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CIDE

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Aurora Gómez Galvarriato
THE EVOLUTION OF PRICES AND REAL WAGES
IN MEXICO FROM THE PORFIRIATO
TO THE REVOLUTION

*Introducción**

What is the impact of popular revolutions on workers standards' of living? This paper seeks to answer this question for the case of the Mexican Revolution (1910-1920). In terms of economic history two important conclusions are often made. First, that workers' living standards deteriorated during the last decade of the Porfiriato, despite remarkable economic growth, because of markedly rising prices. Secondly, the Revolution is believed to have improved living standards for workers and peasants. The first of these beliefs has been supported quantitatively by the work of Fernando Rosenzweig and the group he coordinated at the Colegio de México to build a Price Index for the Porfiriato and obtain statistics for wages (Seminario de Historia Moderna de México 1965). According to them, although there was a sharp increase in prices in this period, wages remained fixed at the same level, and thus real wages fell. This has been considered an important factor in explaining the collapse of the Porfiriato. (Rosenzweig 1989, 247; Reynolds 1970, 25; Katz 1981, 3-49; Clark 1934, 9; Knight 1990, 127-130; Tobler [1984] 1994, 137-139). But the price index and the nominal wage series are ambiguous and have been criticized, although no satisfactory alternative has been developed.

The idea that living standards for workers and peasants improved as a result of the Revolution has generally been supported by the fact that important legal reforms were made to the Constitution in 1917 that included several measures in support of labor (e.g., the legalization of unions), and set the basis for an Agrarian Reform, which was carried out most significantly between 1935-38. Yet, many "revisionist" studies have questioned the fruits of the Revolution in concrete case studies, looking at how a specific town fared from the Porfiriato to some year after the Revolution (Friedrich 1970; Ronfedlt 1973; Warman 1976), or by questioning the general results of the Revolution, either the nature of the event itself, or arguing that at some point it was betrayed (Gilly 1971; Córdoba 1973; Meyer 1991).

The question of what happened to the living standards of workers during the Revolution itself is one that has never been posed.¹ It is traditionally viewed as a transition period in which the economy was totally disrupted. Therefore it would seem useless to try to find the evolution of real wages during this period. However, more recent studies show that industrial production did not stop during the Revolution and that most industrial workers continued to work in their factories

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¹An exception to this would be Ulloa (1985, 17 - 25).

(Womack 1978; Haber 1989). During the years that go from 1910 to 1920 most Mexicans carried on their life, working, studying, making businesses, building families. The war generated new circumstances that made the struggle for survival more difficult, but which also opened up new opportunities.

During this decade, labor organized at an unprecedented level in Mexico's industrial regions, in part due to the Revolution, and in part due to general tendencies of the labor movement throughout Latin America. At the same time an inflationary process started in 1914 that reached hyperinflationary levels in 1916, as a result of the anarchic printing of money by several different revolutionary armies. Therefore, it is extremely interesting to look at the effects of the strengthening of the labor movement and the inflationary process on workers' living standards during this period.

The purpose of my work is to give some quantitative substance to these contentions by looking at the evolution of industrial real wages from 1900 to 1920. The first task of this research was to build a consumer price index for this period. The second step was the construction of a series for wages, which I obtained from a specific textile mill, the "Santa Rosa" factory, managed by the "Compañía Industrial Veracruzana S.A." (CIVSA).

Since CIVSA documents run continually for the period of my study, I can be certain that I am comparing similar information. Yet, by using information from one company, although I gain certainty in my calculations, I lose generality in my results. However, I believe it is better to set a solid stone on which we can stand confidently, than to build a flimsy bridge.

CIVSA workers can be considered an upper bound of industrial workers' living standards, both during the Porfiriato and afterwards, for several reasons.² They belonged to a factory more modern and productive than most textile mills in Mexico in this period, and their union was in the forefront of the nation's labor movement (García Díaz, 1981; Anderson 1976). Veracruz was an important revolutionary arena, and many labor laws were applied in Veracruz before they were put into practice in the whole nation (De la Cueva, 1938).

Since the sources and the specific methodology I used changed through different periods, and since the economic history of each of them is also very different, I will divide the study of prices and wages into three parts: The first, which goes from 1900 to 1913, is a period of relative price stability, in which the sources are continuous and of good quality. The second, which goes from 1914 to 1916 is an inflationary period in which the economy was most disrupted. Practically

²In 1912, the average wage of workers in the textile industry of Veracruz such the highest in the country, reaching on average 3.19 pesos, while in other important industrial centers as Mexico City or Puebla, average daily wages were 2.48 and 2.36 pesos, respectively. Even more, in 1921 the national average daily wage in textile industries was 2.63 pesos, while the CIVSA average daily wage was almost double or 5.08 pesos. (Boletín Estadística Fiscal, *Anuario del año fiscal 1912-13*, and *Fábricas de Hilados y Tejidos en la República en el año 1921*, AGN, DT, 399/1).

the only information available for these years are CIVSA documents. The third goes from 1917 to 1920 when a new era of economic stability and reconstruction started, but when political stability had not yet been achieved. World War I had important effects on the Mexican economy that generated a particular economic environment. In the appendix I will give a general description of the methodology followed to calculate prices and wage series.

III. From the Porfiriato to the Revolution: 1900-1913

A. Prices

Inflation from 1900 to 1910 was between 41% and 52% depending on the index used³, which would represent an annual average inflation of 4% (compared to 2.4% in the United States). From 1908 to 1910 there was a substantial increase in inflation, prices increased in these two years approximately by 18%, compared to a 24% price increase in the previous eight years.⁴

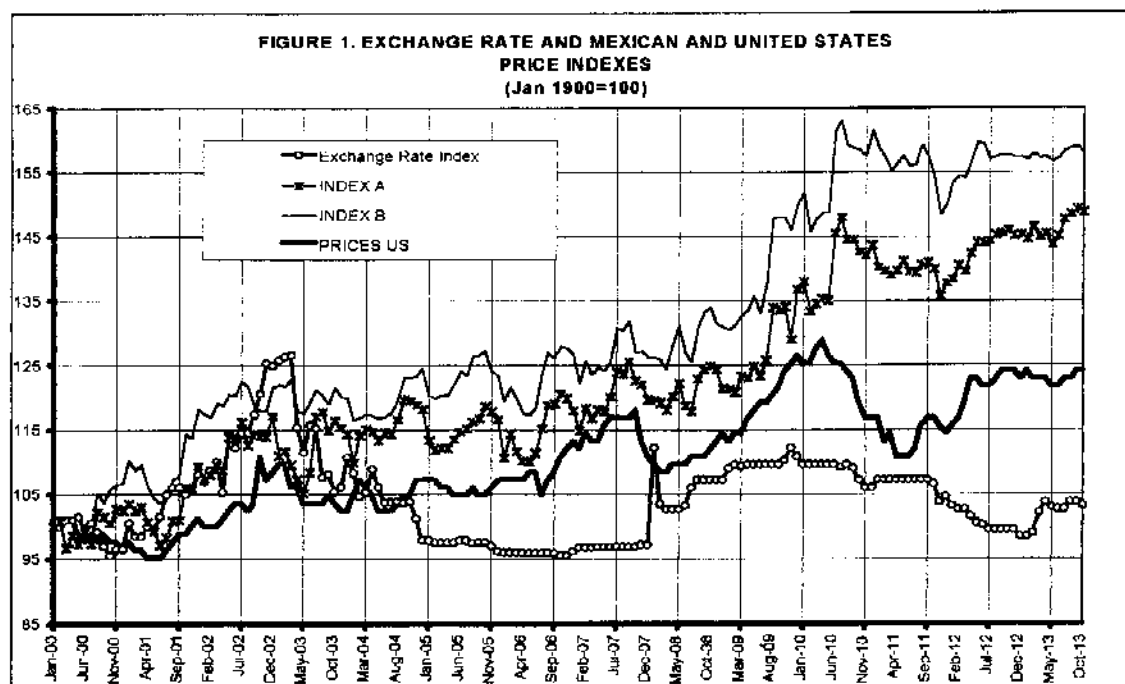
Figure 1 displays the indexes compared to the exchange rate index of pesos per dollars and the United States price index for the same period. We can see a great volatility in the exchange rate until 1904, with a general trend towards a depreciation of the peso. Although legally Mexico was a bimetallic country, gold disappeared from circulation from 1873 to 1905 and the value of the peso was based on the price of silver, while the dollar value was based on gold (Kemmerer 1940).

