

RESEARCH ARTICLE

Mexican Real Wages Before the Revolution: A Reappraisal

Javier L. Arnaut

Seminal literature has documented broadly the living conditions of Mexican workers before the Revolution of 1910. Various authors argue that a continuous deterioration of real wages in the preceding years of the Mexican revolution contributed to the social unrest that led to the armed conflict. Yet, most of the quantitative evidence has focused on aggregate estimates overlooking the regional wage dynamics. Through regional historical data, this article reevaluates quantitatively the patterns of Mexican regional real wages providing new estimates for the period 1877–c.1910. The analysis reveals that a divergent pattern between sectors and regions emerged during these years. However, the study also shows that in general, locally-adjusted regional real wages remained relatively stable throughout the period.

Keywords: Real wages; Mexican Revolution; Porfiriato; Market integration; Regional convergence

Introduction

One of the most important features of the international economy from the mid-nineteenth century until the start of the First World War was the rapid process of globalization. International trade boomed as transport costs declined, driving an unprecedented pattern of global integration of commodities, capital, and labor markets, generating a process of convergence in the living standards of a group of industrial countries (Williamson 1996).

The periphery, particularly Latin American countries were not absent from this. It has been documented how countries like Mexico benefited from the integration of markets associated with the introduction of railroads that caused a sharp fall in transport costs increasing the integration of commodity prices in the country. As a result, Mexican real GDP per capita nearly tripled from 1870 to 1913. However, at the inter-regional level we know very little about the integration of labor markets. Existing studies on the developing world have merely focused on the integration of agricultural commodities without particular reference to the integration of the cost of labor across regions (O'Rourke et al. 1996; Taylor 1997; Rosés 2003; Dobado and Marrero 2005).

In the case of Mexico, the evolution of income disparities during the late-nineteenth century industrialization has been a controversial feature in the historical literature suggesting anecdotally that a continuous decline in the population's living standards generated social unrest in different regions of the country. Compelling narratives about peasant's rebellions in the *haciendas*, worker's protests in the northern and central parts of the country, and in the plantations of the southern state of *Yucatán* have

been part of a rich strand of literature that has depicted a deterioration in the living standards of the Mexican population during those years. These and particularly a decline in real wages have been considered as one of the main motives that inspired the public support for the revolution of 1910 that deposed the presidency of Porfirio Díaz that had ruled the country for more than thirty years (see for e.g. Tannenbaum 1968; Gilly 1971; Knight 1986; Nickel 1988).

This article explores these aspects in order to answer the following questions: Did Mexican regional real wages really decline during this period? And, did real wages converge across regions in the late-nineteenth century as result of the economic forces of globalization? The aim is to contribute to the existing literature in two ways. First, by combining records of regional wage rates with basic commodity price information disaggregated by region, this article provides broader evidence on Mexican real wage trends, and inter-regional and inter-sectoral gaps during the period. Second, it offers an analysis and economic explanation of the phenomenon of regional wage divergence.

The findings based on regional data show that estimated *lower-bound* regionally-adjusted wages remained relatively stable in most of the Mexican regions throughout the period. Although these wages followed divergent within country patterns and although there was a slight declining trend in wages of the industrial sector of the Pacific South region, from a broader quantitative perspective there was moderate wage growth and no dramatic decline as some authors have argued. The present estimates indicate that the interpretation of a secular decline in workers' living standards in Mexico from 1877–1910 does not have strong quantitative foundations.

However, a pattern of real wage divergence across regions was a salient feature. The regions in the Center and Pacific South of the country experienced slower real wage growth

relative to the North, Pacific-North, and Gulf generating wide sectoral wage gaps. A tension between the forces of regional convergence and divergence emerged in which prevalent labor market institutions in Mexico tended to promote regional divergence, keeping structural labor market barriers that prevented inter-regional labor mobility and income convergence within the country.

The article is organized as follows: The following section describes briefly the general performance of the Mexican economy during this period together with some related historical studies in the field. A subsequent section describes data, sources, and methods used, followed by an analysis of the regional and sectoral wage trends and a section that provides an explanation of regional divergence and a general conclusion.

The Mexican economy before the Revolution and related historical studies

In 1876, Porfirio Díaz as new president of Mexico promoted a series of reforms that set the country on the longest period of political and economic stability since its independence. During his thirty-four years in office (1876–1910),¹ a period known in the historiography as the *Porfiriato* the country was radically transformed; liberal reforms promoted an expansion in industry, trade, and foreign investment, leading to unprecedented rates of economic growth (Bortz and Haber 2002).

As illustrated in **Table 1**, by 1910 Mexico's GDP (Gross Domestic Product) per capita nearly tripled its level of 1870, and although these levels were still behind other advanced countries this represented an outstanding growth achievement for the country in relative terms.

While attaining this, Mexico underwent a process of structural transformation. By 1877, nearly forty percent of output per capita was generated in agriculture; but this percentage declined by 1910 to almost thirty percent, whereas other sectors such as commerce increased their share in the economy (see **Table 2**).

During the first years of the regime and claiming to be adherents of the *laissez-faire* philosophy, the officials of the Díaz administration regarded many of the existing colonial policies (such as trade tariffs and inter-regional sales taxes) as obstacles for economic growth, therefore, the main objective of the government reformers was to remove these barriers by promoting a modernization process based on an outward-looking development strategy (Weiner 2000).

The country had a comparative advantage in the production of highly-demanded commodities such as silver, copper, coal, iron, and oil (Mexico was a world leading producer of silver and second in copper) in international markets. Furthermore, there was a growing demand for intermediate inputs in industrialized countries, thus, the expansion of transport infrastructure for commodity exports was considered a necessity in order to increase trade and integrate the country into the global economy (see for e.g. Kuntz-Ficker 1995 and 2014).

Initially, the government of Díaz did not have enough resources to fully undertake the investments that the railway system needed. Hence, subsidies and concessions were provided to foreign companies which covered around one third of the total construction costs.² From only 893 kilometers of railway track at the end of 1879, the network expanded close to 20,000 kilometers by 1910 (Coatsworth 1979). The expansion of the network linked the trade routes of the main exporting centers of the country which reduced freight rates sharply. For instance, estimates indicate that the freight of one ton of cotton textiles on the route Mexico-Querétaro (about 130 miles) dropped from \$61 US dollars in 1877 to only \$3 US dollars by 1910. This decline in transportation costs had a massive impact on production and prices, boosting the mining exporting sector, and the domestic commercialization of agriculture and manufacturing.

Table 2: Sectoral shares of real GDP per capita, 1877–1910 (Percentages).

Sectors	1877	1895	1910
Agriculture and livestock	42.2	38.2	33.7
Mining	10.4	6.3	8.4
Manufacturing	16.2	12.8	14.9
Construction	0.6	0.6	0.9
Transportation	2.5	3.3	2.7
Commerce	16.9	16.8	19.3
Government	11.2	8.9	7.2
Other	–	13.1	12.9
Total	100	100	100

Note: Shares based on GDP per capita in prices of 1900.
Source: Coatsworth (1990).

Table 1: Levels of GDP per capita in selected countries, 1870 and 1910 (1990 Geary–Khamis dollars).

Year	United Kingdom	France	United States	Mexico	Latin American average*
1870	3190	1876	2445	674	778
1910	4611	2965	4964	1694	1038
Increase in GDP (%)	45	58	103	150	33

Source: Based on data from Maddison (2007) updated by Bolt and van Zanden (2014).

*Average of GDP per capita levels of eight Latin American countries: Argentina, Brazil, Colombia, Chile, Mexico, Peru, Uruguay, and Venezuela.

The domestic impact from the expansion of foreign trade varied from region to region. Some rose and flourished but others declined according to the trade intensity of the region. The majority of the population was located in the center of the country where the home of large-scale farms for wheat, maize, and textile manufacturers were. The northern region with less population density was typically specialized in mining and ranching. The renowned historian Friedrich Katz pointed out that economic growth was concentrated mainly in the northern states:

“Another deep-seated discrepancy that Porfirian development produced was an increasing regional disparity between the center, the south and the north of the country” (Katz 1991: 79).

Regional differences in natural resource endowments and population densities shaped the structure of the country's labor market; inhabitants in the northern region were located in towns near to the copper, coal, and silver mines; in the Gulf, people were employed in the emergent textile industries, and inhabitants in the central and southern regions were engaged in agricultural activities in large *haciendas* and plantations.

Land concentration would become a factor that allegedly increased regional income disparities. The Díaz administration promoted a land reform in the beginning of the 1880s to accelerate land redistribution with the aim of promoting investment by privatizing communal land which allowed the legal acquisition of property by development companies and high-income individuals (foreign and nationals). As a result, by the year of 1910, only 835 families owned 95% of the arable land in the country. This unbalanced regional development which broadly characterized the course of the Porfirian economy led journalists and contemporary historians to claim that the exacerbation of regional disparities had serious implications that prevented the country's transition from a traditional to a modern economy.

Indeed, one of the recurrent elements in the literature of the Mexican Revolution is that the critical labor conditions of the expropriated peasants of whom many had become *peones* (pawns) working for the *hacendados* (landlords), coupled to a deterioration in the standards of living throughout these years generated widespread discontent and unrest among workers. This sparked organized political associations in different parts of the country leading ultimately to support an armed revolution that would overthrow the Díaz government (Meyer 1986; Knight 1986).

Related historical studies

The period of the Porfiriato has fascinated economic historians in Mexico and observers around the world. For many years the prevailing image of this period portrayed in Mexican school textbooks was a sort of a black legend. These often paid attention to popular stories that depicted atrocious social conditions and an unequal environment allegedly promoted by the Díaz government (e.g. Turner 1969). By the 1970s a strand of ‘hacienda studies’ popular among

historians specialized on Mexico tended to confirm some of these dreadful conditions. However, recent historiography has provided a more balanced picture incorporating the quantitative methods that characterize the approach of the so-called *New Economic History*. Aspects such as the effects on growth of transport innovation, financial development, foreign trade, and the reorganization of public finances, among others areas, have been explored by several economic historians in recent decades (see a review in Gómez-Galvarriato 2003; Riguzzi 2009).

The work during the 1980s conducted by John H. Coatsworth particularly in *Growth Against Development* (1981) provided a new perspective on the economic performance of Porfirian Mexico, principally on the importance that the railways had in enhancing economic growth. Coatsworth found that the railway expansion during the Porfiriato generated in social savings near to 50 percent of the increase in Mexican GDP per capita. The decline of transport costs reduced price differentials in basic commodities and minerals for exportation, generating a highly dynamic export sector. But, Coatsworth also highlighted a paradox in the economy; the expansion of railroads had brought growth to the country and at the same time carried popular discontent since this new way of transportation had changed agrarian landholding, leaving a vast portion of the population without their property giving rise to agrarian protests.

In general terms, this issue re-opened a long standing discussion on whether the developments of the Mexican economy improved the overall standards of living of Mexicans in the late-nineteenth century. Different quantitative analyses and economic interpretations of the Porfiriato's performance have emerged since Coatsworth's work. Although much of the discussion on economic history has focused on the buoyancy of mining exports, public finance, and the concentration of the banking sector, studies on living standards are scarce. Some of the most recent quantitative analyses on living standards are found in the works of Aurora Gómez-Galvarriato (1998 and 2013).

