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## Income Inequality in Mexico 1895-1940: Industrialization, Revolution, Institutions

Diego Castañeda Garza & Erik Bengtsson

# Income Inequality in Mexico 1895–1940: Industrialization, Revolution, Institutions\*

*Diego Castañeda Garza\** and *Erik Bengtsson*<sup>^</sup>

Abstract

This paper, building on new archival research, presents the first comprehensive estimates of income inequality in Mexico before 1950. We use the social tables method of combining census information with group-level income data to reconstruct Mexican incomes and their distribution for four benchmark years, 1895, 1910, 1930 and 1940. The Gini coefficient for incomes is 0.48 in 1895, 0.47 in 1910, 0.41 in 1930 and 0.51 in 1940. The evidence points to inequality as a multi-faceted phenomenon. Mexican income inequality was shaped by the economic policies of the various regimes, as well as the growth possibilities of various sectors. The revolution of the 1910s entailed reforms (of the labor market and of land ownership) which equalized incomes, but when these reforms were substantially reversed, inequality rose again. The developments are in line with a new branch of the literature that recognizes the importance for inequality dynamics of land ownership. The levels of inequality in the long term display rather strong persistence, in line with institutionalist arguments.

**Keywords:** Income inequality, Income distribution, Social tables, Mexico, Mexican revolution, Political economy.

**JEL codes:** D63, E01, N36, O15

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## 1. Introduction

This paper provides new estimates of Mexican incomes, and the distribution of incomes, for the years 1895, 1910, 1930, and 1940, making it the first study of income distribution in Mexico before 1950. Mexico is important in itself, as the second most populated country and second-biggest economy in Latin America, and as a fascinating case for the wider debate on inequality, where factors such as industrialization and political revolutions – both of which occurred in Mexico in the investigated period – play a major role. New archival work allows us to present fine-grained estimates of incomes per social group in Mexico in these years: from 19 groups in 1895, to 101 groups in 1940. For each group, the size of which we establish according to census figures, we estimate incomes based on a variety of sources. We then use the social tables to calculate income inequality. To preview the results, we find relatively high inequality in the late nineteenth century: a Gini coefficient at 0.48 in 1895, which remains relatively stable to 0.47 in 1910. Then comes a break associated with the Revolution, with the Gini coefficient shrinking to 0.41 in 1930, before returning to 0.51 in 1940.

We use the new estimates to discuss Mexican inequality in the light of several prevalent theories on the determinants of inequality: the Kuznets (1955) focus on industrialization, Piketty's (2014) on capital, Scheidel's (2017) on wars and revolutions, and so on. We show that the Mexican Revolution for a brief period created the conditions for a more egalitarian society. Politics is important in the shaping of economic inequality, but Mexican inequality in the period investigated did not develop in a linear way, and alongside political and social factors, economic factors such as industrialization also played an important part in the shaping of inequality. In sum, Mexico provides a fascinating case study for analyzing the development of inequality.

## 2. Determinants of economic inequality: extant explanations

Several competing explanations have been put forward for the long-run changes in income distribution that are relevant to our analysis of Mexico from 1895 to 1940. First, we have the enduring workhorse of inequality studies, the Kuznets (1955) hypothesis, which relates inequality to the process of economic development. Kuznets argued that, as a country industrializes, a growing share of the workforce moves into the highly-paid industrial sector, and so the sectoral income difference between industry and (low-paid) agriculture means that

inequality grows. When industrialization is mature, most or all citizens enjoy the new higher income, and inequality declines. The full relationship takes the shape of an inverse U playing out over time: first an increase, then a reduction in inequality. By now, a plethora of studies has shown that while industrialization is relevant to income differentials, it is by far not the only relevant factor (e.g. Piketty 2014; Milanovic 2016; Gómez León and De Jong 2019).

Another classic type of explanation focuses on the relative returns to ownership (of land and capital) and labor, respectively. This is formulated prominently in Williamson's (1999) analysis of the trends of land rents and unskilled wages in the Old World and the New World during the period of great Atlantic migration c. 1870–1914. Williamson showed that a great decrease in labor supply because of emigration pushed up wages in the Old World, while the influx of labor into North America drove up (relative) land prices there. Because people who live off wages are typically poorer than people who own land, an increase in the land rent/wage ratio means an increase in inequality (cf. Bleynat, Challú and Segal 2017). A different version of the same logic is Piketty's (2014) comparison of the returns to capital (which he calls  $r$ ) with average income growth ( $g$ ). Given that capital incomes are unevenly distributed, it means that when capital incomes grow faster than average incomes, income inequality grows. During the period studied here, Mexico was mainly an agrarian economy but we will pay some attention to the returns both to land and to capital, which were important for some social groups.

The institutional approach entails a perspective on inequality that is more attuned to political economy, seen as related to the social distribution of power and institutional arrangements. Sokoloff and Engerman (2000) argue that the different histories of institutional development in South and North America, dependent on different patterns of colonialization and the kinds of institutions built by colonizers, have led to different trajectories. In North America, settler colonies established widespread schooling systems and political systems with relatively widespread suffrage, while in South America, extractive colonies were established with little attempt to improve life for the greater part of the population. This put South America on a high inequality trajectory, where inequality of incomes was (and is) deeply embedded in a system of unequal schooling, unequal distribution of political power, and more. The political economy approach is also in many ways supported by Piketty (2014, Chs. 4–8) who has discussed in some detail the evolution of twentieth century taxation, regulation and welfare state policies and their implications for inequality.