Since the mid-nineteenth century the general tendency was for silver to depreciate relative to gold (Secretaría de Fomento, Colonización, Industria y Comercio 1886, 29). However, this tendency was reversed from April 1903 to September 1907 (Kemmerer 1917). In March 1905, Mexico adopted the gold standard through a policy of progressively replacing silver with gold pesos.⁵ This change in monetary policy can be seen in Figure 1 in the greater stability in the exchange rate after 1905. In 1907 a new depreciation of the peso took place, due to the world financial crisis, but although the exchange rate was more variable from then on, compared to 1905-1907, it was more stable than in the period before 1905.

³ I calculate two price indexes. Indexes A is constructed using a basket that reflects the patterns of consumption in 1930 of families marginally wealthier than the average industrial worker. Index B's basket corresponds to families in 1914 poorer than the average industrial worker (see Appendix).

⁴ Through the paper I calculate the average index using the geometric average of the growth rates of the two price indexes. Given that both indexes show the same trend, doing this would not modify the general argument and would provide simplicity.

⁵ For the best description of how Mexico adopted the gold standard see Kemmerer (1916, 471-553).



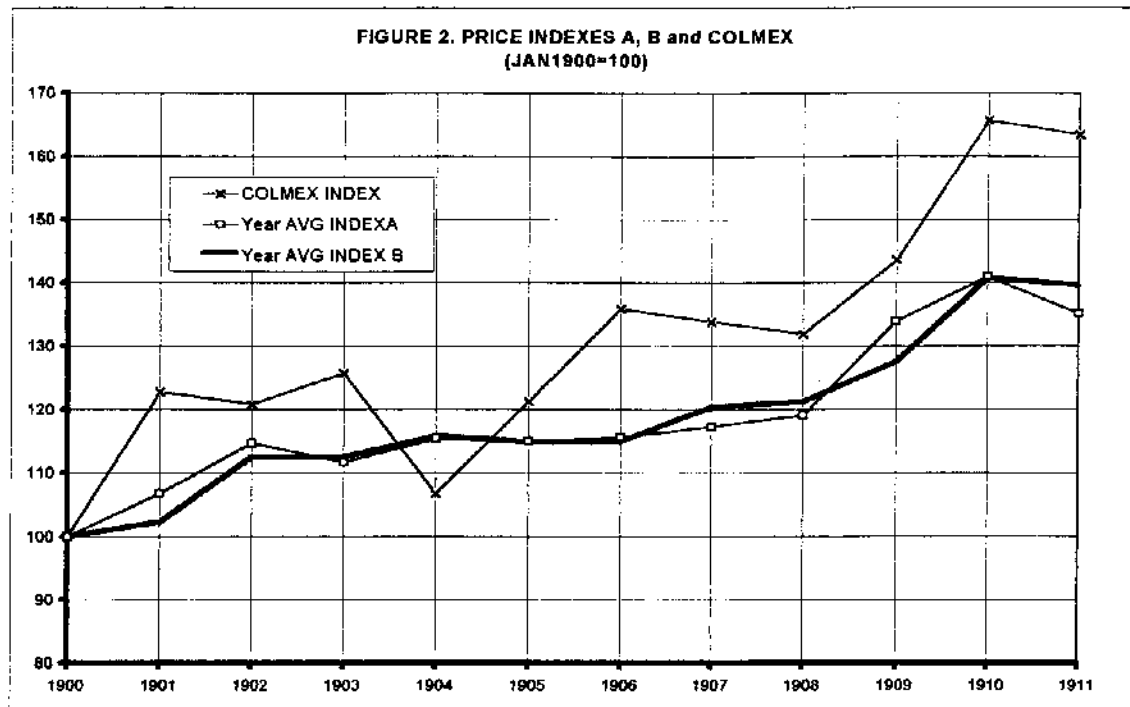
Source: Price Indexes calculated by the author from weekly data in the *Semana Mercantil* and from January to June 1903 from *El Economista Mexicano*, (prices of each fourth week of the month). Exchange rates taken from the *Semana Mercantil*, US prices taken from Warren and Pearson (1933, 11-12).

From 1900 to 1907 prices closely follow the movement in the exchange rate. However from 1908 to 1910 despite a stable exchange rate, there is an important increase in prices parallel to that in the United States⁶. From 1907 on, the government had to relax its financial policy in order to face the delicate financial situation brought on by the 1907 crisis and the fall in the price of silver. By the end of 1908 the "Monetary Commission" succeeded in stabilizing the exchange rate through resources from foreign indebtedness. The Mexican government also expanded credits (Informe de la Comisión de Cambios y Moneda 1909). The monetary history of Mexico from 1907 to 1910 needs to be further developed to enable us to better understand the price movements we find for this period.

Figure 2 compares the new indexes on an annual basis with the Colegio de México (Colmex) index. As can be seen, the new indexes are less volatile than the Colmex one, and describe a smaller increase in prices, although they show the same general trend. The new indexes move more in accord with what we know about monetary policy during the "Porfiriato". The spurt in inflation that the Colmex index

⁶ The correlation between the average price index and U.S. monthly prices (Warren and Pearson 1933) is of .89

shows from 1904 to 1906, for instance, is hard to understand, given the fact that it was in those years that Mexico adopted the gold standard, while the exchange rate was very stable.



Source: Price Indexes calculated by the author from weekly data in the *Semana Mercantil* and *El Economista Mexicano*, Colmex prices taken from *Seminario de Historia Moderna de México* (1965,13).

The new price indexes give less credence than the Colmex one to the argument that the last decade of the Porfiriato was a period when “rampant inflation was an important cause to bring about the Revolution” (Katz 1981,10). However, they do show the important spurt in inflation of the last years of the Porfiriato that is commonly mentioned in the literature (Tobler [1984] 1994, 138; Knight 1990, 130).

B. Wages

From 1900 to 1910 nominal wages rose by 41% and real wages declined by 3.8% (See Table 1). As can be seen in Figure 3, from 1900 to 1907 there is evidence of real wage stability. However, from 1907 to 1911 there is a reduction of real wages of 18%, most of which took place between 1909 and 1910, due mainly to the enormous increase in prices that took place in these years. This qualifies the results of the Colegio de México study that show “a constant erosion of real wages from 1900 on, in which the increase in prices was greater than the increase in nominal

wages, due to the less dynamic conditions in economic growth that weakened the labor market”(Seminario de Historia Moderna de México 1965,17). At the same time, it supports the view that worsening economic conditions might have added up to other causes of popular discontent in the advent of the Revolution.