These studies have analyzed the evolution of industrial real wages before and after the revolution in Mexico from 1900 to 1930. Based on wage records from a textile mill located in Veracruz (Gulf region), one of her studies found that real wages in this company followed a stable upward trend from 1900 until 1907. However, after this period there was a deterioration (a decline of 18% from 1907–1910). Needless to say, in spite of the uniqueness of the information in Gómez-Galvarriato's study, the trends described in that study cannot be regarded as a broad representation of the country's overall real wage rates since other manufacturing and commercial activities were emerging in those years in the north and center of the country, and also a substantial share of rural labor of the country does not take part in these analyses.

Following a different approach, López-Alonso (2007) analyzed Mexican living standards for the period 1850–1950 employing anthropometric information. Exploring the evolution of average heights of the working population she found that for the period of 1877–1910 there

was no change in the average heights unlike the growth in other periods of time, suggesting that the biological standards of living did not improve during the Porfiriato. However, regardless the typical issues and criticism on the use and reliability of anthropometric data, this study does not elaborate an analysis at the regional level.

In recent years, Campos-Vázquez and Vélez-Grajales (2012) constructed an index similar to a human development index which was disaggregated by main cities and regions using data from official population censuses from 1895 to 1910. Their index accounts for literacy, urbanization rates, and health. Contrasting to previous studies, they found that the well-being of the population improved during these years, particularly in the northern states and to some extent in the southern ones, unlike the central region where there was no improvement.

In general, existing studies for this period have used consistently different measures of living standards (single-industry real wage, height records, and human development indices) and apparently there is still no clear consensus about the wage trends at the national or regional level.

Data, adjustments, and limitations

Empirical research on the determination of wages has devoted special attention to the effects of regional price differentials on the calculation of real wages across time and space. These studies have suggested that the analysis of wage differentials should take into account regional differences within countries in the cost of living in order to provide more accurate real wage estimates (Roback 1982; Maré and Glaeser 2001). Historical research for the case of United States and Britain has reexamined previous real wage estimates yielding considerable discrepancies when regional prices and other factors such as the cost of urbanization are included (e.g. Easterlin 1971; Feinstein 1998).

For the case of Mexico, few studies have attempted to undertake a systematic assessment on the regional patterns of the standards of living during the Porfiriato. Existent historiography has generally focused either on a single town/city, or on a sector/company, but there are no systematic analyses available at the sub-national level for these years.³ Also, international historical comparisons have made use a single real wage series but without including intra-regional differences in the country (Williamson 1999; Bértola and Williamson 2003; Challú and Gómez-Galvarriato 2015). One of the possible reasons behind this research lacuna is that data availability is very limited for this period. Although there is a vast tradition in the historical literature describing the conditions of peasants on the Mexican haciendas, records on prices and wages are scattered and discontinuous (Bortz and Aguila 2006: 4–6).

A distinctive effort of compiling information at the regional level is found in *Estadísticas Económicas del Porfiriato: Fuerza de trabajo y actividad económica por sectores* (hereafter *Estadísticas*) published originally in 1964 by El Colegio de México. These statistics were collected by a group of Mexican researchers as part of a large project aimed to give quantitative support to a series of monographs for a seminal multi-volume book collection on the

history of Mexico.⁴ The complete dataset had the objective of providing a general overview of the Mexican economy covering five main areas: population, sectoral production, prices and wages, money and banking, and public finance. However, only the sections of “sectoral production” and “prices and wages” were disaggregated at the regional level.

Far from being perfect, this dataset represents an important approximation of the developments in the Mexican economy and has been used by previous authors for different purposes, however, regional categories on prices and wages have remained underexploited in existent studies. At the same time this data has received strong criticism by some scholars for its poor quality and unspecified methods of classification (Coatsworth 1976). The alternative to circumvent these issues has been either to adjust this data with additional information, or to discard it entirely and switch into other types of information directly from primary sources such as micro-data from single case studies.

In order to account for the regional dynamics with a broader view we opted for the former alternative by adjusting the data from *Estadísticas* with additional price information disaggregated by region. Price information used in the present study is derived from the price series from 1886 to 1910 by Gómez-Galvarriato and Musacchio (2000). For previous years (1877–1885) we constructed a price index linked to the annual commodity price information from the referred volume of *Estadísticas*. As for regional nominal wages, we have also taken these from the same source which we proceeded to adjust with price deflators for their corresponding region.

Adjustments on wage and price data

As mentioned, given that there are differences in the cost of living across regions, our estimates of real wages are adjusted to take account of this. Surprisingly, compilers of the mentioned source neglected these differences and opted to construct a single deflator drawn on Mexico City's wholesale price index.⁵

Authors of that index considered that since the number of goods included in it was greater than in other estimations, it was therefore a more reliable indicator for the country's inflation. However, they neglected the potential variations of regional prices that could have impacted differently the living standards of Mexican workers residing in the location/region where the actual price change occurs.

To regionally adjust wages, we have constructed consumer price indices for each region of the country. Following data from *Estadísticas*, we took the weighted average of the wholesale price of six basic consumption goods for a group of Mexican states classified regionally according to each geographical location (see classification details in *appendix*).⁶

These price averages were adjusted by weighting them with given household consumption weights of Mexico City (consumption household survey of 1914) taken from Gómez-Galvarriato and Musacchio (2000). Nominal wage rates are taken also from *Estadísticas*, which are available by sectors and regions, originally compiled as ‘daily

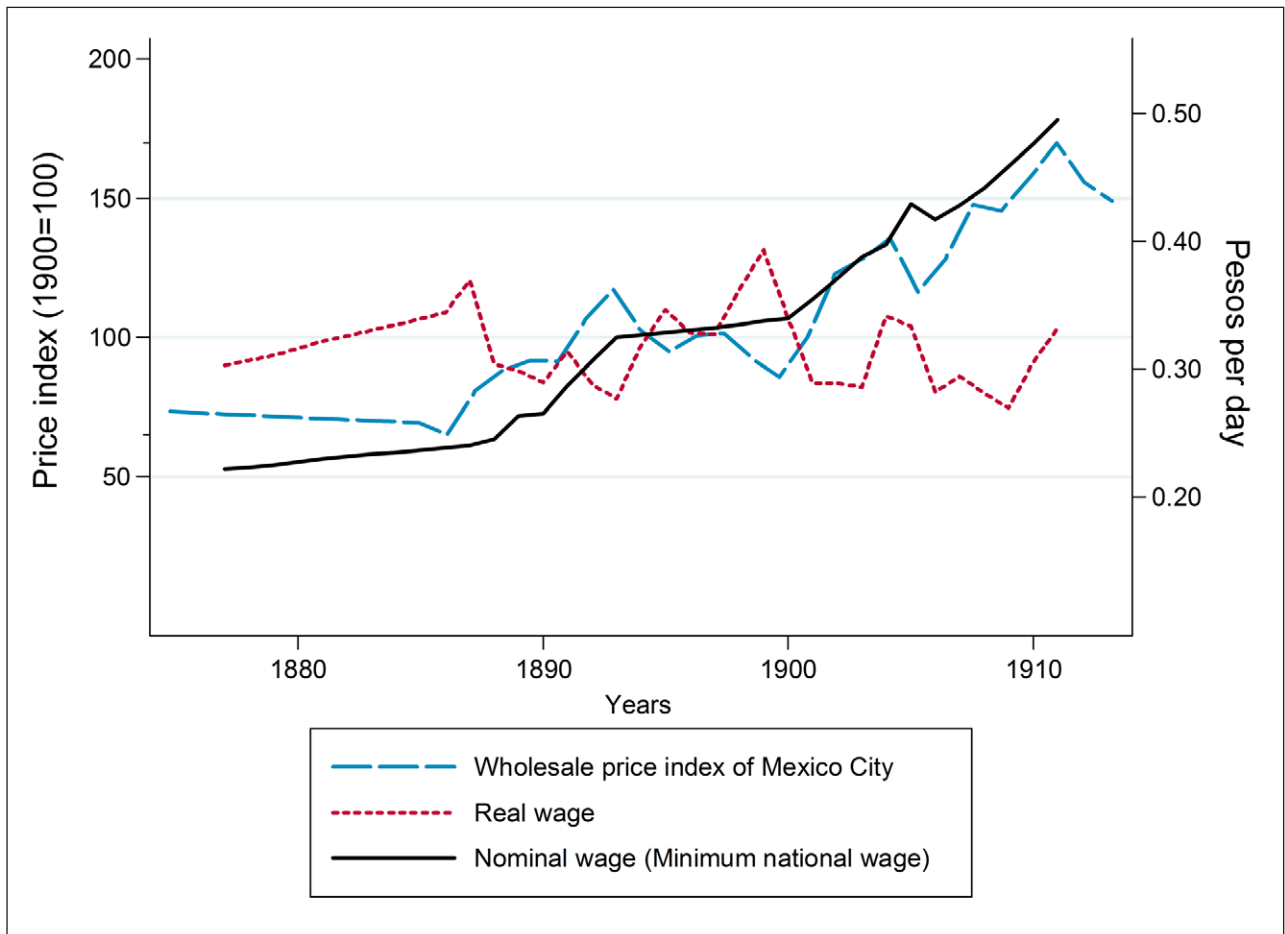


Figure 1: Evolution of prices, nominal wages, and real wages in Mexico, 1877–1911. Source: See details in appendix.

minimum wages’ (*Salario mínimo diario*) in agriculture, industry, mining, the public sector, and the army.⁷

Limitations

Since expenditure weights used for the construction of regional price indexes were taken from a single household consumption survey from Mexico City, we are assuming that there is no substitution of goods due to changes in relative prices. Although this is a standard assumption for *Laspeyres* type indices, it means for this case that there is a homogenous expenditure pattern across the country. The latter represents a strong conjecture, but considering the evidence of existing records of a stable agricultural production and homogenous household consumption, this should not affect significantly our regional estimates.⁸

The main limitation for these estimates is the representativeness of the consumer goods basket at the regional level. Our calculations of regional price indices relied on the availability of price information for these regions. These indices draw on the fixed-weighted price changes of maize, wheat, rice, meat, sugar, and beans (see appendix for further details). Prices of goods other than food products (clothing, electricity, and housing) are not available at the regional level; therefore, our indices can be also regarded as consumer staple indices.

Another limitation is that wage information from *Estadísticas* does not report the type of activity that the

worker undertook within the sector; therefore, it is not possible to disaggregate by the specific type of occupation and/or draw the skill intensity of the salaried worker.

As mentioned, wage information originally refers to minimum daily wages; however, back then the legal concept of minimum wage did not exist in the Mexican labor legislation. Data compilers of this information were referring to the lowest daily wage level they could find in the sector in a particular year. Therefore, our sectoral and regional estimates may be interpreted as lower-bound sectoral and regional indicators of the worker’s living standards.