Finally, another approach to explaining inequality has been proposed by Scheidel (2017) in his book *The Great Leveler*. Scheidel argues that, through history, inequality has

been reduced in a significant way by what he calls the negative forces of levelling: famine, war, plague and revolution (cf. also Alfani 2015). This hypothesis suggests that inequality declines at a high cost, for example, through the destruction of capital in the First and Second World Wars, the massive death totals of the Black Death or the revolutionary violence seen in the Russian and Chinese Revolutions, which included radical agrarian reforms. Indeed, in many countries (but not in all – see Gómez León and De Jong 2019) inequality did fall during World War I and World War II. How much this depended on the wars per se, and how much on reforms and social actions performed during or just after the wars (Piketty 2014, pp. 146–149, 266–267) is still under discussion

No single explanation is sufficient to account for the evolution of inequality in every country at every time. Industrial-agrarian differentials, the relationship of land rents and capital incomes to wages, institutional legacies, wars and policies may all matter at the same time. In an analytical narrative, we go on to analyze the development of inequality in Mexico from 1895 to 1940 with regard to all these factors.

### 3. The Mexican case

Beyond the simple fact that Mexico is one of the most populous countries in the world and therefore important to study from the standpoint of inequality, it also provides a very interesting case for discussing the theories on the determinants of inequality discussed above.

Nineteenth-century Mexico was predominantly an agrarian society. As a poor agrarian country, it could logically be expected to show low levels of inequality (cf. Milanovic, Lindert & Williamson, 2011). But industrialization started to arise during the last two decades of the century, under the Porfirio Díaz government. An economic and political elite colluded to control the economy, ensuring monopoly rents and protection from international trade and preventing the organization of workers (Haber 1989; Kuntz, 2002; Beatty, 2002; Bortz, 2002; Haber, 2002). We would expect that this political and economic structure combined with the strong economic growth in the period to have produced an increase in the levels of inequality – this might be predicted, both from a Kuznets perspective and a more political economy-oriented perspective.

Furthermore, Mexico in the period studied here, 1895–1940, experienced great political turbulence, making it possible to test political economy-oriented explanations of inequality. The Mexican Revolution, where the Porfirian regime collapsed, is a perfect case in which to assess ideas of the relationship between revolutions and inequality, such as

Scheidel's (2017) emphasis on reducing inequality through the destruction wrought by wars and revolutions. The Revolution was turbulent and destructive, but also entailed a redistribution of power in society. We will assess the Revolution's effects on inequality both in the shape of the destruction of lives and capital, and its redistribution of power in society.

### *What do we know about Mexican inequality?*

There is today a lively literature on economic inequality in Mexico, combining information from income surveys, tax data, national accounts and other sources (Campos-Vazquez, Chavez and Esquivel 2016; Reyes Turuel and López 2017; Bustos and Leyva 2017; Del Castillo Negrete Rovira 2017). These studies report high Gini coefficients, with a range running from 0.59 to 0.80, contingent on method. Estimates extend back in time to 1950, with a level that ranges from 0.55 to 0.65. Taken together, these studies suggest that inequality has been high and increasing in Mexico since 1950. Modern income surveys began only in 1989 but Székely (2005) measures income inequality from 1950 to 2004 with adjustments for variability in the different sources, especially the different definitions of monetary income and the differences in the degree of underreporting. He finds that from 1950 to 1984 inequality followed an inverted U pattern, as Kuznets (1955) theorized, an expected result given the fact that this period experienced the fastest economic growth in Mexican history, known as the "Mexican miracle" After 1984, however, the pattern changed and from that year to 2000 inequality rose again.

Estimating economic inequality in Mexico before 1950 is difficult, and previous studies rely on proxies: physical heights, or real wages. López-Alonso (2015) uses height data from military and passport records to reconstruct the evolution of living standards from 1850 to 1950, and shows that the higher social classes grew taller while poor people were stunted, implying ever greater inequality. A drawback is that the Mexican military was to a large degree composed of volunteers who might not have been representative of the wider population, and that the passport sample is clearly biased towards the top of the distribution. Therefore, to infer the entire income distribution from these samples is problematic, but necessary because of the scarcity of data.

Bleynat, Challú and Segal (2017) study Mexican real wages from 1800 to 2015, finding that for a long time the real wage did not increase by much. They argue that this process, where inequality grew since GDP/capita grew faster than workers' wages, was deeply influenced by politics and political economy. Relying on real wages, however, has its

problems; for example, data on wages for a considerable period such as the one covered by the study, are often scarce and centered on specific cities or regions; for this reason, its representativeness can be questioned. Moreover, because prices fluctuated across regions, generalization is problematic. Furthermore, Mexico in the nineteenth century was an agrarian economy where subsistence production was common, more common than wage labor. However, these problems are typical for data of this kind, and better sources are not plentiful. Bleyнат, Challú and Segal provide a remarkable reconstruction of the living standards and clues to the evolution of inequality through independent Mexico, but provide no actual income distribution. Thus, our present reconstruction of Mexican incomes and their distribution for the 1895–1940 period adds substantial new knowledge to the history of Mexico as well as income inequality.