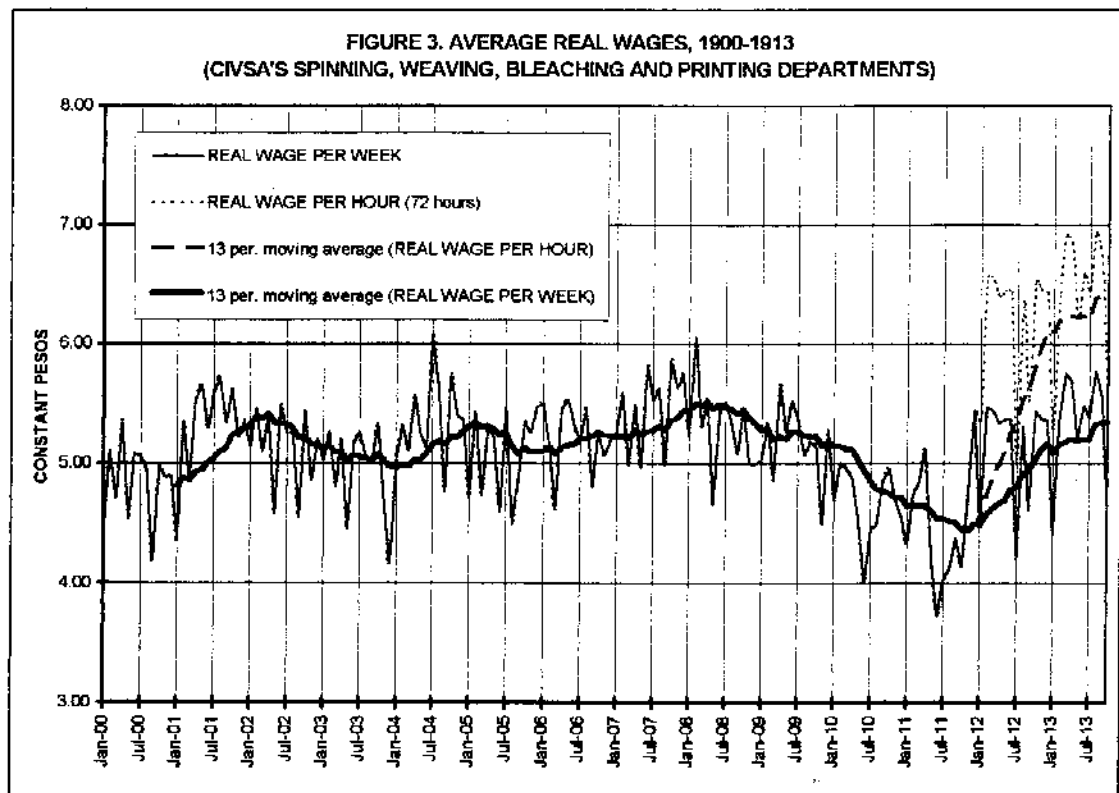
Table 1
Prices and Real Wages 1900-1913

	PRICES AVERAGE INDEX*	NOMINAL WAGES WEEKLY	HOURLY** (72 hrs)	REAL WAGES WEEKLY	HOURLY (72 hrs)
1900	100	\$4.89	\$4.89	\$4.89	\$4.89
1901	104.72	\$5.62	\$5.62	\$5.37	\$5.37
1902	114.89	\$5.95	\$5.95	\$5.18	\$5.18
1903	115.30	\$5.76	\$5.76	\$5.00	\$5.00
1904	116.57	\$6.31	\$6.31	\$5.41	\$5.41
1905	117.94	\$6.04	\$6.04	\$5.12	\$5.12
1906	117.79	\$6.19	\$6.19	\$5.26	\$5.26
1907	122.35	\$6.74	\$6.74	\$5.51	\$5.51
1908	123.97	\$6.62	\$6.62	\$5.34	\$5.34
1909	132.25	\$6.91	\$6.91	\$5.23	\$5.23
1910	146.50	\$6.90	\$6.90	\$4.71	\$4.71
1911	146.07	\$6.60	\$6.60	\$4.52	\$4.52
1912	148.73	\$7.72	\$9.27	\$5.19	\$6.23
1913	150.76	\$8.11	\$9.73	\$5.38	\$6.46
1900-1907	22.3%	37.7%	37.7%	12.6%	12.6%
1907-1911	19.4%	-2.0%	-2.0%	-17.9%	-17.9%
1911-1913	3.2%	22.9%	47.4%	19.0%	42.9%

*The average price index is derived from the geometric average of Indexes A and B growth rates.

** Wages are CIVSA's average wages from the departments of spinning, weaving, bleaching and printing. Weekly working hours were reduced from 72 to 60 in January 1912

Sources: Price Index calculated by the author from weekly data in the *Semana Mercantil*, *El Economista Mexicano*, and CIVSA documents, wages taken from CIVSA documents.



Source: Price Index calculated by the author from weekly data in the *Semana Mercantil* and *El Economista Mexicano*, wages taken from CIVSA documents.

From 1911 to 1913 CIVSA real wages grew by 19%, almost redressing the previous loss in workers' purchasing power. In 1913 real wages were still 23% below their highest point in 1907. This resulted from important nominal wage increases (22.9%) coupled with a low inflation rate of only 3.2%.

Wages increased as the result of several strikes⁷, coupled with the support of the newly created Department of Labor which intervened between workers and manufacturers to end strikes and support negotiations for the benefit of workers. In January 1912 working hours were reduced from twelve to ten⁸ and in July, a set of rules to be followed nationwide inside the mills ("Reglamento") and a minimum wage schedule that set standard pay rates throughout the industry ("Tarifa Mínima") were established (Boletín del Archivo General de la Nación 3-4:1984). If we take into account the reduction in the length of the shift, hourly real wages increased by

⁷In 1911 there were two major strikes at "Santa Rosa" that included all mills in the Orizaba region. CIVSA archive (henceforth CV), Copiadores de Cartas (correspondence), between "Santa Rosa" (SR) and Mexico City offices (MX), September 28 and 29, and October 4, 5, 7, 8, 9, 10, 12, 13, 14, and 16, 1911.

⁸CV correspondence SR-MX, January 1 and 19, 1912.

42.9% between 1911 and 1913. And in 1913, they were 17% above their level in 1907. But it was leisure, rather than income that workers gained. Free time that they could also employ to complement their wage with another job.

Apparently during this period, wages at "Santa Rosa" increased less than in most textile mills since its wages before the minimum wage was established were higher than those of other mills. For the "Santa Rosa" board of directors the minimum wage schedule gave them an opportunity "to level their wages" to wages paid in the industry.⁹

IV. Monetary Anarchy and Inflation: 1914-1916

A. Prices

These are the most violent years of the Revolution, and a period for which little economic data of any kind exist. From the fall of Huerta, on August 12, 1914, to the final entrance of the "Constitucionalistas" to the capital on August 2, 1915, it is hard to talk about the existence of a Mexican government. All governmental publications ceased to exist, as well as almost all other publications of any kind. Yet, this is perhaps the most interesting period in terms of price movements in Mexican history. As Edwin Kemmerer points out "Mexico in the brief period of a dozen years ending in 1916, ran almost the entire gamut of monetary experiences of civilized man" (Kemmerer 1940, 3), and between 1914 and 1916 it lived the most extraordinary ones of all.¹⁰

When Victoriano Huerta came to power after overthrowing democratically elected President Francisco I. Madero in February 1913, he had to finance war against a great number of Revolutionary armies who revolted against him. In order to obtain the necessary money, he forced Mexico's major emission banks to give him credit, and in order to enable them to do it, he lowered their reserve limits. The credibility of paper money holders fell, and they rushed to the banks to change their bank notes into specie. Huerta passed a law that allowed banks to end the convertibility of paper money into metallic coins on November 5, 1913 (Legislación Monetaria 1959, I:195-196). The inflationary process reached new levels.

At the same time Revolutionary armies realized that if Huerta was financing his government through the emission of paper money, they could do the same thing.

⁹*Ibid*, July 16, 1912.

¹⁰For the sake of brevity, this paper does not include a full explanation of the monetary events that took place in these years. For a more detailed account see Kemmer (1940) Manns (1986), Cárdenas and Manns (1992), Manero (1926 and 1957) and Ortiz Mena (1972).