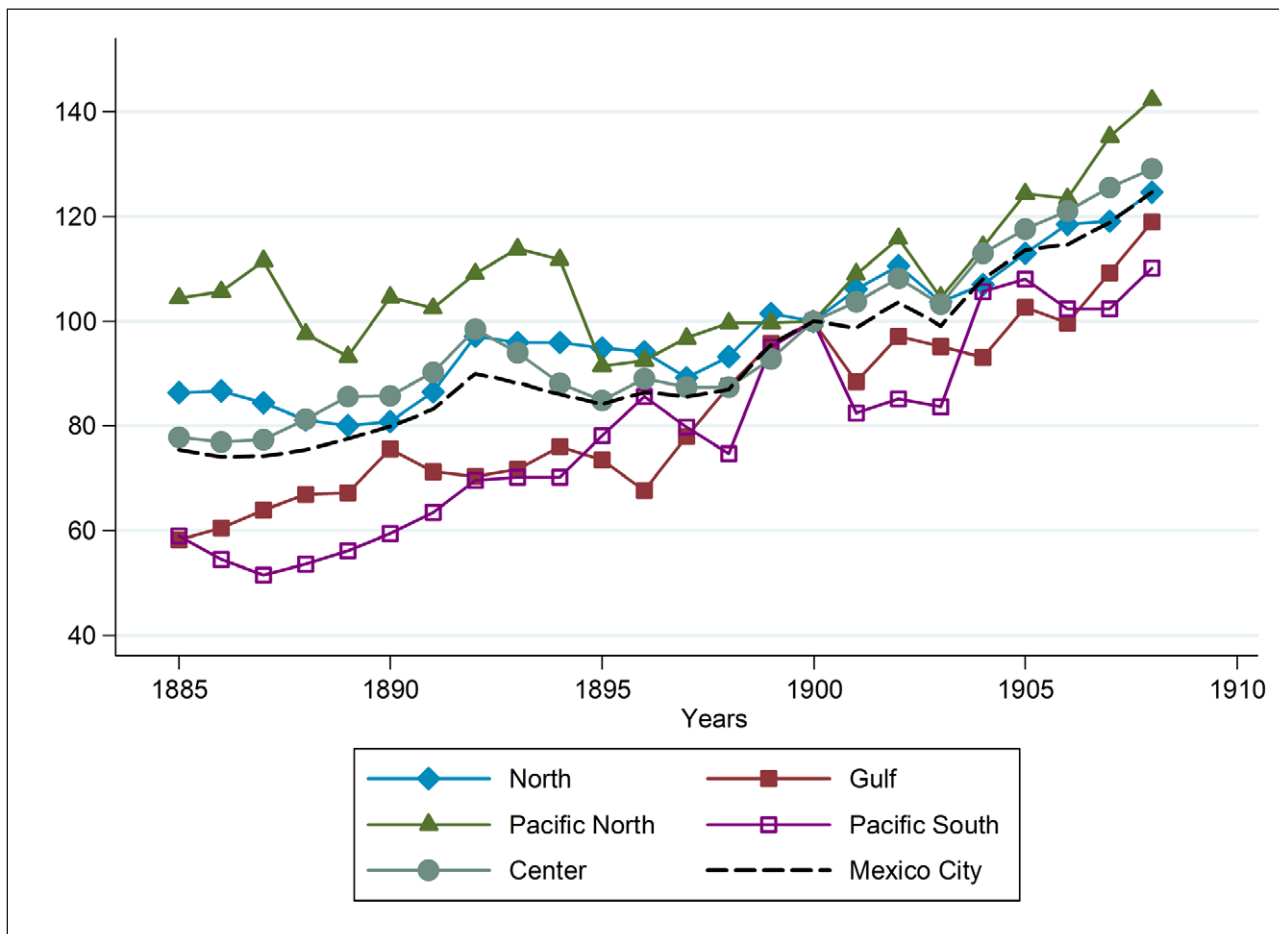
Figure 1 shows an overall picture of the trends in wages and prices using the country’s national estimates. As previous studies have shown, a rising trend in general prices in the last decade of the period caused a slight decline in real wages.

Despite the increases in the average national nominal wages, inflation (the annual change in the wholesale price index) grew faster than wages as depicted in **Table 3**. After a period of relative price stability before 1900, inflation reached an annual average of 6% which inhibited real wage growth from 1900 to 1910. However, this trend may have had a different impact in other regions of the country considering the intra-regional differentials in prices and wages.

Table 3: National wage growth and inflation, 1877–1910.

	Average growth of national nominal wages (%)	Average growth of national real wages (%)	Inflation (% change in logarithm of wholesale price index)
1877–1899	1.89	0.77	0.72
1900–1910	3.51	−0.85	6.02
1877–1910	2.52	0.58	2.91

Source: See text and appendix.

**Figure 2:** Price index by region (1900 = 100).

Source: Based on prices from Estadísticas and household expenditure weights from Gómez-Galvarriato and Musacchio (2000). See methods in appendix.

Note: Mexico City refers to the wholesale price index of Mexico City.

Regional prices

Regional price information drawn from Estadísticas is based on six main commodities (maize, wheat, meat, beans, rice, and sugar) for five regions, which are included to construct fixed-weighted regional price indices. **Figure 2** shows that price levels across regions differed across time.

The cost of living in the Pacific-South region of the country was much less than in the Pacific-North around 1885. Regional price indices show that these trends continued until the turn of the century, and although thereafter regional prices started to converge, an upward trend in all prices occurred after 1900. The inflationary

trend observed in the price data for the last eight years of the period has been highly contested in the literature. On the one hand, it has been regarded as an outcome of the impact of currency depreciation in those years that affected the terms of trade of the country increasing the price of non-tradable goods.

On the other hand, price increases are also attributed to climate shocks that generated consecutive seasons of bad harvests of staple crops from 1901 to 1907. However, whichever factor that may have generated inflation in this sub-period, our main aim in this article is to emphasize its differentiated effect on the cost of living according to the regional developments of wages and prices.

Regional and sectoral wage disparities

Did Mexican wages decline in all regions and sectors during this period? It is expected that some regions had an advantage due to their geographical position and offered initially higher nominal wages, but as standard theory suggests when adjusting them by their purchasing power these disparities would dissipate over time.

One of the most important premises in international trade theory is that factor price equalization forces promote regional real wage convergence. The Heckscher–Ohlin theorem states that in the absence of market distortions, the price of imperfectly mobile factors of production will equalize within countries and regions. The market mechanism through international trade would work sufficiently well to equalize the returns to unskilled labor and capital across regions (For the United States see for e.g. Margo 1999; and, Rosés and Sánchez-Alonso 2004 for Spain).

According to this logic, one expects that improvement in transportation and communication enhances mobility of capital and labor, and this would lead regions, and their incomes (of unskilled labor), to look more equal. Thus, the booming Mexican economy of the late-nineteenth century should provide an opportunity to identify the strength of these assumptions at the regional level related to the reduction of price differentials of the real cost of labor force. First, let us explore the real wage trends.

Regional and sectoral wage trends

Following the records of Mexican nominal wage rates originally computed in Estadísticas, the first fifteen years are characterized by a nearly flat trend followed thereafter by an upward trend in most of the regions (see **Figure 3**). At the sectoral level (**Table 4**), when adjusting with a single price deflator (Mexico City’s wholesale prices), wages were compressed in all three sectors until the turn of the century.

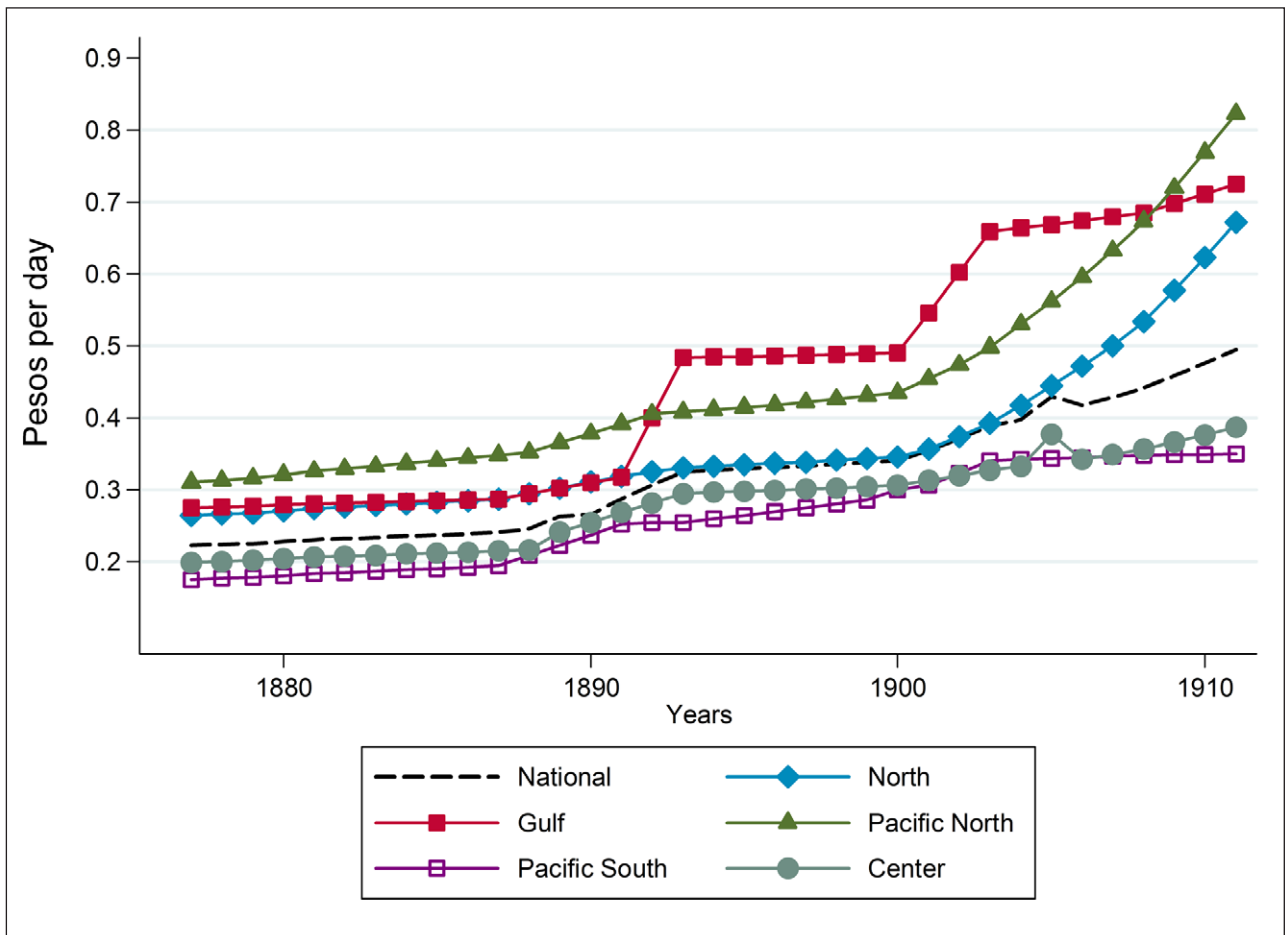


Figure 3: Mexican nominal wages, 1877–1911. Source: Estadísticas Económicas del Porfiriato, *El Colegio de México*, 1965.

Table 4: Growth of nominal wages by sector (Average annual growth rates).

	1877–1889	1889–1900	1900–1910	Full period
Agriculture	0.92	2.11	2.68	1.97
Industry	3.03	1.69	3.54	2.99
Mining	2.40	2.91	8.16	4.72

Source: See text and appendix.

However, regional inflation may have eroded these trends. Indeed, the picture changes when nominal wages are adjusted with Mexico City’s wholesale prices index as the following **Figure 4** and **Table 5** depict. It is possible to observe three main features: i) an increase in the variability of all real wage rates; ii) increasing wage disparities between regions that persisted throughout the period; iii) regions in the Pacific-North and Gulf captured higher real wages than others.

Figure 5 shows that after adjusting for regional prices (that is “regionally-adjusted” real wages), the Gulf region yielded higher wages relative to other regions (although with a larger variation), whereas others remained stable and compressed over the years as a result of a nearly simultaneous growth of regional prices with their respective nominal wages.

But why did the Gulf have this real wage advantage over other regions? Firstly, the Gulf region comprised the states of Veracruz, Campeche, Quintana Roo, and Yucatán, states characterized by the cultivation of Henequén, a plant whose fibers were used for the textile industry. This commodity experienced a price boom during these years making textile companies and plantations highly profitable especially in the fields of Veracruz and Yucatán (Wells 1992). Thus, regional specialization had a clear positive effect on the growth of nominal wages in this

region. And secondly, as it has been previously shown (**Figure 2**), prices in the Gulf were relatively lower than in other regions, thus creating an advantage in the purchasing power of wages.