#### 4. Data, Sources and Methods

To reconstruct Mexican incomes and their distribution in a historical setting, we constructed social tables for four benchmark years. The social tables methodology entails constructing comprehensive datasets of (a) the distribution of the population in various types of economic group (such as small farmers, estate owners, metal industry workers, etc.) and (b) the average income for each such group. For periods before the availability of survey data on incomes – in Mexico, before 1989 – this is one of the most often used methods for reconstructing income distribution. The methodology has a long history, going back for example to the table for England and Wales in 1689 constructed by Gregory King (cf. Allen 2019).

Social tables constitute an effective tool for the reconstruction of past income distributions. Covering the whole of the population, they allow comprehensive inequality measures like the Gini index and other synthetic indicators to be calculated. However, social tables do have important limitations. A first limitation is that as each occupational category is assigned its mean income, the within-group inequality is underestimated. To mitigate the underestimation that comes from assuming the mean income for all members of a category, it is necessary to produce as many categories as possible. The more disaggregated the occupational categories are, the less of a problem within-group inequality becomes. Especially for 1930 and 1940, we have very fine-grained social tables, with 98 and 101 groups respectively. This minimizes the within-group variation problem. A second limitation is the informational requirements for constructing the social tables. It is necessary to use a variety of primary and secondary sources of unequal quality and therefore introduce margins

of error in the estimates. For the same reason, the measurements that are derived from social tables are better understood as revealing trends rather than accurate point estimates. To tackle this issue, we used as many primary sources as possible to estimate the incomes of the social groups.

In constructing the social tables for Mexico in the years 1895, 1910, 1930 and 1940 the starting point of the analysis were the censuses (cf. Bértola et al. 2009; Rodríguez Weber 2014, 2016) and, since they differ in design over time, our analysis was paired: the 1895 and 1910 censuses are similar, as are the 1930 and 1940 ones. To calculate incomes we used a wide array of primary and secondary sources. The approach is discussed below. For more detailed presentation of the sources and approach, see Appendix A.

### *The 1895 and 1910 Social Tables*

For Mexico, the first official census was produced in 1895 by the General Directorate of Statistics (*Dirección General de Estadística*). Two more censuses were conducted under the Díaz government, in 1900 and 1910. While the censuses of 1895 and 1910 possess the same structure, registering 149 occupational categories, the 1900 census is different, reporting more aggregated categories; hence it is less precise. Furthermore, the questionnaires are different, and the general quality and depth of information is inferior. For both 1895 and 1910, there is information of the number of women working in each category, but incomes are not differentiated. So, in practical terms we cannot distinguish gender differences in incomes, but only in participation. The 1895 and 1910 years are suitable for this study, because 1895 was the middle point of Díaz's long rule and 1910 was the last year of his administration and the year that the Mexican Revolution begun. However, because there is no income information for each category, we have to collapse the occupational categories of the census into 19 occupational categories that broadly represent the employment structure, for example, manufacturing workers, peasants, the military and so forth.

The income data come from the Institute of National Statistics, Geography and Information (INEGI), based on the work of Fernando Rosenzweig (1965) and available in digital format. This source needs interpretation; for example, the salaries that it reports are based on the most populated cities and regions. At country level it is representative enough, but at the regional level it is not. To complement it, we used a combination of primary historical sources and secondary historiographic sources. For the salaries of the bureaucracy and other professionals, we followed Rodríguez Weber (2014, 2016) and used the statistical

yearbooks of 1893 and 1894, and the payrolls from government offices such as the payroll of the General Directorate of Statistics. We also used private hiring advertisements such as the one from the Engineers' School of Guadalajara (*Escuela de Ingenieros de Guadalajara*), available from the National Newspaper Archives (*Hemeroteca Nacional de México*).

An important problem for our study is that Mexico's rural population accounted for half the population and much of its income was in kind. We estimated Mexican incomes with various assumptions for the incomes of the subsistence peasants. When triangulating the national income produced from our social tables with the GDP/capita estimates of previous research, we reached what we believe is a reasonable estimate of subsistence peasants' (imputed) income. See Appendix E for a more detailed discussion.

For top incomes, paid to the large landowner class, the industrialist class and the merchant-financiers, we had to employ another mix of primary and secondary sources. For the landowners, the *hacendados*, we relied on both the Social Statistics from the Porfiriato and Mexico's Historical Statistics account of the number of *hacendados*, around 830-850 men and their families, and the number of *haciendas* (large estates) under their control. We knew that land was highly concentrated and most of the fertile land was owned by this class. We made the conservative assumption that 50 per cent of the production value of the land was produced on these large estates to approximate the income of the *hacendados*; it is a conservative assumption, given that several historiographic sources describe their incredible wealth (Coatsworth 1976; Markiewicz 1985; Haber 1989, 1992; Katz 1998; Márquez 2018).<sup>1</sup>

In addition, archival sources from the Madero family, one of the most prominent and wealthy *hacendado* families of the country, were consulted via the Ministry of Finance. The archives show a yearly income close to our estimates and in some years up to twenty per cent higher. Wasserman's (1985) study of Enrique C. Creel, one of the most powerful and wealthy men of the time, suggests that the income of the *hacendado* class could be above our estimates.