An anarchic printing of paper money started all through the Republic, with each Revolutionary group's paper money being effective only in the area under its control. In June 1916 Carranza put into effect a sort of "stabilization program" by which he tried to restore the confidence of citizens in paper money by taking out of circulation all types of paper money that his army had printed previously, replacing them with a new kind of currency, the "infalsificable". The problem was that his government printed more than seven times the amount of "infalsificables" necessary to replace the paper money then in circulation. (Cárdenas and Manns 1992, 457). The "infalsificables" were originally convertible to gold. However, by the end of June the population realized the emission was too large and started changing "infalsificables" to gold to a point that the fund established to back the paper money ran out ending the convertibility of "infalsificables" to gold. From this moment on, the "infalsificables" depreciated at an impressive rate (Cárdenas and Manns 1992, 458).

The peso ceased to serve as a unit of value and most prices were set in dollars or gold pesos even as early as mid 1915. In April 1915 CIVSA documents record a meeting of merchants and industrialists in which they decided to set their prices in terms of dollars.¹¹ Sales were made according to the exchange rate of the date of purchase although paid in Mexican paper money.

By 1916 all prices of articles announced in newspapers were set in gold pesos.¹² Only wages, taxes, and the prices of a few articles such as newspapers and tramway rides were set in "infalsificables". By October, the government also started collecting a portion of taxes in metallic coins in order to avoid a total collapse in its real tax revenues (Boletín de la Secretaría de Hacienda. Decretos y Circulares 1917).¹³ By the end of November, even newspaper were priced in gold pesos.¹⁴

In December, the government finally realized that it was better to back out on the "infalsificable" policy, and Carranza decreed that all wages, as well as taxes, had to be paid in gold pesos.¹⁵ By the end of December, all payments were made in metallic coins, which people had been hoarding.

Figure 4 shows the evolution of the textile price index in pesos from 1914 to 1916, compared with the exchange rate to dollar. These figures show how the textile index followed the exchange rate closely. Taking January of 1914 as 100, the textile index is equal in December 1916 to 6309.78, showing the greatest increases in the period from August to December of 1916.

¹¹CV, "Actas de deliberaciones del Consejo de Administración", April 27, 1915. CIVSA price lists show prices in dollars starting July 1915. They probably changed since May, but there are no price lists available for May and June of that year.

¹²The most important national ones are "El Demócrata" and "El Nacional".

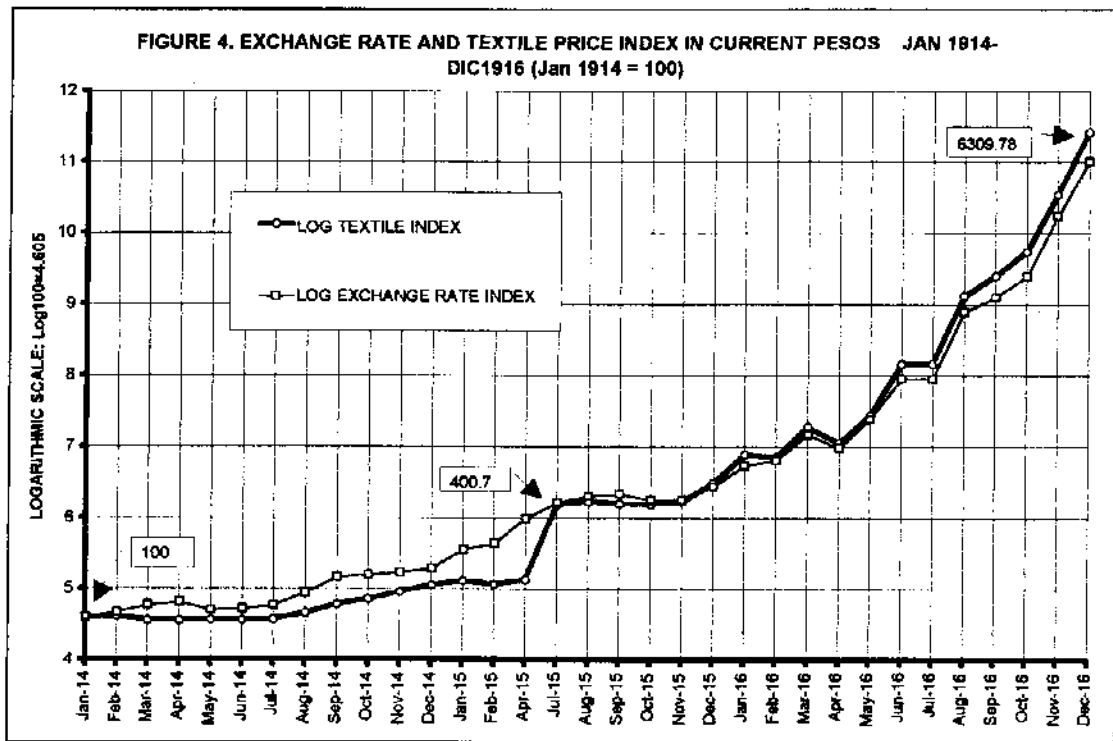
¹³Carranza decrees of October 5, 22, 23, 27, and November 1, 15, 16 of 1916.

¹⁴*El Nacional*, November 30, 1916 and November 15, 1916.

¹⁵Decrees of December 9 and 13, 1916.

The exchange rate was relatively stable until December 1914. From this month on CIVSA's prices fell behind until July 1915, when its entrepreneurs found this trend unsustainable and decided to set their prices in dollars. The fact that they decided to do so in coordination with many other merchants and industrialists was an indicator that this pattern must have occurred elsewhere in the economy.

During the same period the prices of raw cotton in dollars and the price index of textile products in the U.S. were both increasing due to World War I. As the international prices of cotton and textiles grow, these prices grow in Mexico even in terms of dollars. In Figure 4 we can see that from December 1915 on, the textile price index grows faster than the exchange rate. However, most of the price climb in terms of pesos can be explained by the change in the exchange rate.

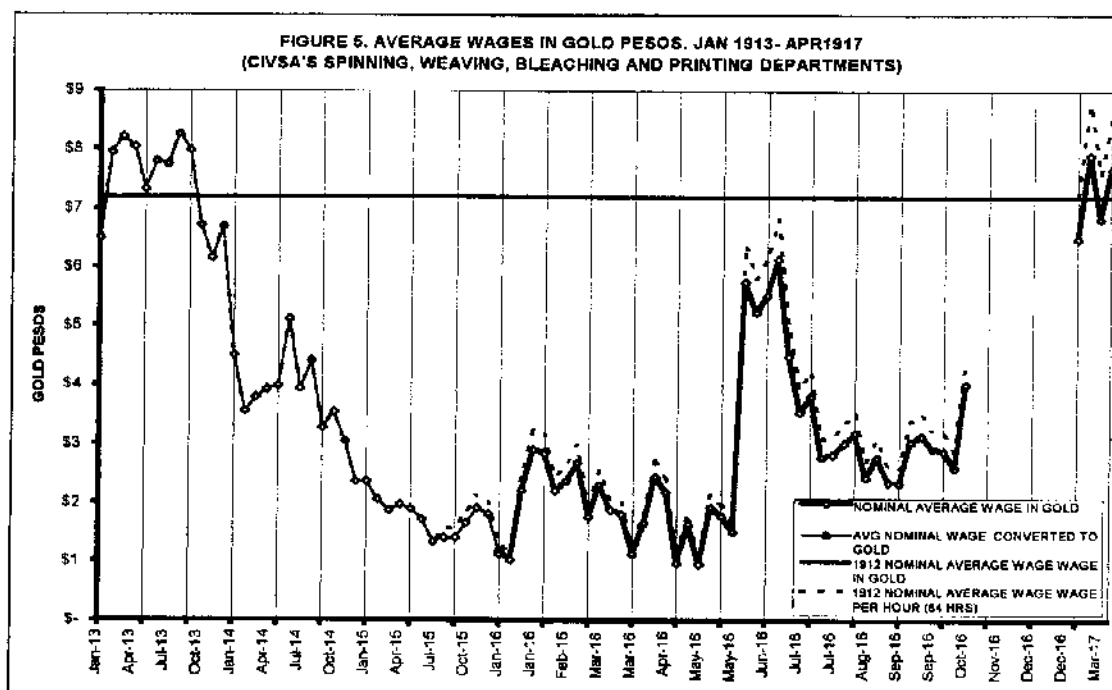


Source: CIVSA documents and exchange rates from Kemmerer (1940). The period should be divided in two parts, but I have unified them using a specific exchange rate (7.5), between the "infalsificables" and the "Veracruz" money.