The Pacific-North region had also a wage advantage over the Pacific South and Center of the country. Although the advantage was less pronounced like in the Gulf, it is worth highlighting a feature that may have impacted on wage levels; the proliferation and settlement of North American and French copper companies in the Pacific-North, particularly in the states of Sonora and in the peninsula of Baja California transformed this region through increasingly specializing in export mining.

As a result, higher wages rates were required to attract mining workers within the predominantly ranching

Table 5: Growth of wages by sector adjusted with prices of Mexico City (Average annual growth rates).

	1877–1889	1889–1900	1900–1910
Agriculture	-0.26	0.30	-0.23
Industry	2.01	0.57	-1.12
Mining	1.29	1.84	3.88

Note: Adjusted with wholesale price index of Mexico City. Source: See text.

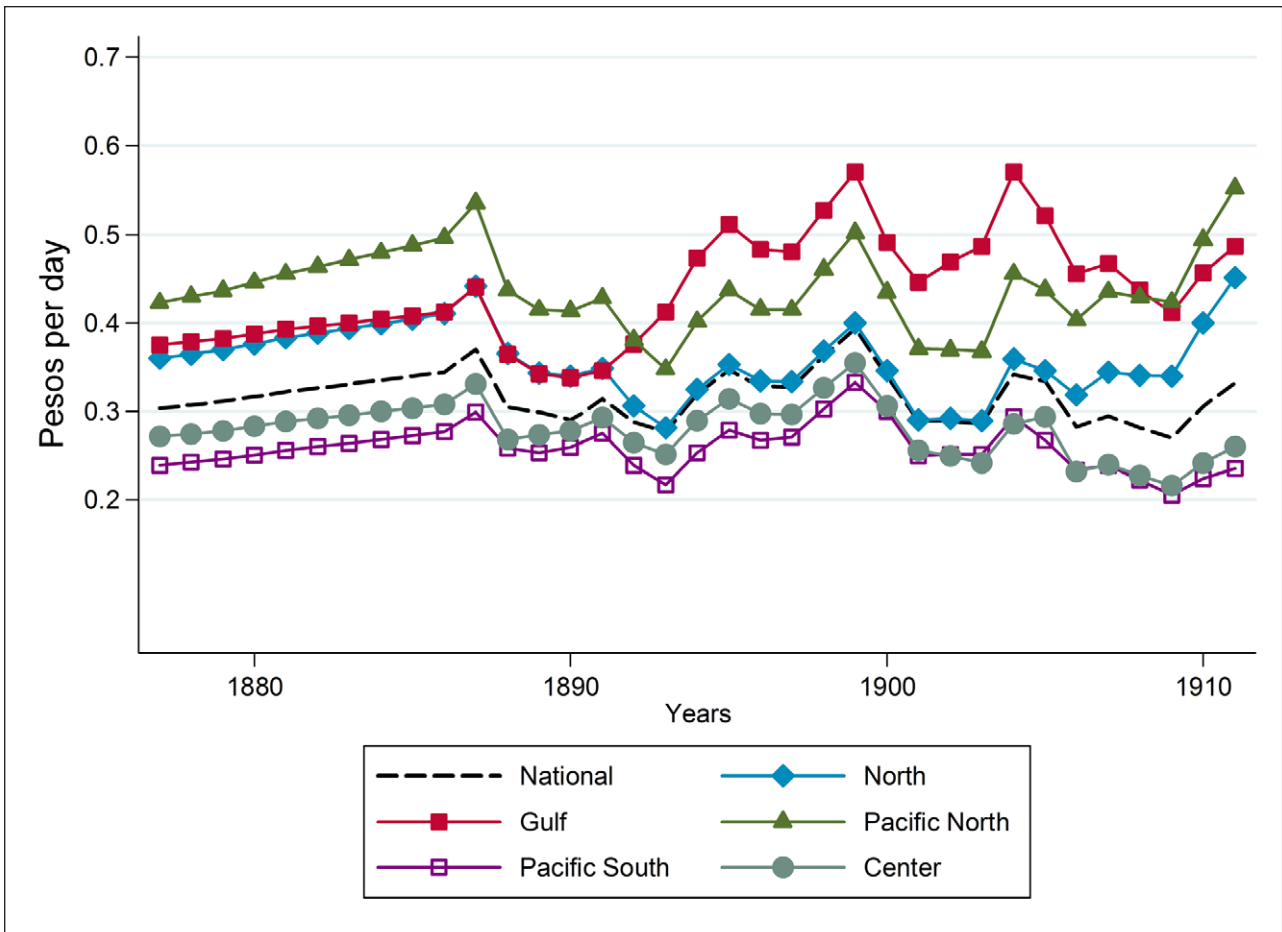


Figure 4: Wages by region adjusted with prices of Mexico City, 1877–1910.

Note: Adjusted with wholesale price index of Mexico City. Source: See text and appendix.

northern states. Also, there was an external aggregate shock, a decline in the price of silver during the last decade of the regime. Zabludowsky (1992) has documented how this phenomenon pushed upwards the price of imported goods promoting the export sector which favored the northern regions, and at the same time impacting positively nominal wages.⁹

Real wage rates in other regions remained relatively stable, although in the Gulf there was a slight wage decline

after 1905. Unfortunately, and due to the nature of this data, there is no information available of subsequent wage rates regionally disaggregated for the last two years of the regime (1909–1910).

Table 6 displays a view at a sectoral and regional level. It shows that the northern mining regions (North and Pacific-North) were the ones that yielded on average a higher real wage growth (around 6% per year) principally during the period of 1900–1908, similarly to the

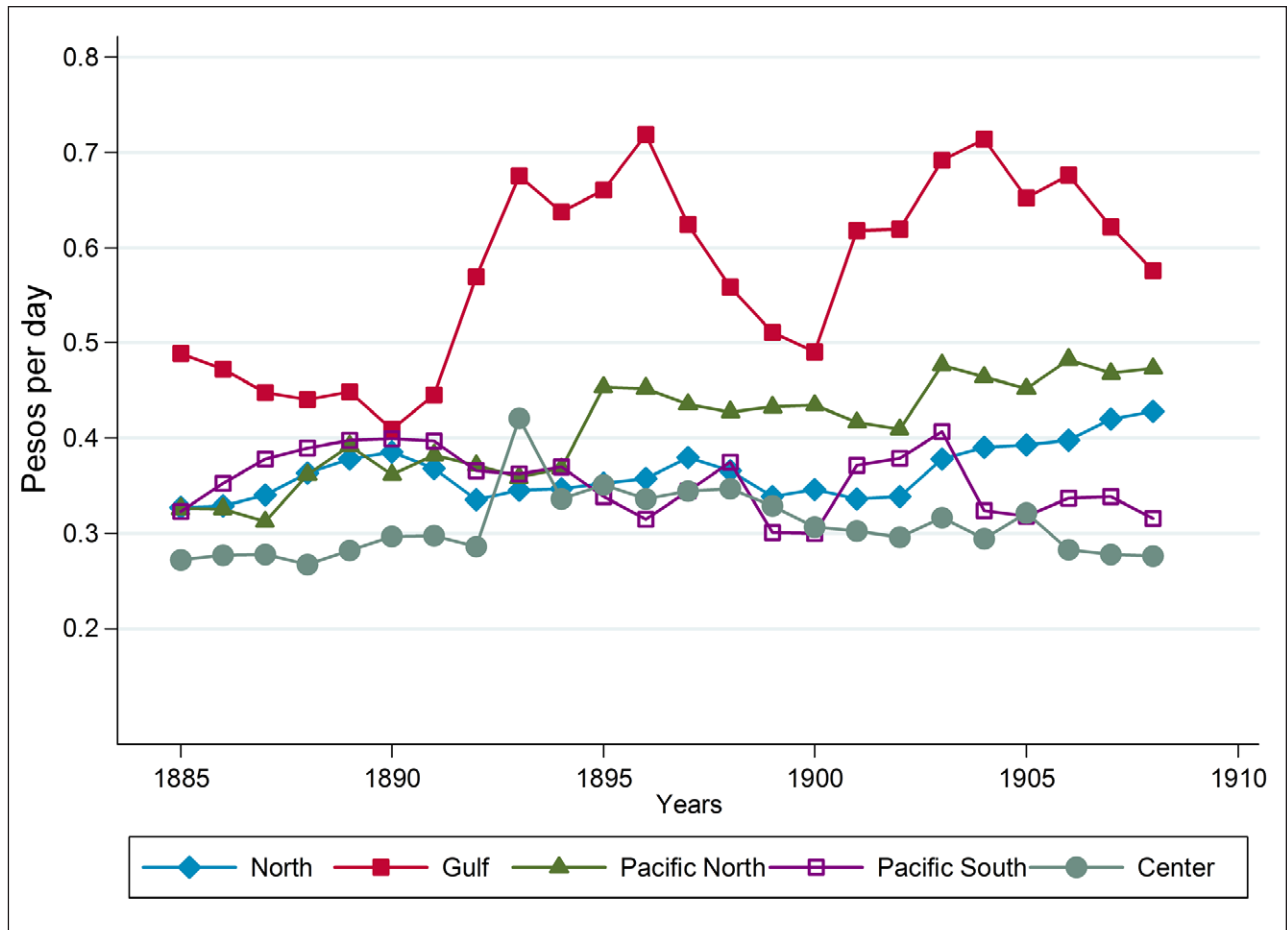


Figure 5: Regional wages adjusted with regional deflators, 1885–1908.
 Note: Adjusted with consumer price indices from their corresponding region.
 Source: See text and appendix.

Table 6: Growth of regionally-adjusted wages by sector and region (Average annual growth rates).

	North	Gulf	Pacific-North	Pacific-South	Center
1885–1900					
Agriculture	1.52	0.25	1.26	-0.12	1.04
Industry	1.49	-1.13	3.34	-1.94	0.35
Mining	2.06	-0.93	3.17	-0.34	1.53
1900–1908					
Agriculture	0.20	2.21	0.77	2.36	-1.47
Industry	2.01	0.10	1.23	-0.24	-1.52
Mining	6.08	-1.32	5.57	4.79	3.53

Note: Adjusted with regional deflators (1900 = 100).

expanding agricultural sectors (above 2%) of the Gulf and the Pacific South. The growth of industry wages was rather moderate compared to the wages in the booming mining sector. However, in broad terms the Pacific South and Center regions were the ones that benefited relatively less than others.

Many historians have placed special emphasis on the Mexican mining industry during the Porfiriato due to its paradoxical effects on the economy throughout the regime. On the one hand, its expansion through mineral exports brought an unprecedented development for the center and northern region of the country, but on the other, the predominance of foreign exploitation of natural resources and the existent working conditions brought a series of unrest and clashes between mining company owners, workers, and government (Bernstein 1965). Still, as **Figure 6** depicts, the high risk activity in the mines, made mining workers among the highest paid, especially the ones located in the northern regions where mining towns constantly suffered from shortages of labor.

By 1907/08 a typical mining worker living in the Pacific-North earned per day in real terms more than double than its counterpart working in a mine located in the Gulf. Of course, wage rates may have varied among mining companies and depended on the type of mineral extracted, but in a regional average, there was a large wage disparity observed within this sector. However, despite the relatively

high wage economy in the North and Pacific-North, mining strikes proliferated in these areas.

