cotton textile industry was obtained from the following sources: For 1900-1911: México, SHCP, *Boletin de Estadística Fiscal*, several issues, México, *The Mexican Year Book 1908*.:523-531, 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, "Estadistica semestral de las fcas. de hilados y tejidos de algodón de la Reública Mexicana correspondiente al semestre de 1913". For 1914-1920: Stephen Haber, *Industry and Underdevelopment. The Industrialization of Mexico 1890-1940* (Stanford, 1989), 124; and México, Secretaría de la Economía Nacional, [Moisés T. de la Peña], *op.cit.*, 14 and 126. For 1921-24: México, Poder Ejecutivo Federal, Departamento de Estadística Nacional, *Aspectos Económicos de un Quinquenio: 1921-1925*, 8-29; *Boletin de Estadística*, January 1924, 52-55; *Estadística Nacional*, September 30, 1925, 5-17. For 1925-1930: 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.

[46] México, Secretaría de la Economía Nacional [Juan Chávez Orozco], *op.cit.*, 63.

Table 12. The Mexican Textile Industry 1900-1934

	Active Mills	Spindles	Looms	Workers	Workers (adj)	Cotton[a] Cons.	Sales (nominal)	Sales (in pesos of 1900)	Loom Eq. per Worker	Loom Eq. 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	27,828	$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	28,641	$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	22,778	31,673	31,673	35,878	$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	32,126	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	$25,188	1.06	1.59		$758
1920	120	753,837	27,301	37,936	25,291	31,694	$170,492	$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
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	28,888	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	$106,396	$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	831,496	30,090	38,804	25,869	39,437	$97,162	$37,233	1.01	1.52	1,016	$960
1930	143	842,285	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	$34,818	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	855,258	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
1900-1910	-8.2%	26.1%	45.4%	19.4%	19.4%	19.8%	42.8%	10.3%	0.97	0.97	1,079	$1,277
1911-1920	0.8%	3.9%	11.7%	18.0%	-21.3%	-8.3%	134.7%	-6.1%	1.06	1.46	981	$1,036
1921-1926	15.0%	11.8%	14.6%	16.6%	16.6%	31.0%	-20.8%	-7.5%	0.96	1.44	888	$812
1927-1934	10.8%	4.5%	3.2%	-4.7%	-4.7%	-42.0%	-29.2%	-9.4%	1.06	1.58	882	$888

Sources: See footnote No. 33. Notes: Loom equivalents have been calculated following Gregory Clark, "Why Isn't the Whole World Developed? Lessons from the Cotton Mills," *Journal of Economic History*, Vol XLVII. No. I, March 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.

Increased protection levels were necessary to keep Mexican mills running. As Tables 4 and 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 protectionists 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

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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.[47] 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 the inaugural address that "free national and international competition" was one of the main principles behind the revolutionary industrial policy.[48]

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.[49]

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 onwards also created incentives for increased protection all through 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 decrease 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 when 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

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[47] Daniel Cosío y Villegas, *La Cuestión Arancelaria en México* (Mexico City, 1932), 99.

[48] Alberto Pani, "Alocución de bienvenida a los delegados por el Sr. Ingeniero D. Alberto Pani, Secretario de Industria y Comercio," in México, Secretaría de Industria, Comercio, y Trabajo, *Reseña y Memorias del Primer Congreso Nacional de Industriales* (Mexico City, 1918), 46.

[49] Increased foreign competition must be part of the reason why CIVSA's markup (price/costs) decreased from 96% from 1904-1908 to 45% from 1923-1927.

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 giving further protection. Moreover after 1947, the import of specific items in the tariff schedule were forbidden for some years (see Tables 4 and 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 flexible wage schedule, the Textile Workers' and Industrialists' Convention of 1937-1939 kept it unchanged.[50]

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 general 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."[51] 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 on that year, to carry out the project.[52] However, despite of their efforts, they had no success.[53] Only new plants established after the war

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[50] 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.

[51] CV, AAG, February, 26 1927.