B. Wages

From January 1914 to December 1915, nominal wages rose by approximately by 153%. Yet CIVSA prices rose by 560% in the same period. Real wages deflated by the textile index fell from \$8 pesos in June and August 1914, to less than \$2 pesos in May 1916, when they reached their lowest level.

In 1915 there were no strikes but nominal wages were increased several times, amounting to a 99.7% increase for the year.¹⁶ Some of these increases were the result of Carranza's decrees, while others were granted by the company "given the high cost of the products of the most basic need".¹⁷ In August the maximum legal working hours were reduced from ten to nine hours.¹⁸



Source: CIVSA documents and exchange rates from Edwin Kemmerer (1940). Before January 1916 the wages were converted to gold using the exchange rates. From January 1916 on the graph shows weekly data. On August 1915 weekly working hours were reduced from 60 to 54.

In January 1916 a further 50% wage increase was granted to workers on the condition that they promised not to strike.¹⁹ However any increase in wages was followed by a greater increase in prices, and wages in gold pesos kept falling as can be seen in Figure 5. This made workers aware that the only solution was to be paid in gold pesos. In February 1916, the "Executive Committee of the Union of Free Workers of Spinning, Weaving and Printing" of CIVSA sent a letter demanding the factory managers pay wages in gold pesos or their equivalent since,

¹⁶CV correspondence SR-MX, February 20, 1915 and April 7, 1915. CIDOSA Archive (henceforth CD), telegram of Marcos López Jiménez to CIDOSA, April 2, 1915.

¹⁷CV correspondence SR-MX, October 19, 1915.

¹⁸*Ibid.*, August 23, 1915 and CD letter from Rio Blanco to the Department of Labor of Veracruz, August 10, 1915.

¹⁹CV correspondence SR-MX, January 18, 1916.

...given that daily wages are not enough to cover our living necessities, because merchants have risen their prices by 2000% and given that we will never be able to get even with them by asking for an increase in wages, (...) and to avoid abuses, we have agreed with all the unions of the State of Veracruz that from the 24th of this month, our wage should be paid in "national gold" or its equivalent in paper money calculated by the exchange rate at New York, in order to put ourselves on equal terms with capital that charges in "American gold" for its merchandise.²⁰

From May 20 to 26, 1916 CIVSA workers again joined a strike that had reached national levels.²¹ In order to end this strike companies and workers reached a compromise by which wages in "infalsificables" were set at the same nominal amount that they had been paid in the "Veracruz" paper money, despite the fact that an "infalsificable" was worth at least four times more than a "Veracruz" note.²² This caused the 281% wage increase in terms of gold pesos that we see in Figure 5.

Although nominal wages were increased again in September and October the real wages kept deteriorating.²³ In November, workers finally gained the right to be paid in gold pesos, after an important strike in all the Orizaba valley mills that lasted more than two weeks.²⁴ They were the first workers in Mexico to obtain payment in specie, an event which made newspapers headlines.²⁵ As can be seen in Figure 5, labor regained the gold peso wages of the first semester of 1913 through this measure. Workers experienced a reduction in wages of 698% in terms of gold compared to the average wage of 1912 to May 1916, when wages reached their nadir. By the end of 1916 and early 1917 wages had regained their 1912-13 gold value.

V. The Difficult Return to Stability: 1917 - 1920

A. Prices

²⁰ *Ibid*, February 21, 1916 (translation from Spanish done by myself).

²¹ Newspapers report that bakers, electricians, tramway, telephone and potable water workers in Mexico City were also part of this strike. *El Nacional*, May 23, 1916.

²² There is a problem in defining the equivalence between "Veracruz" notes and "Infalsificables". A government decree in May 19, 1916 sets its equivalence as 4 to 1. However CIVSA documents set the equivalence as 5 to 1 during the first week of June, as 8 to 1 during the second week, and as 10 to 1 thereafter.

²³ CV correspondence SR-MX, September 12, 1916, October 24, 1916.

²⁴ CD correspondence Mexico-Rio Blanco, October 27 and 30, November 1 and 17, 1916.

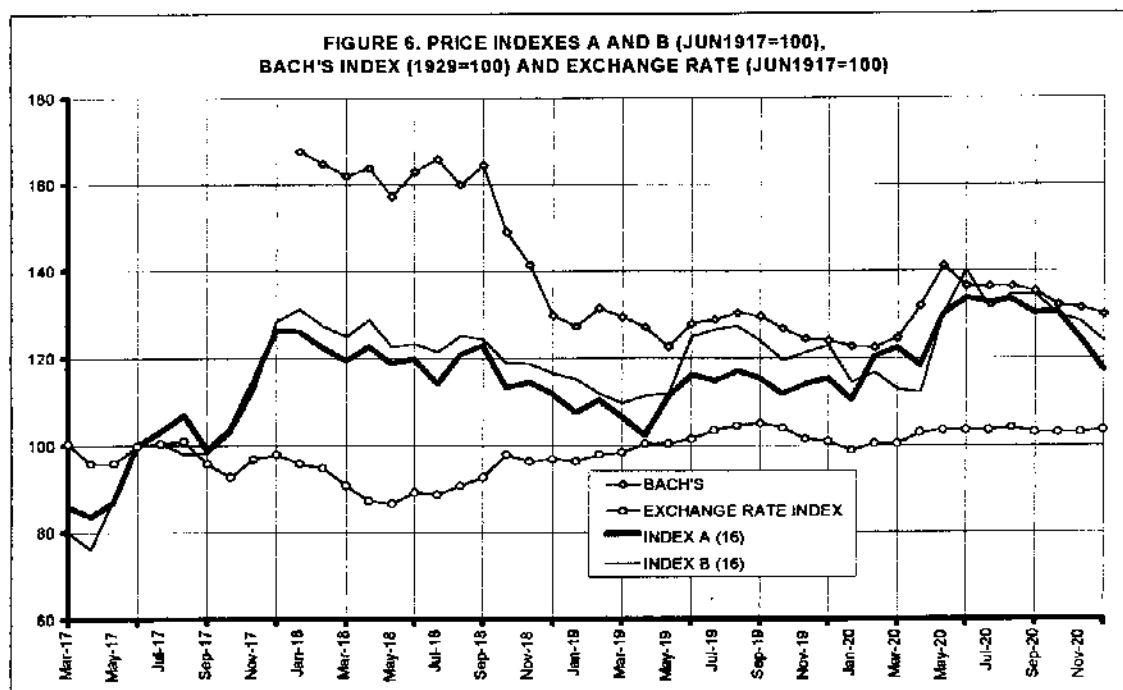
²⁵ *El Nacional*, November 1, 1916.

The return to price stability was not a soft landing. The impact of World War I on international financial markets produced an extensive rise in the price of silver after August 1915. By March 1916 the silver peso was worth more as merchandise than as money. This situation created incentives to melt down and export silver coins and as a result, a tremendous scarcity of metallic money.²⁶ According to Torres Gaytán (1986, 145) in December 1916 there were \$35 million pesos in metallic coins in circulation, and a year later there were close to \$56 million pesos. This is a small amount compared to \$173.5 million metallic coins plus more than \$130 million pesos in bank bills that circulated in early 1914 (Kemmerer 1917,32). Carranza instituted a bank seizure in September 1916 that lasted until January 1921 that created a further contraction in the supply of money. In November 1918, following Edwin Kemmerer's advice, the Mexican government started reminting the existing silver coins in order to reduce their metallic content (Kemmerer, 24; Torres Gaytán, 150) The continued appreciation of silver made it necessary to remint silver pesos again on October 27, 1919 (Espinosa de los Monteros 1928, 14).