Studies on the formation of worker's unions in Mexico have described that although unrest of miners in the north of the country was growing in the first decade of the 1900s, the propagation of strikes in other sectors and regions had different worker's demands. For instance, whereas several groups of miners demanded better safety conditions and health benefits, industrial workers in the textile industries of the Gulf and Pacific-South mainly demanded salary raises and an equalization of wages between nationals and foreign employees (Leal and Woldenberg 1980). Indeed, **Table 7** shows that regionally-adjusted wage growth in

Table 7: Growth of real wages in industry by region adjusted with regional deflators, 1885–1908 (Average annual growth rates).

	1885–1900	1900–1908
North	1.49	2.01
Pacific-North	3.34	1.24
Gulf	-1.13	0.10
Pacific-South	-1.94	-0.24
Center	0.35	-1.52

Source: See text.

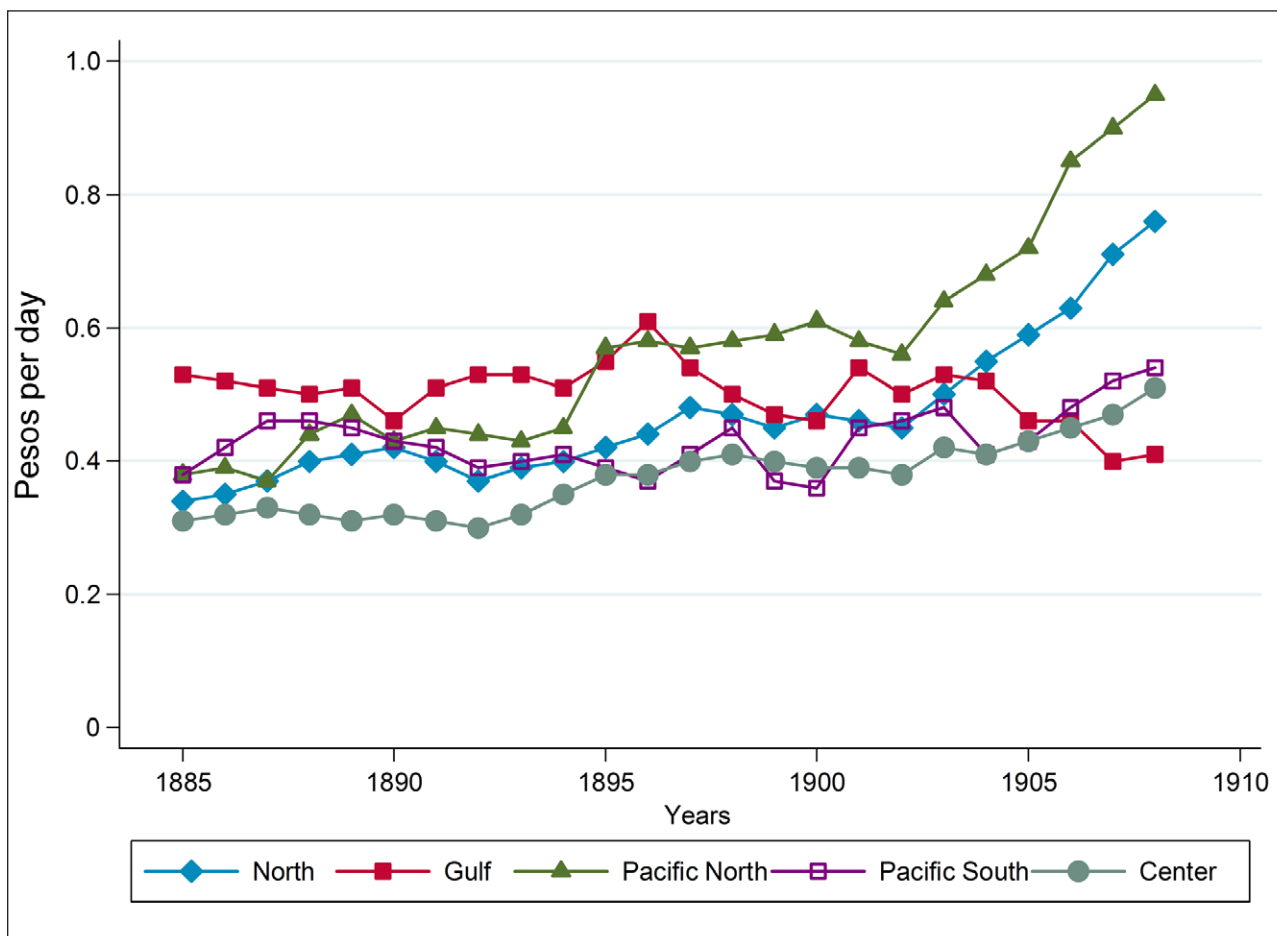


Figure 6: Regionally-adjusted wages in the mining sector, 1885–1908.

Note: Adjusted with consumer price indices (1900 = 100) from their corresponding region.

Pacific South, Gulf, and Center declined relatively to the regions in the North and Pacific-North, whereas the latter experienced positive growth rates throughout the years.

Another important feature that the estimates of regionally-adjusted wages show is that there are considerable differences compared to single deflator estimates (adjusted with Mexico City prices; see also **Figure 3**. A in the appendix). **Figure 7** illustrates this. In the predominantly agricultural regions of the country (Pacific-South and Gulf), levels and growth trends of real wages are substantially different when they are adjusted with different deflators.

Overall, looking at the wage development of all Mexican regions and sectors, and with the exception of the workers in the Pacific-South which benefited the least of all, the stable trends (slightly upward) in the growth of regionally-adjusted wages may provide an impression that the working conditions during the Porfiriato were very favorable for the majority of the workers (especially in the northern regions).

However, this feature should be judged carefully since wage rates are not a straightforward indication of the nature of the labor regime, i.e. length of labor shifts, working days, etc. It is difficult to generalize since these depended on the particular type of occupation, company, and location. During these years there was no standard labor code that allowed workers associations to be consented by the Mexican legislation.¹⁰

In fact, except for foreign railroad employees, most of Mexican workers were not unionized and some studies have reported that labor shifts were up from 12 to 14 hours in textile companies, whereas salaried peasants in the *haciendas* of the south were up to work 16 hours per day (Alston et al. 2009).

Wage convergence or divergence?

If some sectors and regions experienced higher wage growth than others, it is possible that across time the lagging ones were catching up to the levels of others, giving as a result a process of wage convergence. The idea of convergence and divergence across countries and regions is mainly derived from the predictions of the standard neo-classical growth model.

The “convergence literature” (e.g. Barro and Sala-i-Martin 2004) refers to σ -convergence if the dispersion of income (in this case real wages) between a group of economies or regions falls over time. And/or, there is β -convergence, when the partial correlation between income growth and its initial level is negative over time.

Figure 8 depicts the evolution of the coefficient of variation of regionally-adjusted real wages across regions in three sectors. The figure indicates that wage dispersion did not decline over time, but instead, increased throughout the period. Although it declined shortly from 1885–1890, thereafter a continuous dispersion rose in the three sectors (especially in agriculture), suggesting that there was no σ -convergence across Mexican regions, but a marked trend of σ -divergence.

On the other hand, **Figure 9** presents a test for evidence of β -convergence which refers to a tendency for initially low-wage regions to experience faster wage growth than

high-wage regions. However, the figure reports the opposite (β -divergence), confirming the previous result.

There is a positive correlation of initial wage levels with their growth, that is: regions that had initially low-wage levels grew at a slower pace than regions that had higher wage levels.

Even though the exercise to test β -convergence requires more data observations for statistical significance and robustness, the relationship with the present adjusted data shows clear signals that the Pacific South and Center regions lagged behind in the growth of real wages of the North, Pacific-North, and Gulf.

What can explain the regional wage gaps in Porfirian Mexico?

According to evidence presented in the previous section, the price of labor did not converge across Mexican regions during this period. Even after adjusting nominal wages with regional prices, real wage gaps persisted across regions and sectors. Why did Mexican workers accept less income in one region if they could have obtained much more in another region? Explanations on this issue are part of a long tradition in the field of development economics. One of the standard arguments is the existence of labor market imperfections such as lack of information on wage differences, and institutional barriers to labor mobility: firms and individuals are unaware of different income opportunities.

The existence of wage gaps within countries are considered a temporary phenomenon related to the geographical distances between urban centers and rural areas; since the rural-urban migration process is not instantaneous due to the costs related to relocation, potential rural migrants would gradually respond to differences in wages, and gaps disappear, equalizing regional wages. The economic historian Jeffrey Williamson has argued that wage gaps are a manifestation of labor market disequilibria that most industrializing countries experience during episodes of drastic economic transformation (Williamson 1991: 42). Thus, the changes that Mexico underwent during the Porfiriato may be an illustration of the unequal impact that industrialization (due to productivity differences) had on regional labor markets since factories, mines, and plantations were highly dispersed geographically.

According to the present calculations, the temporary labor market disequilibrium was certainly not corrected. The underlying causes of this may have been determined by external, and domestic structural factors; a differentiated regional impact by an external shock; and the prevalence of extractive labor market institutions. For instance, silver depreciation at the turn of the century was transmitted through a rise of trade exports in a different proportion by raising nominal wages in the less populated mining regions in the North and the Pacific-North, and not much to the densely-populated agricultural states in the South which widened the wage gap between these regions (Zabludowsky 1992). However, this external shock (currency depreciation) was a transitory factor, which may have contributed to the existence of wage gaps but should have dissipated thereafter. But as we have shown, these