[52] *Ibid.*

[53] 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 opposed to participate in the project and it was also dissolved. The Minister of Industry and Labor asked to 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 processes. 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.

were exempt from restrictions imposed by the industry-wide labor contract and some modern mills were established.[54] 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% of the looms, 38.28% of the spinning frames, and 52.98% of the carding machines).[55]

In 1950, CIVSA's president explained that after several months of negotiations, restrictions on the modernization of the industry had not been lifted.[56] 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 flexibilization of the legal restrictions on the use of new technology. However, a minority of industrialists in favor of continuing to work with out-dated machinery together with the unions were able to prevent any modification of the labor laws and wage-lists.[57]

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."[58]

From 1951 onwards the "General Rules for the Modernization of the Textile Industry" were included as an addendum to the wage-list.[59] These rules allowed more flexibility in the operation of modern machinery,[60] 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, 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

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[54] The International Bank for Reconstruction and Development, *The Economic Development of Mexico* (Baltimore, 1953), 69, and CV, AAG, February 28 1928.

[55] Javier Barajas Manzano, *Aspectos de la Industria Textil del Algodón en México* (Mexico City, 1959), 51.

[56] CV, AAG, March 20 1950.

[57] CV, AAG, March 21 1951.

[58] The International Bank for Reconstruction and Development, *op.cit.,69.*

[59] *Diario Oficial,* February 6 1951.

[60] 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 (28th rule).

modernization of the industry.[61] The members of the "National Union for the Modernization of the Textile Industry" considered 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 interest of firms operating with old machinery "that only seek for their indefinite subsistence" was opposed to modernization. Since out-dated firms had the majority of the 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, out-dated 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.[62] Although these new laws permitted the creation of some modern mills and 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 13).

Table 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.

[61] *Diario Oficial*, October 23 1950.

[62] *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

At the 1945 Textile Convention CIDOSA presented a detailed comparative analysis of productivity levels in the Mexican, American, and English industries.[63] Its results showed the disastrous state the Mexican industry (see Table 12). 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.[64] 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 it was gradually phased in allowing the industry to implement certain technological changes (i.e. installing the warp stop motion system in plain looms).[65]

Table 14. Productivity Comparisons c. 1945.

	U.S.	England	Mexico	Mex. vs U.S.	Mex. vs Eng.
Spinning					
Warp No.9 a)					
kg. 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)					
kg. per worker per hour	4.45	2.32	1.13	25%	49%
total labor	101	195	399	395%	205%
Weaving					
Coarse unbleached cloth c)					
m. per worker per hour	32.4	12.8	9.8	30%	77%
total labor	890	2,252	2,941	330%	131%
Medium q. unbleached cloth d)					
m. per worker per hour	44.5	14	9.4	21%	67%
total labor	337	1,072	1,599	474%	149%

[63] 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 U.S. in March - April 1944.

[64] Segunda Ponencia de la Compañia Industrial de Orizaba S..A. *op.cit.*, 195.

[65] *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, op.cit.*, 56.

Notes: The basis of comparison used was as follows: 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. 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, 175-190. Data for spinning and weaving are the sum of the different parts of both processes, including yarn preparation and cloth preparation and reception.

A United Nations study on the productivity of the Latin American textile industry published in 1951 indicated that as many as 85% of the spindles and 95% of the looms working in Mexico were out-of-date, that is, built during the first quarter of the century or earlier.[66] Likewise, a Mexican public financial study (Nafinsa) reported that in 1957, 34.4% of the spindles, 46% of the carding machines, and 33% 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,[67] and where the mills were older. In this state 67% of the spindles, 72% of the carding machines, and 73% of the looms working in 1957 had been manufactured before 1910.[68] The industry gradually moved away from those states where the labor movement was strongest, wages highest, and labor regulations most effective. In 1923, 20.8% of spindles and 22.37% of looms in Mexico were in Veracruz, but 1950 these figures had declined to 14.81% and 17.81% respectively.[69] In the end, the strength of Veracruz' labor movement was the cause of its own demise.[70]

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[66] Naciones Unidas, *op.cit.*, 87.