The scarcity of money would lead us to expect deflation in the indexes. This is what Espinosa de los Monteros (1928, 9) believed. Yet, this is not what the new indexes show, nor what newspapers and company documents of the period recount.²⁷ As can be seen in Figure 6 there is a sharp price increase in 1917, then prices follow the trend of the Bach and Reyna price index until 1920. Prices rose from March to December of that year between 47% and 60% depending on the index used. If we consider only the last semester of 1917 for which better price data exists, they increased between 26% and 29%. CIVSA's textile prices also show an increasing trend during this period.

²⁶ *El Economista*, June 4, 1918, p. 2.

²⁷ *El Pueblo* January 21, 1917, p.10, March 6, 1917, p.1, *El Economista*, November 23, 1917, p.3 and CV, letter from J. Michel, MX to the Comité Consultatif in Paris, October 9, 1917.



Source: Price index calculated by the author using monthly data from *Excelsior* and *El Demócrata* (Mar-Jun 1917), *El Economista* (Jun 1917-Apr 1919), AGN, Fondo del Departamento del Trabajo, boxes 144, 184, 187 (Apr 1919-Jul 1920), *Boletín de Industria Comercio y Trabajo*, 1919, vol I and vol II, *Gaceta Mensual del Departamento del Trabajo*, Sep 1920-Dec 1920. Exchange rates taken from Ortiz Mena (1972) and Bach's index taken from Bach and Reyna (1943).

The enormous increase in prices in this year, despite monetary contraction, was the result of a supply contraction generated by a decrease in production due to the Revolution, coupled with an increase in demand caused by World War I. The backward shift of the supply curve was not only the result of war time destruction, but mainly of the disruption of the railway and financial systems (Gómez, 1990). To this we should add the bad weather that damaged agriculture described in accounts of the period.²⁸

On the demand side, World War I generated an outward shift that created world wide inflation. Prices in the United States, Mexico's main commercial partner, rose dramatically in 1917, and this must have pressured a price increase in Mexico.²⁹ Furthermore, restrictions to trade arose due to the war that inhibited Mexico from complementing its reduced production with imports. *El Economista*

²⁸CV, letter from J. Michel, MX to the Comité Consultatif in Paris, October 9, 1917.

²⁹The inflation rate for 1917 in the United States was of 37% (Historical Statistics of the United States, 200).

attributes the rise in corn and sugar prices, in part, to a United States law that prohibited the export of these two products.³⁰

In 1918 the contractionary monetary forces that I have described must have prevailed since the price indexes evidence a price deflation of between 3.9% and 5.9%, depending on the index used.³¹ In this year, the situation in the commodities market changed, as the government and the different merchant unions made major efforts to import the goods that had been scarce during 1917. From January 1918 on, shipments of sugar, wheat, flour, and corn were brought from the United States, Cuba, Guatemala, El Salvador and Argentina.³² The abundance of goods combined with the scarcity of money reduced prices in this year, but as the monetary situation stabilized and domestic production increased, the economy returned to a more stable path, and faced a moderate increase in prices in the next two years.³³

B. Wages

Conflicts over wage increases did not end in Mexican industry when they were finally set in gold pesos at the end of November 1916. The tremendous decline in purchasing power that workers had faced in the previous years finally ended. Yet, prices continued to rise during 1917, even in terms of gold pesos. The difference is that by this time workers no longer had any "monetary illusion", they had built a strong labor movement, and that they could count on the support of the government in ways previously unimagined.

On May 1, 1917 the shift was officially reduced from nine to eight hours in compliance with the new Mexican Constitution signed in February. The Constitution also included legislation that required companies to provide coverage for accidents, sickness, pensions, etc. CIVSA managers reported that these supplementary expenditures would increase labor costs for the factory by at least 15%.³⁴

On May 3, CIVSA workers went on a strike,³⁵ together with fifteen factories in Mexico City and all textile mills in Veracruz and Michoacán, representing a work force of more than 3000.³⁶ On May 15, the government of Veracruz decided to give

³⁰*El Economista*, October 5, 1917, p.10.

³¹This is the price change of the annual average index of each year. If we calculate the December-December index deflation in 1918 was 11.4% and 9.2% depending on the index used.

³²*El Economista*, December 3, 1917, February 6 and 23, March 18, April 18 and 23 and May 11, 1918. Notice of the shipments arrivals appeared on February 16, March 22, May 6 and June 12, 1918.

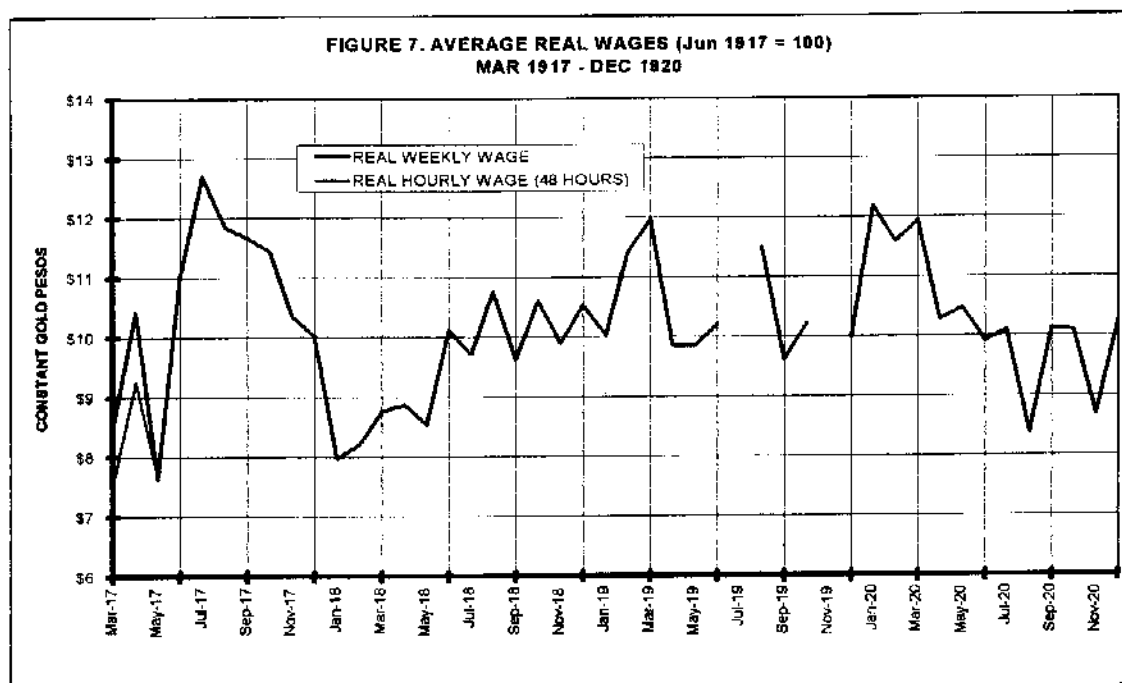
³³Between 3.2% and 5.5% in 1919 and between 1.6% and 0.7% in 1920 using indexes A and B respectively (December to December price changes).

³⁴CV, letter from J. Michel, MX to the Comité Consultatif in Paris, April 30, 1917

³⁵CV, telegram SR-MX, May 3, 1917.

³⁶*El Pueblo*, May 9, 1917, first page.

workers an increase over the minimum tariff of 1912 of 80% for work paid per piece and of 65% for work paid per shift.³⁷ In Figure 7 we can see this substantial wage increase that took place between May and June 1917.



Source: Wages taken from CIVSA documents. Data is missing for some months due to strikes that rendered atypical data. For price index sources see Figure 6.