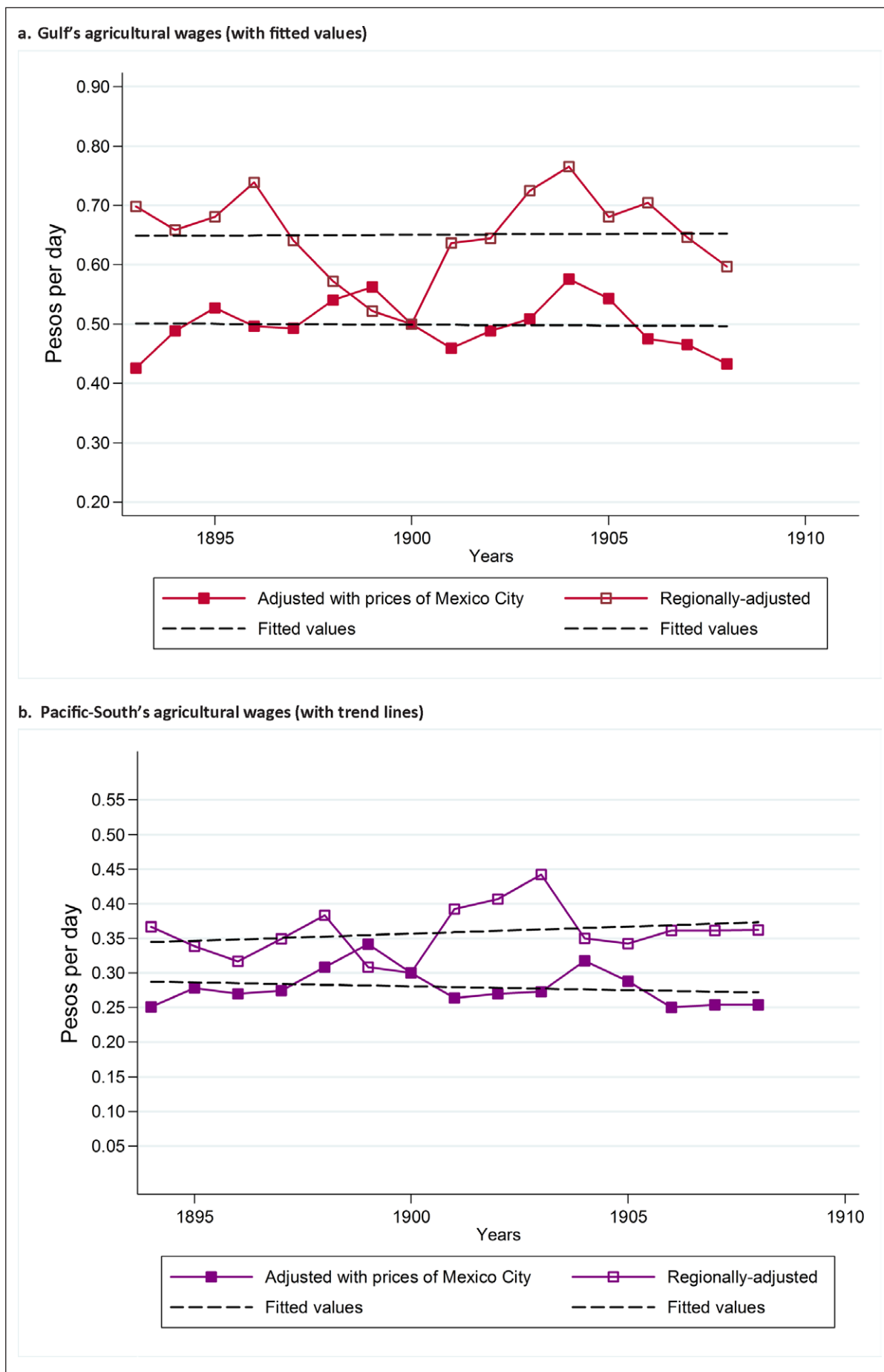


Figure 7: Real wages of the agricultural sector in the Gulf and Pacific-South, 1895–1908. Source: See appendix.

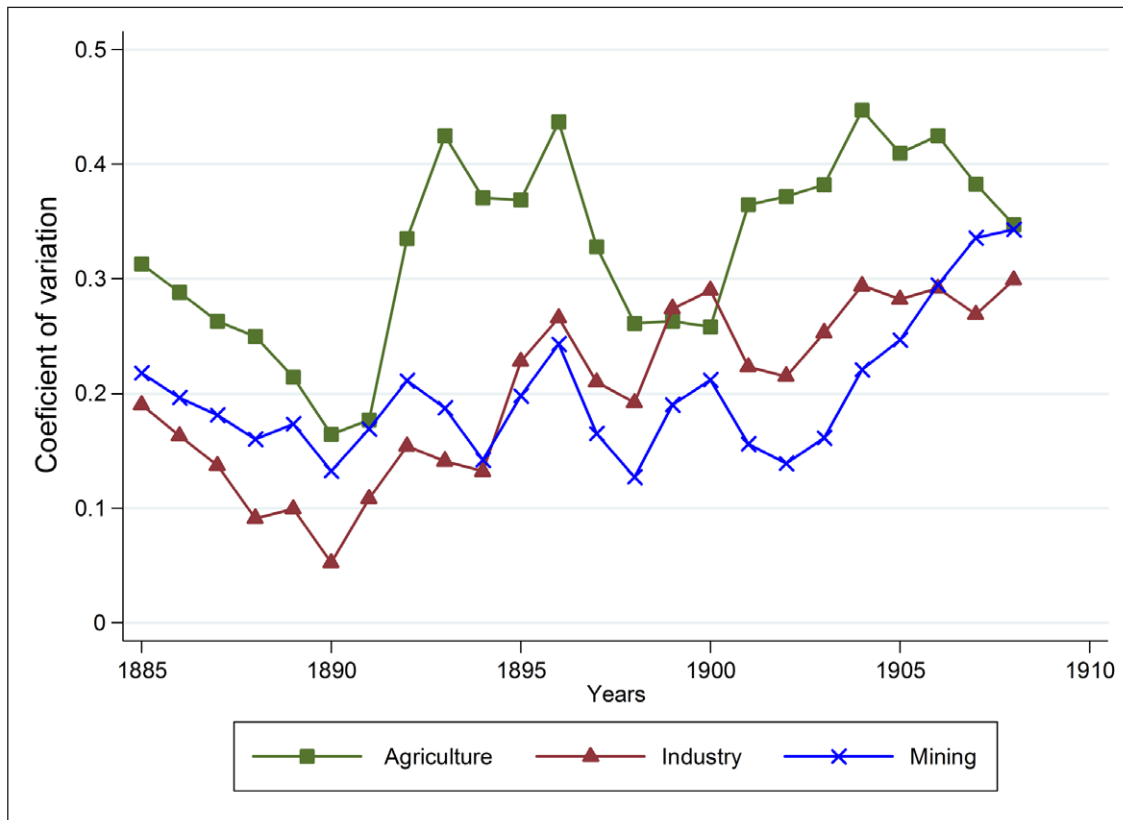


Figure 8: σ -convergence/divergence of real regional wages, 1885–1908.
 Note: σ -convergence/divergence is measured as the coefficient of variation of wages adjusted with regional prices among the five regions within a sector for each year.
 Source: See in text.

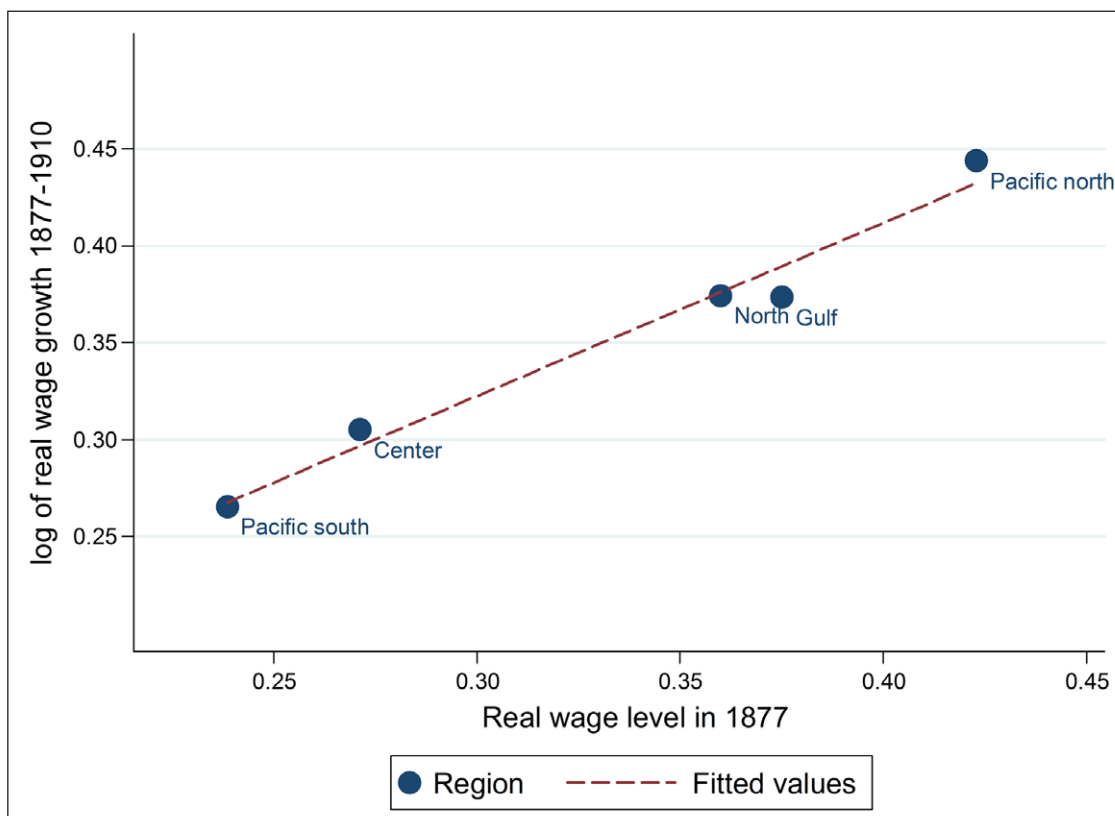


Figure 9: β -divergence of real wages across Mexican regions.
 Source: See in text.

gaps widened over time which may have obeyed to prevalent structural factors in the Mexican labor market.

Regarding this, a strand of empirical studies appeared in the 1970s for the case of developing countries, further formalizing into theoretical models that showed that wage gaps can persist in the course of development. The emergence of a 'dual economy' framework implied that there were different patterns of development within a country because the demand of labor and technology were different between the rural and urban sector. This type of analysis inspired by the pioneering work of Sir Arthur Lewis became the conventional wisdom for development economists to study the structural transformation during industrialization.

It is argued that in early stages of industrialization, capital formation in urban industry is far more rapid than in agriculture. Consequently, urban wage rates rise relative to rural wage rates, releasing labor into the city which was absorbed (holding down urban wages) until the rural labor surplus is exhausted. Thus, wage differentials are a result of an unbalanced growth in the demand for labor. Migration is seen as a favorable factor for growth since it was an indication that labor is moving out of low productivity areas. The Harris-Todaro model has become the workhorse framework that links wages and migration. The model is a formalization of the process mentioned which basically states that because domestic urban and rural labor markets are linked; any rise in expected urban wages will be exhausted by migration from the rural-agricultural sector (Hatton and Williamson 1992).

However, high rates of migration in Porfirian Mexico were not precisely a common feature, foreign nor inter-regional. Although foreign immigration flows predominantly from Spain increased, comparatively speaking, during the so-called era of 'mass migration' the country never experienced high immigration flows of Europeans as in the United States or even near to the ones in other Latin American countries like Argentina and Brazil (Sánchez-Alonso 2007). But interestingly, given the existence of coerced labor in the southern rural areas, unrestricted inter-regional migration within Mexico was also not very common, an aspect that had crucial implications in the determination of national wages.

Coerced labor and regional wage gaps

The existence of debt peonage (bonded labor) has been a well-known feature in rural areas of Latin American countries since colonial times (e.g. Bauer 1979). For the case of Mexico, it has been documented in a series of regional studies. Debt peonage was basically a coercive mechanism used by owners of the haciendas and large plantations to attract workers within a market framework to voluntarily work in commercial and agricultural activities in which employers would give payments in advance to workers for their temporary subsistence and/or transportation costs. The worker's labor services were the means of repayment for their debts.

Frequently, more productive workers tended to incur into more debt, accumulating it over time which legally locked them to remain under a fixed contract

in a particular plantation until the debt was fully paid. Although this framework was outlawed by the Mexican Federal Constitution of 1857, studies indicate that during the Porfiriato this mechanism was used to upfront the labor shortages in regional markets in booming economic activities, especially the ones in the south such as the large plantations in the state of Yucatán.¹¹

Knight (1986) and Katz (1991) have characterized how different labor market regimes were in place according to the geographical distribution of the country: in the North, a "free" labor force was in place; in the Center prevailed a more "traditional" debt peonage; and in the South, a coercive and extractive debt peonage was common.

The prevalence of this type of institution in the South and Center encouraged coerced labor contracts which prevented worker's unrestricted mobility across regions and sectors. Thus, inter-regional migration was insufficient to balance labor markets via wages. As a consequence, this induced labor market segmentation affected profoundly the evolution and size of regional and sectoral wage gaps.

Figure 10 reports an increasing sectoral wage gap of agriculture to industry and to mining. Instead of an equalizing trend, it shows that by the end of the decade of the 1900s wage levels in agriculture experienced a fast decline reaching to a point of being less than half of the level than in mining.