For the *bacerlonetes*, the industrialists, we had to construct their labor and capital incomes. For the labor income we turned to the work of Galán (2010), which reports the salaries of the owners of different textile companies and stores in the state of Veracruz and Mexico City. Then we crosschecked with the archives from Mexico's City Historical Archive

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<sup>1</sup> As reported by Márquez (2018) in a letter from Abraham Gónzales, the governor of the state of Chihuahua to President Madero, the property of Luis Terrazas, the richest man in the country had a value of 9,156, 610.80 pesos in 1912, equivalent to more than 63 million dollars at 1990 prices. According to Márquez (2018), in the same year Terrazas owed 128,869.82 pesos in property taxes alone, equivalent to 896,000 dollars in 1990.

of Notaries (*Archivo Histórico de Notarías de la Ciudad de México*) which reports salaries and firms' shares. From the register of firms' shares and their owners, we computed the value of capital and, using Haber's (1989) estimates of the rate of return to capital from the leading firms in Mexico between 1896 to 1938, we derived the capital income for this class.

Finally, two other classes or occupational groups that proved important to discuss were domestic employees and people without occupation. Domestic employees accounted for a large share of the population, 15 per cent in 1895 and 29 per cent in 1910. We do not find reports of payment to this class, so they had to be constructed. To do so, we took the average of the different cleaning, cooking and general assistant jobs on the payrolls and derived from it a daily wage that we applied for 250 days. (Appendix E also includes robustness checks with imputed subsistence incomes for domestic workers.)

The group without occupation required more thought to be included in the social tables. The group represented 24 per cent and 23 per cent of the population in 1895 and 1910 respectively<sup>2</sup>, therefore it is significant. Some researchers, such as Bolt and Hillbom (2016) count them; other authors including Gómez León and De Jong (2019) and Rodríguez Weber (2014, 2016) exclude them. As argued by Gómez León and De Jong (2019) if we count them, we maybe guilty of double counting people who live on a family income, for example, school children and wives, and as a result overestimate inequality. Nonetheless, not counting them misses out a significant portion of the population and, since we cannot distinguish the true unemployed from people who are double counted, we would be probably underestimating inequality.

We eventually considered this issue as something that could be exploited to give the estimates more reliability. We decided to compute the tables in two different ways: with and without those who had no occupation. In this way, we obtained floor and ceiling figures for the levels of inequality. We took the average of the two estimates as a middle ground estimate. For further discussion, see the robustness checks in Appendix E. To impute a monetary income to the subsistence class, we avoided the problems of price differentials in a less than fully interconnected economy such as Mexico in our period (cf. Bortz and Águila 2006; Arnaut 2018). Instead, following Milanovic, Lindert and Williamson (2011), we assumed as the subsistence level incomes of 400 dollars from the 1990 per year equivalent in pesos of the time. 400 dollars from 1990 was the subsistence level of income estimated by

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<sup>2</sup> After removing children aged 7 or less. The Díaz government in year 1907 signed a presidential award forbidding child labor for those below 7 years of age. From 1890, several states had passed their own regulations on child labor with different exceptions.

Maddison (1995). In the case of Mexico in the period there is evidence from Challú and Gómez-Galvarriato (2015) and López-Alonso (2007, 2015) that welfare ratios and stunted heights strongly correlate, indicating a subsistence standard of living. Therefore we considered the 400 dollars in 1990 values to be a valid estimate for those close to subsistence. The calculated incomes are presented in Table 1.

[TABLE 1 HERE]

### *The 1930 and 1940 Social Tables*

For 1930 and 1940, we can build exceptionally detailed social tables: in 1930, 98 groups are shown, and in 1940, 101 groups.<sup>3</sup> This ameliorates the well-known problems of within-group heterogeneity for studies of inequality using social tables. The groups were again fetched from the censuses and matched with incomes from statistical yearbooks and other sources. Furthermore, due to the regional reporting of wages in 1930, we were able (Appendix D) to present alternative inequality estimates which took into account within-group inequality. Compared to the 1895 and 1910 social tables, the 1930 and 1940 ones add very fine-grained categories for different types of workers in the manufacturing and service sectors, e.g. printing and lithography workers; workers in yarns, fabrics and prints; those in the cigarette industry; land transport carriers; metal manufacturing workers; dry cleaning workers; potters; dough, tamales, tortillas and atole makers).

Recently there has been some discussion of “dynamic” social tables (Rodríguez Weber 2014, 2016; Gómez Leon and De Jong 2019). This means that the social categories have been revised between the benchmarks. The present work embodies a mixture of static and dynamic social tables. For the 1895 and 1910 pair, the social tables retain the same structure and for the 1930 and 1940 pair, the structure is almost the same. This fact adds a dynamic element to the analysis since it allows us to trace winners and losers between benchmark years, but without making yearly variations between the two sets of tables, a strategy comparable to that of Londoño (1995).