This wage increase was higher for Veracruz mills than for those of the rest of the country. CIVSA managers claimed that this put them at a disadvantage with other factories since Puebla factories increased wages only by 16% for wages per shift and by 20% for wages per piece, while factories in Mexico City increased them by 55% and 20% respectively.³⁸

The huge nominal wage increase that took place from May to June of 1917 was completely redressed in real terms by the great price increases of this period (see Figure 7). In 1917 real wages per week fell by 10.5%, and hourly wages by a little less due to the shift reduction (see Table 2). This time the causality between prices and wages seems to be different. While in 1912, 1915 and 1916 inflation preceded wage increases, now wages moved before prices did. There were no further important wage increases until the end of 1920, except a 10% increase that came out in August 1919 as a byproduct of an important strike whose principal motive was to obtain a collective contract.

³⁷CV, correspondence SR-MX, May 15, 1917.

³⁸CV, letter from J. Michel, MX to the Comité Consultatif in Paris, May 15, 1917.

¡Error! Objeto incrustado no válido.

*The average price index is derived from the geometric average of Indexes A and B growth rates. ** Wages are CIVSA's average wages from the departments of spinning, weaving, bleaching and printing. Weekly working hours were reduced from 54 to 48 in May 1917.

Sources: Wages taken from CIVSA documents. For price index sources see Figure 6.

In 1918 real wages recovered as a product of the price deflation, although not enough to recover the purchasing power lost by workers in the previous year. From 1917 to 1920 real wages fell by 3.29%, while real wages per hour did by 1.74%. Wages at the beginning of 1917 were similar to those of 1912-1913 in terms of gold (see Figure 5). The decline in real wages experienced from 1917 to 1920 shows how difficult it was for workers to maintain the purchasing power they had by 1912-1913.

VI. Conclusions

This article gives evidence to what was a bitter struggle between industrial workers and inflation between 1908 and 1920. While until 1907 there was relative stability in real wages, from 1907 to 1911 they fell by almost 18%. It is difficult to tell what was the impact of this erosion in real wages on the growing popular discontent that gave way to the Mexican Revolution.³⁹ Yet, the deterioration of real wages, not in the last decade, but in the last couple of years of the Porfirian regime, might have contributed to its demise.

The general trend of real wages at CIVSA during the Porfiriato can be safely generalized for industrial workers of at least the central region of Mexico during this period. Its evolution is not so much depicted by the changes in CIVSA's nominal wages, but by the price index which does not rise significantly.

During the first years of the Revolution, workers started being able to fight back inflation, through the surge of the labor movement and the support the new government provided through the Department of Labor. The minimum wage for the textile industry negotiated at the Convention of Industrialists of July 1912 was the most significant result of this process. From 1911 to 1913 real wages per shift grew by 19% and hourly wages increased by 42.9%. It is likely that real wages increased even more in most textile mills, since "Santa Rosa" wages were already high before the setting of the minimum wage schedule. Those factories that had lower wages prior to that year must have increased wages by a greater amount.

However these gains proved to be short lived. After Huerta seized power, and the war took on greater proportions, political chaos gave way to monetary anarchy,

³⁹ Alan Knight (1990, 130) criticizes the argument that the real drop in living standards during the 1900s be considered an important cause of the Revolution since it is very difficult to establish a causality between the two events.

and inflation struck back with even greater intensity. From 1914 to 1916, hyperinflation caused an impressive decline in workers' purchasing power, which fell to its worst point in May 1916, a seventh of what it had been in 1912 in terms of gold pesos. There exists evidence showing that companies were pricing their merchandise in gold as early as December 1915 which would imply a transfer of income from workers to company owners. In December 1916 after several strikes workers finally won the battle for payment of wages in gold pesos.

We can be fairly sure that workers real wages faced a similar overall decline during this period. CIVSA workers were, to a certain extent, able to check the deterioration of their purchasing power caused by inflation through strikes. This appears to have been the case of most textile workers, since CIVSA workers were not alone in their strikes, but were part of a broader labor movement that organized and coordinated workers of several trades and industries from several regions in central Mexico.

Other workers lacking an equally powerful labor movement would have experienced a further deterioration of their real wages. However, those workers who received a significant portion of their payment in kind must have fared better, since they were less subject to the ravages of inflation. Furthermore, workers who faced subsistence wages prior to 1914 could not have experienced as dramatic fall in their wages as CIVSA workers.

In 1917 workers were able to regain the real wages they earned in 1913, which had been lost during the inflationary period from 1914 to 1916. The purchasing power achieved from 1917 to 1920 was an improvement over the final years of the Porfiriato. Yet, it was not very different from the real wage earned in 1907. However, in terms of wages per hour, real wages increased in this period relative to those of 1913, since the shift was reduced from ten to eight hours. Furthermore the labor laws of Veracruz of 1914 and 1915 and the Constitution of 1917 brought about other non-wage benefits to workers, such as sickness and accident compensation and retirement pensions, which CIVSA directors valued as an additional 15% increase in wages.

It was very difficult for workers to maintain the purchasing power just recovered. From 1917 to 1920 the effects of World War I on the Mexican economy and the destruction of economic institutions and infrastructure caused by the Revolution made the return to price stability a difficult task. In 1917 an important inflationary process took place despite the enormous monetary contraction generated by the collapse of the "infalsificables". Despite of great nominal wage increases, real weekly wages diminished by more than 10%. A loss that was almost recovered during the following year due to the price deflation. By 1920 workers weekly real wages were almost 4% below those of 1913. CIVSA's real wage increase from 1917 to 1920 cannot be generalized to other industries or regions since we know that textile mills in other states increased their wages by a much lower rate.

The high inflationary levels since 1915 must have been in themselves an important factor in giving strength to the labor movement, on that gave workers an immediate and relevant motive to unite and to fight. Most of the strikes carried on during this period were highly effective, something which would have given great prestige to unions and as well as additional strength. At the same time, inflation would have enabled employers to cope with the additional charges implicit in the new labor legislation.

By 1913 workers had won most of what the Revolution would give them, and the fall of Madero and the spread and intensification of war had a very high cost for workers in terms of living standards. Those were times of penury and hunger. The labor movement grew stronger and by 1917 workers were able to recover the purchasing power they had by 1913, working less, and with higher non-wage benefits. Yet, despite of the vigorous unions, workers were not able to retain this level of real wages through the period 1917 -20. This paper shows that it was leisure rather than income what workers obtained from the Revolution relative to their earnings before their real wages started collapsing in the last two years of the Porfiriato.

These results provide an explanation to the controversial role that industrial workers played during the Revolution (Carr 1976, Clark 1934). It does not seem strange that workers joined the "Constitucionalista" armies against "Zapatista" peasants, as they did after 1915, given that the war was now costing them so dearly and that they had already obtained benefits from it.

Given that in Mexico the Revolution came about together with a strengthening of the labor movement, it is impossible to separate their effects as independent processes. The Revolution certainly contributed to the growth of the labor movement and the speed and depth of its gains. Yet, by no means can we conclude that if the Revolution had not taken place, these gains would not have taken place anyway. A comparative study with other Latin American countries could help us clarify this counterfactual.

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Appendix A: A General Methodological Perspective

A. Prices

Two price indexes exist for the period of this study, but both have important limitations. The first is an annual price index for Mexico City for the Porfiriato (1877, 1886-1911) created in the 1960s by a group of historians led by Fernando Rosenzweig at El Colegio de México (Seminario de Historia Moderna de México 1965).⁴⁰ It has been criticized mainly for weighting its shares by production instead of apparent consumption data (Craig, 1993, 51-67; Cerda 1993).⁴¹ The few articles it includes and the fact that it is annual create additional problems for its use to deflate wages for this period.

The second covers the period 1918-1928 and was constructed by Federico Bach and Margarita Reyna from the "Oficina de Barómetros Económicos" in 1943.⁴² Its problem is also related to the weights employed since they are based on production figures which they recognize as not very reliable (Bach and Reyna, 1943). A further problem is the absence of an explanation of the methodology the authors followed.