[67] Legal wages and regulations were only important where the labor movement was strong enough to enforce them. In 1958 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, *op.cit.*, 28.

[68] Barajas, *op.cit.*, 67-74, 97-99.

[69] *Ibid.*, 44.

[70] 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, *op.cit.*, 148-159, and 179-196.

According to the United Nations study, the number of man-hours-per-kilogram of production was 269% higher in the Mexican cotton textile industry than in a standard modern industry. Modernization of equipment could increase productivity by 260% in spinning and 281% 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.[71] 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% of the annual aggregate investment made in Mexico in 1957. If the process had taken place over 10 years, it would have generated an annual displacement of 896.53 workers, who could have been relocated to other sectors.[72]

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.[73] 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 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%, wages in the cotton textile industry fell by 38%.[74] Moreover, wages paid by old mills were far lower than those established by law for modern ones. The 1955 wage-list (*Contratos 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.[75]

Government's protectionist policy placed the 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."[76] However, modernization of the industry could not be postponed forever, and as time went by and the industry became more out-dated, the problem became increasingly difficult to solve.

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[71] Naciones Unidas, *op.cit.*,87.

[72] Barajas, *op.cit.*, 149

[73] The International Bank of Reconstruction and Development, *op.cit.*, 69, and Naciones Unidas, *op.cit.*, 87.

[74] Barajas, *op.cit.*, 31.

[75] *Ibid.*, 33

[76] The International Bank of Reconstruction and Development, *op.cit.*, 69

Mexico was not alone in this difficult quandary. In Río de Janeiro, 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 those in Mexico.[77] 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.

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 without much risk 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 for it? The deterioration of relative productivity and competitiveness 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 the technology employed by the industry unchanged. Unemployment, widespread bankruptcies, and social unrest were the alternatives. Yet every time the decision to change the textile labor contract and 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

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[77] It is interesting to note that in Sao Paulo Brazil, these restrictions were less important than in Río 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 19th century or the beginning of the 20th century, when most of the mills were founded. Because the textile industry developed later in São Paulo than in Río 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, *op.cit.*, 1-17, 20, 55, 74, and 112.

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.[78]

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 until 1972 with few modifications.[79] 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 levels of competitiveness and productivity, as Lazonick has pointed out.[80] In accordance with

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[78] Whereas manufacturing production increased by an annual rate of 4.60% between 1986 and 1990, textile industry production rose only by 0.97%. This hides the even worst performance of the weaving and spinning sector of the industry, which did worst than other sub sectors in the textile industry. Its production in terms of real pesos declined by 13% from 1980 to 1991, and its employment by 8%. 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 Martínez, "Implicaciones del Libre Comercio sobre la Industria Textil Mexican: 1986-1991," B.A. thesis, UNAM, 1994 appendix, Table 12; Gary Gerreffi and Jennifer Bair, "En Búsqueda del Desarrollo Integrado en México," in *Trabajo*, Year 1, No.2, December 1998, 160; Márquez, *op.cit.*, 98-100.

[79] December 31, 1972 was the due date to implement a new operating system based on workloads. *Diario Oficial*, September 15 1980, 15, Chapter VI, Article 45. The wage-list of 1966 was the first to allow that plain loom weavers tended more than 4 looms, on the condition that the union agreed to it and that the weaver was paid 45% of the wages set for the normal load on the extra quantities produced with the additional machinery. *Diario Oficial*, december 24, 1966, Chapter VI, 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, *op.cit.*, 117-126. By 1994 the industry wide collective contract (*Contrato-Ley*) of the textile industry had recently been suppressed. Márquez, *op.cit.* 123.

[80] 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

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."[81] 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 manning 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 fearful of going bankrupt. However, the power of these two actors 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 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 non-existent domestic industry. Rather it was put into place to allow the subsistence of an industry that was forced by labor regulations to exist as a frozen picture of the 1900s in technological and organizational terms. 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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investing in management and following a different managerial strategy. Lazonick, *Competitive Advantage, op.cit. passim.*

[81] Wolcott and Clark, *op.cit.*, 421.

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