The incomes data have been assembled as follows. Wages for many worker categories are derived, following Rodríguez Weber (2014, 2016), from the statistical

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<sup>3</sup> For comparison, Bolt and Hillbom (2016, p. 1278) use 11 groups in their study of Botswana. Gomez Leon and de Jong (2019, p. 1082) use 22 occupational groups, which after differentiation for skill and gender become 78 social groups, for Germany and Britain.

yearbooks for the years 1930, 1938, 1941 and 1946 and make it possible to assign mean incomes to most of the categories. To crosscheck these incomes and to complement missing ones we employ the industrial censuses of 1930 and 1940 that contain data from industries and the agrarian censuses of 1935 and 1940.

After the Mexican Revolution and the agrarian reform of the 1920s, a new agrarian class emerged: the *ejidatarios*, a type of communal or collectivist landowner. These were studied in special censuses in 1935 and 1940. There we can locate the number of *ejidatarios* and the value of the products of their land from which we can derive their mean income. From the agrarian census of 1930, we can obtain a new number of large landowners now defined as owning more than 5 hectares of land and of the small landowners who owned less than 5 hectares of land. We derive the mean income in these categories from the average value of production of each type of property.

For the top incomes, we employ the same Haber (1989) series of rates of returns between 1896 and 1938 and use the average growth rate to project the series up to 1940. The industrial censuses give us information about the owners in each industry and the workers' incomes. However, most of the income comes from capital gains. As regards the large landowners, the *hacendados* group was modified due to the dispersion of the elite and the formation of a new elite after the Mexican Revolution, but we follow the process described above, employing the agrarian census to classify this population by the number of hectares they owned and the average land production value. As an important consideration, after the revolution many *hacendados* were able to return to their lands (Katz, 1998). Although most of the land probably fell into new hands, either to a new elite or redistributed to the landless population, the expropriated *hacendados* could choose the land they were going to keep. For this reason, we assume that they chose the land with the highest production value; we use this assumption to calculate their incomes.

For the domestic workers we used Hidalgo's (2018) wage estimates and for the group with no occupation we followed the same logic as in the construction of the 1895 and 1910 social tables. In constructing the social tables we removed children below the age of 7 and kept this estimate as the main one. We also constructed the tables with and without the unoccupied full count so as to have floor and ceiling levels of inequality, compute an average of both levels and employ it as a robustness check; see Appendix E.

Since the social tables for 1930 and 1940 are so huge (98 and 101 groups, respectively), they are too elaborate to present in the main body of the paper; for details, please refer to Appendix B.

## 5. Results: Mexican inequality, 1895–1940

Table 2 presents our main estimates of the Gini coefficient of Mexican incomes in 1895, 1910, 1930 and 1940. Inequality was quite stable in the early years: the Gini coefficient was 0.4782 in 1895 and 0.4699 in 1910. There was then a rather drastic drop to 1930, when the Gini was 0.4145, followed by an increase during the 1930s to a high level of 0.5148 in 1940.

[TABLE 2 HERE]

We next interpret the Mexican developments in the light of the explanation models discussed above, and the social, economic and political development of Mexico during the period.<sup>4</sup>

### *Mexican inequality in times of an oligarchic modernization project, 1895–1910*

The level of 0.4782 in 1895 is in the middle range compared to the South American countries in 1870 studied by Bértola et al. (2009); these writers find 0.52 for Argentina, 0.39 for Brazil, 0.59 for Chile and 0.48 for Uruguay. The 1910 level of 0.4699 in Mexico is lower than those estimated by Bértola et al.: 0.57 for Argentina, 0.60 for Brazil, 0.56 for Uruguay, and 0.64 for Chile. Nonetheless, it is a high level of inequality if we consider that Mexico at the time was an agrarian society, with over 70 per cent of the total population and over 50 per cent of the working population in rural areas (Estadísticas Históricas de México, Tomo I). There are several reasons that could explain the difference from the other Latin American countries. Countries such as Argentina, Uruguay and Chile enjoyed a less traumatic 19th century. México was plagued by wars, both internal and foreign interventions from its independence up to the last third of the century: from the very destructive War of Independence of 1810-1821 (cf. Coatsworth 1989) to the Mexico-American War of 1846, the War of Reform 1857-1860 and the French intervention of 1862-1867. The socio-political instability in Mexico hindered economic growth and hence the possibility of rapid accumulation. Other Latin American countries could integrate to the nascent global economy of the 19th century sooner than Mexico, which means that economic growth and Kuznetsian

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<sup>4</sup> As an additional check on our estimates we compared the per capita income that can be derived from the social tables to the Mexico per capita income from the Maddison project (Bolt and van Zanden 2014) – see Appendix E, Table 1.

forces perhaps explain the higher levels of inequality in these countries. It is relevant to note that the agrarian frontier was more expansive in countries such as Argentina, Chile and Uruguay in the 19th century. Chile fought and defeated Peru and Bolivia in the War of the Pacific, acquiring substantial gains of fertile territory, rich in minerals. The concentration of this land within the economic elites enabled income and wealth to be concentrated. Argentina also experimented with agrarian frontier expansion as more lands were brought into commodity production, following a similar process of accumulation. According to the Maddison dataset, Mexico's GDP per capita in 1910 (in 1990 US Dollars) was 1,694, while it was 3,822 in Argentina, 769 in Brazil, 3,000 in Chile, and 3,136 in Uruguay (Maddison Project Database 2013). This presents Mexico as more equal than the richer economies of Argentina, Chile, and Uruguay, and also as compared to the much poorer Brazil.