Because of the competition from the mines of the northern Mexican regions and in the cotton fields in the south of the United States, employers of the agricultural sector in the Mexican south tightened labor coercion measures, and also raised nominal wages to retain workers (Katz 1974, 34). However, as shown in **Figure 10**, in real terms these increases in agriculture were not enough to match the steeped progress in wages of the industrial and mining sector, accentuating the wage gap vis-à-vis agriculture after 1900.

Concluding remarks

The Mexican Revolution has been a topic of recurrent dispute among historians interpreting the origins behind the uprising in Mexico in 1910. Most of the explanations have pointed at causes associated to the frustration of the peasantry bereft from its rights of their land; to the undemocratic attitude of the president in its reluctance to step down after governing for more than three decades and committing atrocious acts of violence against rural indigenous populations; and to a rise of income inequality coupled with a continuous deterioration of the workers' living standards, among other numerous explanations. Evidently, social phenomena can be multi-causal and multi-dimensional, and for many observers it has been customary to accept that it was the combination of all of these factors that inspired the emergence of revolutionary movements across the country.

This article has shown that the interpretation on a secular decline in the workers' living standards in Mexico from 1877–1910 does not have strong quantitative foundations. The analysis provided evidence based on regional data showing that estimated *lower-bound* regionally-adjusted wages remained relatively stable in most of the

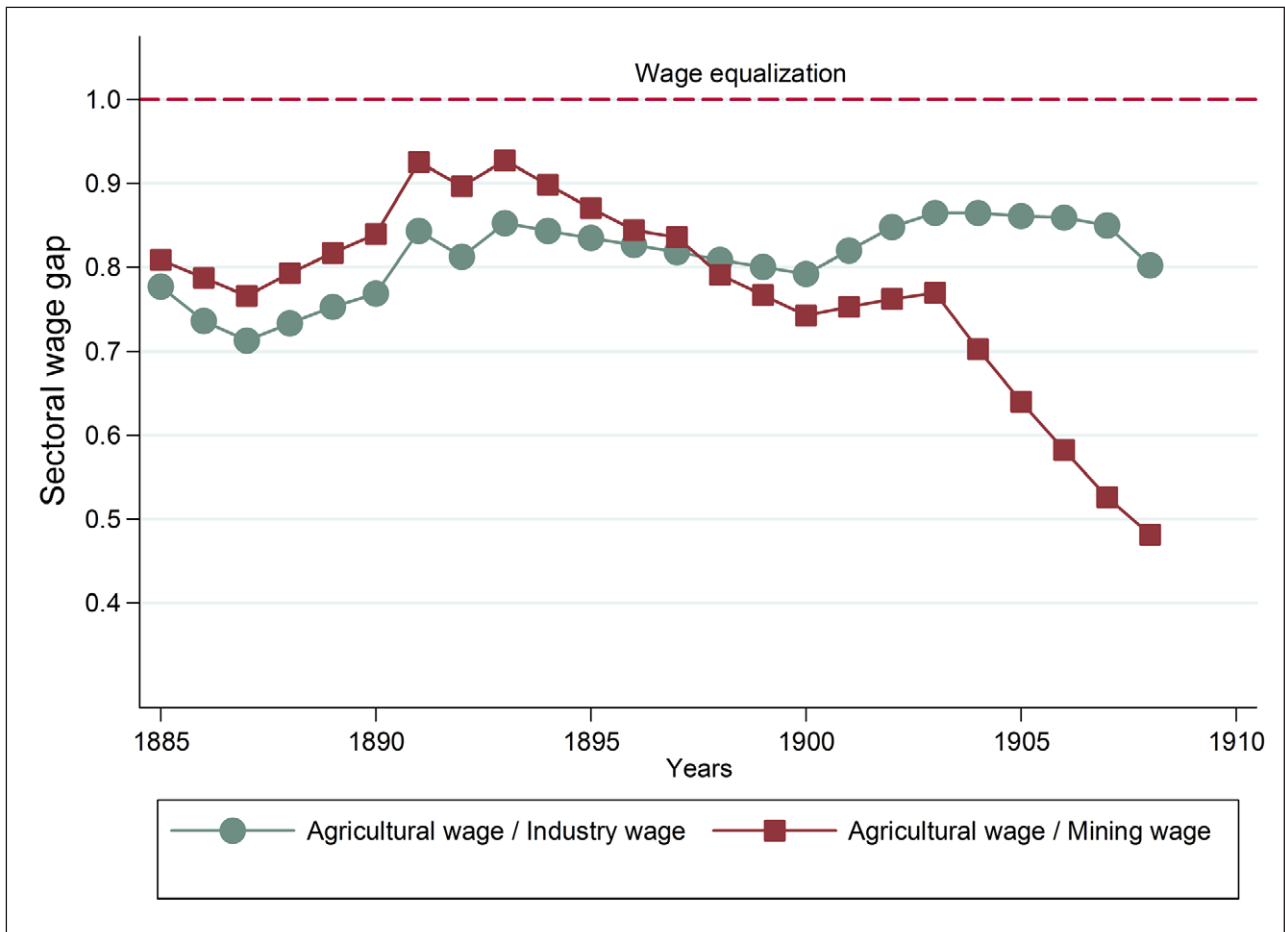


Figure 10: Agricultural real wage gap to industry and mining.
 Source: See in text.
 Note: Regionally-adjusted wages from the corresponding sector.

Mexican regions throughout the period. Although wages followed divergent patterns within country and there was a slight declining trend in wages of the industrial sector of the Pacific South region, from a broader quantitative perspective there was moderate wage growth and no dramatic decline as the conventional literature argues. Of course, this does not mean the working conditions were improving considering the length of working days and the meager labor contract benefits, but certainly there was no continuous deterioration in the purchasing power of lower-bound wages.

However, real wages were not equalized across regions. In fact, they tended to diverge over time, which is a paradoxical feature considering the well-documented process of commodity price integration as an outcome from the improvements of the transportation system during this period. The regions and sectors in the Center and Pacific South of the country experienced a slower real wage growth relative to the North, Pacific-North, and Gulf. A tension between the forces of regional convergence and divergence emerged in which prevalent labor market institutions in Mexico tilted the scale for divergence by not allowing the removal of structural barriers for labor market mobility. Coerced labor was institutionalized in the rural labor markets of the southern regions affecting inter-regional migration which in turn generated

rigidities in nominal wages and thus, regional real wage divergence.

Unlike the experience of factor price convergence in the United States and other open economies over the same period, the Porfirian regime in Mexico claiming to embrace inter-regional free trade and the abolishment of extractive labor market institutions inherited from the colonial period, tended to tolerate labor coercion schemes with the purpose of up-fronting labor scarcity in large-scale plantations and mining companies. Seemingly, instead of promoting efficient labor reallocation, this institution (labor coercion) was unable to clear out the differences in the regional demand for labor being reflected in the widening real wage gaps across sectors and regions.

Although case-country experiences of regional convergence are more common in the economic growth literature, the phenomenon of regional real wage divergence is not an exceptional case. In fact, it is consistent with the theoretical developments of the so-called 'New Economic Geography'. In that view, regional divergence is driven by the increasing returns in industry, decreasing returns in other sectors, a high share of non-agricultural activities in GDP that yields high labor productivity and income heterogeneity across regions (Krugman and Venables 1995; Hanson 1997).

But in a 'cliometric' sense, there are more inquiries than answers for the Porfiriato. Perhaps one of the most difficult and unresolved questions is that if the country experienced an unprecedented expansion in real output per capita, why did the worker's real earnings in the most productive sectors and regions not parallel this? Indeed, although real wages diverged, they did not collapse but remained stable and slightly upward. One question remains, however, on the *bonanza* during those years; where did all the fruits of economic growth go if Mexican laborers did not capture it in its entirety?

This feature could be an historical analogy of the 'growth puzzle' visible in other industrializing countries that experienced a 'Kuznets curve' type of development which presumes increasing income inequality during early industrialization and declining inequality in a modern industrial society. The data limitations of range and coverage in the present study prevent us to confirm this long-term empirical observation.¹² To provide more precise answers on the underlying causes of convergence and divergence in the periphery during the *belle époque* it is necessary to have a greater detail in historical data disaggregation and coverage. This calls for additional efforts in re-constructing historical data not only on regional wages and prices, but on systematic regional estimates of capital (physical and human) for Mexico and other developing regions.

Nevertheless, the quantitative findings of a 'divergent real wage growth' in Porfirian Mexico illustrate that mainstream wage equalization theories may not travel well through the breakdown of historical data. It also unveils that aggregate comparative income measures may not be very informative about the effects of globalization on the standards of living of the developing world in the late-nineteenth century.

Notes

- ¹ Diaz stepped down as president in 1880 and hand-picked one of his trusted political operatives Manuel González as his successor whereas he continued as government minister. However, by 1884 Diaz was re-elected as President and continued uninterruptedly in office until 1910. Historians have broadly considered the period 1876–1910 as the Porfiriato.
- ² It is estimated that 80% of the capital for railroad construction was covered by North American investors. See Meyer and Sherman (1987: 444).
- ³ For case studies see, Katz (1974); and Cross (1978). See also the most recent study on the textile mill in the valley of Veracruz described in Gómez-Galvarriato (2013). Recently, Challú and Gómez Galvarriato (2015) covered this period using Mexico City's real wages from an international perspective.
- ⁴ The collection series was published in Spanish as *Historia Moderna de México* edited by Daniel Cosío Villegas consisting in a total of ten volumes on political, social and economic history of Mexico. Volume VII published in 1965 as 'Porfiriato: Vida Económica' was particularly devoted to the history of this period.

- ⁵ Their index (Mexico City wholesale price index) was based on thirteen goods with production weights of 1939.
- ⁶ Annual price data for each commodity collected in Estadísticas comes originally from the weekly publications of a Mexican financial magazine *La Semana Mercantil*.
- ⁷ Nominal wage rates for the army and public sector were left out in the present analysis since there is no regional disaggregation on these categories.
- ⁸ Previous studies argued that there was a shortage of agricultural basic goods during the decade 1890–1900 that caused inflation in the subsequent decade. However, Coatsworth (1976) re-calculated several agricultural production statistics and showed evidence of the contrary; there was no shortage of agricultural production for domestic consumption during these years.
- ⁹ The Mexican Monetary Commission back then reported this feature regarding the observed wage increase in the Northern region. See in Comisión Monetaria, *Datos para el Estudio de la Cuestión Monetaria*, Secretaria de Hacienda y Crédito Público, 1904.
- ¹⁰ Although worker's associations emerged stealthily before 1910, the creation of the Mexican Liberal Party in 1900 gave a platform for workers' advocacy. However, it was after the official recognition of the labor code in the Constitution of 1917 where the minimum wage and an eight-hour working day were legally enforced.
- ¹¹ There are studies documenting a process of forced relocation of groups of indigenous population in the north (for instance, indigenous people called "Yaquis") to work in the plantations of the south. See for e.g. Hu-Dehart (1974). Also, there is evidence on the existence of a penalization to landowners if their peones moved to work to other plantations out of the region without official notice. See Alston et al. (2009).
- ¹² See an approximation of the dissimilar trend between real wages and output (GDP) per capita in the last column (a)/(b) of Table 3.B. in the appendix.

Additional File

The additional file for this article can be found as follows:

- **Supplementary file 1.** Appendix. DOI: <https://doi.org/10.16993/iberoamericana.421.s1>

Acknowledgements

The author would like to thank Herman de Jong, Daniel Gallardo, Ben Gales, and Oisín Gilmore for helpful comments on earlier drafts of this article. Any errors and omissions are responsibility of the author.