Instead of an index weighted by production figures, I decided to build a new price index of those goods entering into laborers' budgets (Fisher 1926, 207), which I considered more adequate to deflate wages. Fortunately, an effort to build a workers consumer basket based on direct questionnaires answered by families was undertaken in 1930 by the "Comité Reorganizador de los Ferrocarriles Nacionales de México" (The Railways Reorganization Office). Unable to distribute their questionnaire among railway workers, they handed it out among workers of the Ministry of Finance. There is a full description of the methodology they used which makes this information reliable. (Arroyo 1931; Ferrocarriles Nacionales de México. Oficina de Estudios Económicos 1931). The basket I used refers to consumption patterns in Mexico City and is based on 1189 questionnaires answered this I call the "1930 basket", which I use to calculate index A.

The problem with this basket is that it refers mainly to public employees who had incomes higher than those of most industrial workers.⁴³ Also, 1930 consumption

⁴⁰It includes prices of 13 items.

⁴¹Luis Cerda and Marc Gilly (1993) have recalculated the Colmex index by adding imports and subtracting exports from the production figures to calculate the shares of each item. The resulting index is not very different from the Colmex one.

⁴²It included prices of 33 articles.

⁴³The average wage of CIVSA's workers (\$1038.59 for 1930) fell in the "Comité's" lowest earning category of less than \$1200 annual pesos.

patterns are more than likely to have changed between 1900 and 1930. Fortunately, it was possible to construct an alternative basket from a series of questionnaires distributed in 1914 to families in Mexico City by the Office of Legislation and Labor of the Department of Labor. There were eighteen questionnaires which detailed the income and expenditures of very low income families⁴⁴. I will refer to the shares obtained from this source as the "1914 basket", used to calculate index B. (See Table A1).

A lower and an upper bound price index can be built with these two baskets since they refer to families either poorer or richer than the average of industrial workers. At the same time, since one is from 1914 and the other from 1930, they cover a wide period of time which helps us see how much consumption patterns could have changed over time.

I constructed Laspeyres price indexes specific to Mexico City. This city is the only one for which I have enough price data. Yet, this does not pose a big problem since the price data that I have for the Orizaba region for some years correlates closely with prices in the capital.⁴⁵ Yet this price index could not be generalized for the whole country. Further efforts at building price indexes for other Mexican regions need to be undertaken.⁴⁶

I took prices of textiles from CIVSA price lists. I believe that "Santa Rosa" prices give a good idea of textile prices available in the market since the company documents show how they were continually checking competitors' prices in order to fix theirs, generally at the same level.

Since I did not have prices for some goods included in the original baskets I excluded them, recalculating the shares for the items I had. The shares actually used to calculate the indexes are shown in the right side of Table A1. Since I have a different set of products for the 1900-13 period than for 1917-20 one, the weights accorded to products in the two periods differ.

B. Wages

The most significant effort to collect data for wages for the "Porfiriato" was again undertaken by the Colegio de México group. However the data are not a very reliable since they combine wage data for different occupations from disparate

⁴⁴ Archivo General de la Nación, (henceforth AGN), Fondo del Departamento del Trabajo (henceforth DT), 91/ 4 and 68/1 (first number indicates box, the second folder).

⁴⁵ The average correlation of prices between Córdoba and Mexico City for 1918-1930 is of 0.72. Unfortunately there are not enough prices from Orizaba but this city lies between Mexico City and Córdoba which is only 13.7 miles away from Orizaba and can be considered part of the same region.

⁴⁶ The price index for Guadalajara during the "Porfiriato" that Craig (1993) presents, seems, for instance, to be very different from the one of Mexico City.

sources. A further problem is the difficulty in comparing them with data for other periods, for which this kind of series was never built.

My main source of wage data were CIVSA payrolls and accounting books.⁴⁷ This company, located in the Orizaba valley of the state of Veracruz, has been in continuous operation since 1898. During the "Porfiriato" it was, with the "Compañía Industrial de Orizaba S.A." (CIDOSA), one of the most modern textile mills, together they produced 20% of Mexican cotton textiles in the last decade of the Porfiriato (Haber 1989,57,94). The textile industry was the most important manufacturing industry in these years, and in 1930 it employed approximately 30% of manufacturing labor (Primer Censo Industrial 1930). The series of average weekly nominal wages used includes the wages of all workers in the spinning, weaving, bleaching and printing departments of "Santa Rosa". It represents 83% of the total labor force at the mill.⁴⁸ From CIVSA documents I obtained weekly wages per worker, not wages per hours of work. Since most of the workers of the factory were paid for piece work rather than on a daily basis, wages vary depending on the number of hours and days per week actually worked. This adds volatility to the monthly wages obtained.

⁴⁷ CIVSA employed an average of 2100 workers. Weekly total payments to labor per department are taken from the "Libro de Caja" (Cashier's book). The number of workers per department comes from CIVSA payrolls. I get weekly wages from dividing total payments per department between the number of workers per department.

⁴⁸ This leaves out workers from three departments: "dyeing", "general merchandises", and "workshops".

TABLE A1. CONSUMER PRICE INDEX SHARES						
AGGREGATE EXPENDITURES						
	OBSERVED		USED 1900-1913		USED 1917-1920	
	(A)1930	(B)1914	(A)1930	(B)1914	(A)1930	(B)1914
FOOD	38.8%	61.6%	62.5%	79.3%	55.1%	86.7%
CLOTHING	14.6%	7.0%	23.6%	10.4%	20.8%	3.2%
RENT	14.8%	14.8%				
PERSONAL EXP.	7.3%	6.0%	11.8%	8.9%	10.4%	0.4%
ALCOHOLIC BEVERAGES	4.9%	4.0%	8.09%	5.59%		
SOAP	1.5%	1.2%	2.39%	1.65%	10.4%	0.4%
TOBACCO	0.9%	0.8%	1.52%	1.05%		
FUEL & LIGHTING	9.7%	7.5%	2.10%	1.4%	13.8%	9.7%
FIRE WOOD					4.3%	3.0%
COAL		5.0%			4.3%	3.0%
PARAFFIN OIL		1.6%			3.4%	2.4%
CANDLES		0.9%	2.10%	1.4%	1.9%	1.3%
OTHER EXPENDITURES	14.7%	3.1%				
TOTAL	100%	100%	100%	100%	100%	100%
FOOD						
RICE	1.5%	2.4%	2.4%	2.1%	1.9%	1.9%
SUGAR & SUGAR LOAF	3.7%	5.1%	5.8%	4.7%	4.7%	4.3%
COFFEE	3.0%	4.5%	4.8%	4.7%	3.9%	4.3%
MEAT	15.3%	17.5%	24.2%	24.1%	19.6%	21.7%
CHOCOLATE	1.2%		2%			
BEANS	3.7%	6.7%	5.8%	6.3%	4.7%	5.6%
FRUIT	3.6%					
CHICKPEA	1.4%	0.1%	2.2%			
EGGS	7.4%	0.4%				
MILK	18.5%	5.5%			23.8%	7.3%
VEGETABLES	3.4%	6.2%				
FAT	5.9%	7.7%	9.3%	8.2%	7.6%	7.4%
BUTTER	1.2%					
BREAD	18.2%	22.3%	28.8%	22.7%	23.4%	20.5%
POTATOES	1.2%	1.4%				
FISH	1.4%					
CHEESE	1.2%	1.3%	1.9%	10.6%		
TORTILLAS	6.3%	14.2%	9.9%	12.3%	8.0%	11.0%
SALT		1.9%		2.2%		2.0%
CHILI	1.8%	2.9%	2.8%	2.0%	2.3%	14.1%
TOTAL	100%	100%	100%	100%	100%	100%

Sources: Luna Arroyo, Estudio del costo de la vida en México, 1930 and Presupuesto de familias de obreros, Departamento de Legislación y Trabajo, Fondo del Departamento del Trabajo, AGN, Caja 368, exp.2 and 3.