Nevertheless, the 1895–1910 period was one of economic expansion in Mexico. Porfirio Díaz took power in 1877 with ambitions to unify the country economically and to strengthen the state. The economy was then shaped by an inadequate road network and social instability, with much local influence for local political and military leaders and bandits. Díaz centralized power and deployed the Rurales, a type of militarized police, to combat banditry on the roads. In addition, he reduced inner trade tariffs, reformed the commercial code and the mining code, and increased external tariffs. Foreign investment began to arrive in the 1880s, and railroads were built (Coatsworth 1981). These developments signaled the possibility of a more integrated domestic market.

Mining, an old Mexican specialty going back to the colonial period, was one of the winning sectors in this transformation. Furthermore, it used the expansion of the *hacienda* economy to service the mines and other industries that began to flourish. The booming economy stimulated commerce and the creation of financial intermediaries and industries to service the sophisticated taste for European fashion, art, and other forms of conspicuous consumption of the new Porfirian elite. The political elite of liberal reformers, furthermore, were convinced that the country needed a class of yeomen farmers to propel agrarian capitalism (Haber, 1989). The tool for this construction was blunt: they confiscated land that belonged to the indigenous rural population. In 1883, the government passed new laws that allowed private companies to survey for the government land that was considered “unused”. In exchange for this surveillance, the government took two-thirds of the surveyed land and paid the companies with the rest (Haber, 1989). Afterwards, the government could sell its share or assigned its use to productive projects. In this way, great expanses of land ended in the hands of a tiny minority who could afford either to buy land, survey it or simply remain

close enough to the government to have it assigned to them. As Markiewicz (1985) describes it, between the Juárez government and 1892, 82 per cent of the rural communities, mostly of indigenous descent, were incorporated into *haciendas* that found in them precious labor to be exploited.

The rural population did not welcome the expropriations and often rebelled against them. Coatsworth (1981) explores these rebellions in great detail and describes how the government had to resort to brutal repression to contain them and protect the interests of the *hacendados* and the foreign investors. The policy of expropriating land, combined with the violence that expelled segments of the population from the provinces, created a flux of internal migration; many arrived in cities looking for waged jobs in the newly created industries. In this way, the booming economy of the time and the brutality of the Díaz government soon provided the conditions for a proletariat to emerge.

In the second half of the Díaz regime, after 1895, the economy changed course. While industrialization geared up, overall economic growth stagnated. The political elite was convinced that sustaining industrial production in a national market that lacked purchasing power required the creation of monopolies (Haber, 1989). The government suffered from a “commitment problem”: they needed to attract private investment to promote economic growth and increase political stability, but the state could not establish the rule of law; taxes were often unreliable and local elites strong (Haber, 2002). To solve the commitment problem, Díaz resorted to textbook crony capitalism, using political power to create rents that in turn provided a stable enough compromise for both sides. Mexican industries were not competitive on the world market, and the state pursued a protectionist policy (Haber, 1989; Beatty, 2002; Kuntz, 2002). Another factor that contributed to the creation of a tight economic elite was the high cost of capital. Mexican financiers often had close links with the government and used them to extract rents and create networks of businessmen that controlled the significant firms around the country (Haber, 1989). Politically created rents stimulated an enormous concentration of income and wealth, since only a tiny minority with access to resources and political influence controlled the value creation in the economy. The high levels of inequality in 1910 were thus not only a product of economic development, as theorized by Kuznets (1955), but also a result of political economy processes.

[FIGURE 1 HERE]

To help us understand the development of incomes and inequality from 1895 to 1910, Figure 1 displays “growth incidence bars”, which show the real income gains for each occupational group (cf. Lakner and Milanovic’s (2013) growth incidence curves). *Hacendados*, the merchant financiers and the top echelons of government were the clear winners and the workers and peasants the clear losers. This aggravated the inequality. The rate of return on capital in this period certainly outpaced economic growth overall: rates of return were around 7 per cent 1896–1910, but GDP per capita growth only 2.1 per cent per year (Haber 1989; Bolt et al. 2018). But again, we must acknowledge that the  $r > g$  dynamic here was politically enforced in a crony capitalist setting.

While rents were high, working conditions for the agrarian population were harsh and wages were low. The German agronomist Karl Kaerger (1902), in a research mission from the German Kaiser, considered the possibility of substituting imports from the United States agriculture for Latin American ones in case of war. Kaerger had gone to Mexico to observe agricultural production and labor conditions. In his report, he mentions the low wages paid to Mexican peasants and shows how these labor conditions, low labor costs and possible high profits in agricultural exports, were favorable to German investments. On May 7, 1904, *El Economista Mexicano*, a weekly newspaper dedicated to economics and finance, reported wages to be so low that the rural population, in a bad harvest year, could not afford clothing.