Funding Information

The author acknowledges the financial support from Erasmus Mundus External Cooperation Window (141301-ECW-LOT 18).

Competing Interests

The author has no competing interests to declare.

References

- Alston, LJ, Mattiace, S and Nonnenmacher, T.** 2009. "Coercion, culture, and contracts: Labor and debt on henequen haciendas in Yucatán, Mexico, 1870–1915." *Journal of Economic History*, 69: 104–137. DOI: <https://doi.org/10.1017/S0022050709000357>
- Barro, R and Sala-i-Martin, X.** 2004. *Economic Growth*. Cambridge: MIT Press.
- Bauer, AJ.** 1979. Rural workers in Spanish America: problems of peonage and oppression. *The Hispanic American Historical Review*, 59: 34–63. DOI: <https://doi.org/10.2307/2514135>
- Bernstein, MD.** 1965. *The Mexican mining industry, 1890–1950: A study of the interaction of politics, economics, and technology* (State University of New York Press).
- Bértola, L and Williamson, JG.** 2003. "Globalization in Latin America Before 1940." *National Bureau of Economic Research, Working Paper No. w9687*.
- Bortz, J and Aguila, M.** 2006. "Earning a living: A history of real wage studies in twentieth-century Mexico." *Latin American Research Review*, 41: 112–138. DOI: <https://doi.org/10.1353/lar.2006.0019>
- Bortz, J and Haber, SH.** 2002. *The Mexican Economy, 1870–1930: Essays on the Economic History of Institutions, Revolution, and Growth*. Stanford University Press.
- Campos-Vázquez, RM and Vélez-Grajales, R.** 2012. Did Population well-being improve during Porfirian Mexico? A regional analysis using a quasi-human development index. *Journal of Human Development and Capabilities*, 13: 597–620. DOI: <https://doi.org/10.1080/19452829.2012.693066>
- Challú, AE and Gómez-Galvarriato, A.** 2015. "Mexico's real wages in the age of the great divergence, 1730–1930." *Revista de Historia Económica-Journal of Iberian and Latin American Economic History*, 33(1): 83–122. DOI: <https://doi.org/10.1017/S021261091500004X>
- Coatsworth, JH.** 1976. "Anotaciones sobre la producción de alimentos durante el Porfiriato." *Historia Mexicana*, 167–187.
- Coatsworth, JH.** 1979. "Indispensable railroads in a backward economy: The case of Mexico." *Journal of Economic History*, 39: 939–960. DOI: <https://doi.org/10.1017/S0022050700098685>
- Coatsworth, JH.** 1981. *Growth against development: The economic impact of railroads in Porfirian Mexico* (Northern Illinois University Press).
- Coatsworth, JH.** 1990. *Los orígenes del atraso: Nueve ensayos de historia económica de México en los siglos XVIII y XIX* (Alianza Editorial).
- Cross, HE.** 1978. "Living Standards in Rural Nineteenth-Century Mexico: Zacatecas 1820–80." *Journal of Latin American Studies*, 10: 1–19. DOI: <https://doi.org/10.1017/S0022216X00019714>
- Dobado, R and Marrero, GA.** 2005. "Corn market integration in Porfirian Mexico." *Journal of Economic History*, 65: 103–128. DOI: <https://doi.org/10.1017/S0022050705050047>
- Easterlin, R.** 1971. "Regional income trends, 1840–1950." In: Fogel, R and Engerman, S (eds.), *The reinterpretation of American economic history* (pp. 38–53). New York, NY: Harper Row.
- Feinstein, CH.** 1998. Pessimism perpetuated: Real wages and the standard of living in Britain during and after the industrial revolution. *Journal of Economic History*, 58: 625–658. DOI: <https://doi.org/10.1017/S0022050700021100>
- Gilly, A.** 1971. *La revolución interrumpida* (Ediciones El Caballito).
- Gómez-Galvarriato, A.** 1998. "The evolution of prices and real wages in Mexico from the Porfiriato to the Revolution." In: Coatsworth, JH and Taylor, AM (eds.), *Latin America and the World Economy Since 1800* (Harvard University/David Rockefeller Center for Latin American Studies), pp. 347–378.
- Gómez-Galvarriato, A.** 2003. "Industrialización, empresas y trabajadores industriales, del Porfiriato a la Revolución: la nueva historiografía." *Historia Mexicana*, 773–804.
- Gómez-Galvarriato, A.** 2013. *Industry and Revolution: Social and Economic Change in the Orizaba Valley, Mexico*. Harvard University Press. DOI: <https://doi.org/10.4159/harvard.9780674074330>
- Gómez-Galvarriato, A and Musacchio, A.** 2000. "Un nuevo índice de precios para México, 1886–1929." *El Trimestre Económico*, 47–91.
- Hanson, GH.** 1997. "Increasing returns, trade and the regional structure of wages." *The Economic Journal*, 1: 113–133. DOI: <https://doi.org/10.1111/1468-0297.00145>
- Hatton, TJ and Williamson, JG.** 1992. "What explains wage gaps between farm and city? Exploring the Todaro model with American evidence, 1890–1941." *Economic Development and Cultural Change*, 40: 267–294. DOI: <https://doi.org/10.1086/451940>
- Hu-Dehart, E.** 1974. "Development and rural rebellion: Pacification of the Yaquis in the late Porfiriato." *The Hispanic American Historical Review*, 54: 72–93. DOI: <https://doi.org/10.2307/2512840>
- Katz, F.** 1974. "Labor conditions on haciendas in Porfirian Mexico: Some trends and tendencies." *The Hispanic American Historical Review*, 54: 1–47. DOI: <https://doi.org/10.2307/2512838>
- Katz, F.** 1991. "The Liberal Republic and the Porfiriato, 1867–1910." In: Bethell, L (ed.), *Mexico since Independence*. Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511626050.003>
- Knight, A.** 1986. *The Mexican Revolution: Counter-Revolution and Reconstruction* (University of Nebraska Press).
- Krugman, P and Venables, T.** 1995. Globalization and the inequality of nations. *Quarterly Journal of Economics*, 110: 857–880. DOI: <https://doi.org/10.3386/w5098>
- Kuntz Ficker, S.** 1995. "Mercado interno y vinculación con el exterior: el papel de los ferrocarriles en la economía del porfiriato." *Historia Mexicana*, 39–66.
- Kuntz Ficker, S.** 2014. The contribution of exports to the Mexican economy during the first globalisation (1870–1929). *Australian Economic History Review*, 54(2): 95–119. DOI: <https://doi.org/10.1111/aehr.12040>

- Leal, JF** and **Woldenberg, J.** 1980. *La clase obrera en la historia de México*. Mexico: Siglo XXI.
- López-Alonso, M.** 2007. "Growth with inequality: Living standards in Mexico, 1850–1950." *Journal of Latin American Studies*, 39: 81–105. DOI: <https://doi.org/10.1017/S0022216X06002045>
- Maddison, A.** 2007. *The world economy: Historical statistics*. OECD Publishing.
- Maré, DC** and **Glaeser, EL.** 2001. "Cities and Skills." *Journal of Labor Economics*, 19: 316–342. DOI: <https://doi.org/10.1086/319563>
- Margo, RA.** 1999. "Regional wage gaps and the settlement of the Midwest." *Explorations in Economic History*, 36: 128–143. DOI: <https://doi.org/10.1006/exeh.1999.0714>
- Meyer, CM** and **Sherman, W.** 1987. *The course of Mexican history*. Oxford University Press.
- Meyer, J.** 1986. Haciendas y ranchos, peones y campesinos en el porfiriato. Algunas falacias estadísticas. *Historia Mexicana*, 477–509.
- Nickel, HJ.** 1988 Agricultural labourers in the Mexican Revolution (1910–40): Some hypotheses and facts about participation and restraint in the highlands of Puebla-Tlaxcala. In: Katz, F (ed.), *Riot, rebellion and revolution. Rural social conflict in Mexico* (Princeton University Press) pp. 376–416.
- O'Rourke, KH, Taylor, AM** and **Williamson, JG.** 1996. "Factor price convergence in the late nineteenth century." *International Economic Review*, 37: 499–530. DOI: <https://doi.org/10.3386/h0046>
- Riguzzi, P.** 2009. "From globalisation to revolution? The Porfirian political economy: An essay on issues and interpretations." *Journal of Latin American Studies*, 41: 347–368. DOI: <https://doi.org/10.1017/S0022216X09005598>
- Roback, J.** 1982. Wages, rents, and the quality of life. *Journal of Political Economy*, 90: 1257–1278. DOI: <https://doi.org/10.1086/261120>
- Rosés, JR.** 2003. "Why isn't the whole of Spain industrialized? New economic geography and early industrialization, 1797–1910." *Journal of Economic History*, 63: 995–1022. DOI: <https://doi.org/10.1017/S0022050703002511>
- Rosés, JR** and **Sánchez-Alonso, B.** 2004. "Regional wage convergence in Spain 1850–1930." *Explorations in Economic History*, 41: 404–425. DOI: <https://doi.org/10.1016/j.eeh.2004.03.002>
- Sánchez-Alonso, B.** 2007. "The other Europeans: immigration into Latin America and the international labour market (1870–1930)." *Revista de Historia Económica/Journal of Iberian and Latin American Economic History*, 25: 395–426.
- Seminario de Historia Moderna de México.** 1965. *Estadísticas económicas del Porfiriato. Fuerza de trabajo y actividad económica por sectores*, (Mexico D.F.: El Colegio de México).
- Tannenbaum, F.** 1968. *The Mexican agrarian revolution*. New York: Archon Books.
- Taylor, AM.** 1997. "Peopling the pampa: On the impact of mass migration to the River Plate, 1870–1914." *Explorations in Economic History* 34: 100–132. DOI: <https://doi.org/10.1006/exeh.1996.0665>
- Turner, JK.** 1969. *Barbarous Mexico*. University of Texas Press.
- Weiner, R.** 2000. "Battle for survival: Porfirian views of the international marketplace." *Journal of Latin American Studies*, 32: 645–670. DOI: <https://doi.org/10.1017/S0022216X00005903>
- Wells, A.** 1992. "All in the family: Railroads and henequen monoculture in Porfirian Yucatan." *Hispanic American Historical Review*, 72: 159–209. DOI: <https://doi.org/10.2307/2515554>
- Williamson, JG.** 1991. Inequality, poverty, and history: The Kuznets memorial lectures of the Economic Growth Center, Yale University. New York: Basil Blackwell.
- Williamson, JG.** 1996. "Globalization, convergence, and history." *Journal of Economic History*, 56: 277–306. DOI: <https://doi.org/10.1017/S0022050700016454>
- Williamson, JG.** 1999. "Real wages, inequality and globalization in Latin America before 1940." *Revista de Historia Económica/Journal of Iberian and Latin American Economic History*, 17: 101–142.
- Zabludowsky, J.** 1992. "La depreciación de la plata y las exportaciones." In: Cárdenas, E (ed.), *Historia Económica de México*. Mexico: Fondo de Cultura Económica.

How to cite this article: Arnaut, JL. 2018. Mexican Real Wages Before the Revolution: A Reappraisal. *Iberoamericana – Nordic Journal of Latin American and Caribbean Studies*, 47(1), pp. 45–62, DOI: <http://dx.doi.org/10.16993/iberoamericana.421>

Published: 11 September 2018

Copyright: © 2018 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.



Iberoamericana – Nordic Journal of Latin American and Caribbean Studies, History is a peer-reviewed open access journal published by Stockholm University Press.

OPEN ACCESS