Standard economic theory such as the Stolper-Samuelson theorem and the Heckscher-Ohlin model might predict that global economic integration would make unskilled labor, the intensive factor of production in a country such as Mexico, more intensively used, so it would gain from trade, while nationally scarce factors such as skilled labor and capital would lose (cf. Williamson 1997). But this is not what occurred in Mexico during the so-called period of external growth (*crecimiento hacia fuera*) (cf. Knight 1999). Government protection of industries prevented this kind of distributional force. Besides, the Porfirian regime had the core principle of freezing the existing distribution of resources and political power. For this reason, the government actively resisted the creation of an organized working class. Any attempt to demand higher wages or improve labor conditions was ignored; any attempt of a strike in a factory was met with force.

[FIGURE 2 HERE]

The Lorenz curves for 1895 and 1910 in Figure 2 reveal the nature of some of the changes that they refer to, the winners and losers of the liberal modernization project of the Díaz government. The development was contradictory; as we have seen, the Gini coefficient was essentially stable between these years. The Lorenz curves show no Lorenz dominance – they cross at different points. Middle groups benefited from the development, which in the Gini coefficient cancels out the advantageous development of the elites discussed above. In this sense, while we point to serious inequalities in the Mexican economy in 1910, our results also resonate with those of Arnaut (2018), who argues that the development during the Diaz regime was not as bad for the popular classes as some historians have argued. Furthermore, as is well known, the Gini coefficient is especially sensitive to changes in the middle of the distribution.

The contradictions of the Diaz regime intensified in the first decade of the twentieth century, and the revolts of peasants and workers such the Rio Blanco revolt of 1907 ended in massacres, (Gómez-Galvarriato, 2002). The political economy of the regime proved socially unsustainable.

### *The Revolution and income inequality, 1910–1940*

Inequality was high from 1895 to 1910, but then fell rather steeply to 1930: the Gini went down from 0.47 to 0.41. What accounts for this movement?

The Mexican Revolution is the obvious starting point of the analysis. It overthrew the Díaz regime, but it did not have a unified ideological agenda or goals; the country's development during and after the Revolution was contradictory and multi-faceted. (Gómez-Galvarriato, 2002).<sup>5</sup> The early parts of the Revolution more resembled a civil war, where governments lasted for short periods and were weak. This weakness obliged local and national governments to make enormous concessions to workers on a scale not hitherto dreamt of. State governors such as Luis F. Domínguez from Tabasco and Candido Aguilar from Veracruz decreed minimum wage increases, regulated the maximum working hours per day, abolished debts and prohibited physical punishment at factories (Bortz 2002). This development most likely lowered income inequality by allowing for higher wages.

Overall, the labor movement, suppressed under the Diaz regime, made advances in the 1910s and 1920s. In 1911 the first general strike in the textile industry was successfully

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<sup>5</sup> The Mexican revolution arguably ended in 1921, after most revolutionary leaders were dead and a faction had claimed victory; however, soon after this conflict ended a minor religious war erupted, enduring until 1929.

conducted in the states of Veracruz and Puebla, leading to a collective contract and the unionization of the textile industry (Bortz, 2002). The 1920s saw waves of strikes, which increasingly ended with acceptance of the workers' demands (Mexico's Statistical Yearbook 1938, pp. 144-145, Table 77). The gains for the popular classes did not arrive from the revolutionary political agenda; but were instead accidental, facilitated by the new unstable power relations during the revolutionary process. Furthermore, Venustiano Carranza's series of decrees from the beginning of 1915 restored lost land to the peasants, extended the new labor law to the whole country and increased the minimum wage. The land reform should have had a marked effect on inequality, since the agrarian sector was still the largest in the economy.

At the height of the factional infighting of the Mexican Revolution, the peasants and workers became vital sources of men for the revolutionary armies. In 1915, Carranza's Constitutionalist Army (*Ejercito Constitucionalista*) engaged in a ferocious war with Francisco Villa's Northern Division (*La División del Norte*) and to a lesser extent with Emiliano Zapata's army. The latter, although less of a military threat, provided the ideology for the revolution. Thus, Carranza's concessions to the working classes that formed his army were a necessity: the 1917 Constitution recognized labor and social rights (Bortz, 2002).<sup>6</sup> Waves of strikes continued during the 1920s, with compelling wins for the workers (Mexico's Statistical Yearbook 1938, pp. 146-151, Table 78). From 1920 to 1929 real wages increased by 131 per cent, with some regional variations due to differences in the strength of the labor movement (Gómez-Galvarriato 2002). The 1920s also saw political reforms, which highlight a larger redistributive ambition of the state: an income tax at a very low rate was introduced for the first time in 1924, and an inheritance tax introduced in 1926. The political faction that prevailed at the end of the revolution engaged in a process of state building that required more fiscal capacity. The federal government spending, as a share of GDP, increased from 4.9 per cent in 1910 to 6.8 in 1925 (Solís, 1971).

How extensive was revolutionary violence and destruction, and how much did it matter for the drop in inequality from 1910 to 1930? Scheidel (2017, p. 347) cites the Mexican Revolution and its agrarian reform as an example of the effects of conflict on inequality. However, historiographic evidence suggests that the actual destruction of capital was not massive (Haber, 1989, Womack, 2012). Revolutionary armies captured factories and haciendas and exploited them for the resources to sustain their military operations. Haber

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<sup>6</sup> This process is quite parallel to the concessions to working class demands in European countries in the years of the First World War, as discussed by Scheve and Stasavage (2010) and others.

(1989) describes how the economic elite was left untouched after the revolution and shows how industrial output recovered after the fighting stopped. Owners even managed to retain political power, for example, influencing the draft of the 1917 Constitution (Bortz, 2002). Katz (1974, 1998) describes how some of the confiscated lands were returned after the revolution to their previous *hacendado* owners. These facts imply that the destruction of capital chosen by Scheidel was not the means of the levelling process. Nonetheless, violence did play a role in the levelling, for it provided the popular classes with some bargaining power to wrest concessions out of the elites. The Mexican Revolution impacted on inequality in more subtle ways, such as labor rights, social rights, education and health services, the introduction of income taxes and large-scale land reform, as well as the institutional reforms of the 1917 Constitution.

### *Inequality in the 1930s*

From 1910 to 1930, political economy factors clearly created winners and losers and affected the trajectory of income inequality. Between our 1930 and 1940 benchmarks, the story is slightly different. We observe an increase of inequality in a period when social rights and public services expanded. During the 1930s, social policy and land redistribution took a larger role, particularly during Lázaro Cárdenas' government, 1934-1940. Cárdenas' policies accelerated the reformed redistribution of land, nationalized the oil and rail industries and promoted extensive national campaigns to train professors and medics and then deploy them around the country (cf. Campos-Vázquez, Domínguez and Márquez 2017). That inequality nevertheless increased is closely related to the Kuznets hypothesis, in that Mexican industrialization took off with the Second World War. Industry's share of GNP increased from 13.6 per cent in 1930 to 16.31 per cent in 1940, as compared to 11.28 per cent in 1910 (Bank of Mexico, 1989). Large infrastructure projects stimulated the demand for industrial goods, initiating the period that Alan Knight (1991) calls internal growth (*crecimiento hacia dentro*).

Cárdenas' government maintained some tensions with Mexican industrialists. During his government, their influence on policy was reduced, and the popular classes increased their political participation. Knight (1991) sees the acceleration of the land redistribution under Cárdenas as favorable to the well-being of the peasants and as a source of change in the political equilibrium. In the 1930s, we have on the one hand the equalizing forces of social

policy and land redistribution and on the other, the Kuznetsian increase in inequality due to rapid economic development.

Figure 3 clarifies which groups benefited from growth in the 1930s. Large landowners suffered after the agrarian reform<sup>7</sup>, a number of them moving to other sectors. The main winners were small businesses that accompanied the acceleration of the industrialization process, and manufacturing workers. Although peasants and *ejidatarios* made significant gains, these gains were dwarfed by the income gains of the industrial occupations.

[FIGURE 3 HERE]

[FIGURE 4 HERE]

From the 1930 and 1940 Lorenz curves (Figure 4) and Table 3, we can distinguish how inequality was driven not only by the top income gains, but from differences between skilled workers around the middle of the distribution and unskilled workers at the bottom of it. The 1930 distribution is significantly compressed, because it can be seen in the decline of the ratio of landowners' income to other benchmark classes. In 1940 the rapid industrialization of the economy favored skilled urban workers over the still numerous rural population, as can be seen in the recovery of the ratio of workers' income to peasants' income – a thoroughly Kuznetsian mechanism. At the same time, we observe how land stops being the primary source of income: the ratio of large landowners to workers dramatically diminishes, and the businessman ratio to other classes becomes the larger one. All this evidence points to a Kuznetsian process.

[TABLE 3 HERE]

Nevertheless, the fact that land stopped being the primary source of income does not necessarily mean that the old elites disappeared. As Wasserman (1987) points out, the old elite employed several strategies to survive; for example, dividing their lands to avoid the land

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<sup>7</sup> During the Cárdenas government, 18 million hectares were expropriated and redistributed between 500,000 peasants. The climax of the agrarian reform came in 1936 when President Cárdenas expropriated 150 thousand hectares of land and redistributed it between 30,000 peasants in the rich northern region of la Laguna. The agrarian reform, Article 27 of the Mexican Constitution and the oil nationalization were the main topics of a series of diplomatic confrontations between the United States and Mexico between 1936 and 1940. For a detailed narrative, see Gilly (1994).

reform, selling them to foreign investors, diversifying their investments and marrying members of the new regime. In this sense, the capacity of the old economic elite to survive and retain some degree of economic influence is reflected in the recent findings of Ager, Platt Boustan and Eriksson (2019) in the postbellum United States and the economic recovery of former slave-owning families. These mechanisms could be part of the explanation behind the rise in inequality between 1930 and 1940. We return to this discussion in the concluding remarks.

## 6. Conclusions and Further Discussion

Mexican income inequality from 1895 to 1940 experienced a jagged development: high levels from 1895 to 1910, a fall after the Revolution, and then a sharp increase again in the 1930s. How can we make sense of this pattern? As discussed in section 2, competing explanations and theories abound. To judge the usefulness of these explanations, it is time to look at our results from a more long-run perspective. Figure 5 shows our estimates (minimum, maximum and preferred) for 1895–1940, along with other estimates for 1950–2016.

[FIGURE 5 HERE]

Using the Kuznets hypothesis, the most influential single argument in the historical inequality literature, we indeed observe to some degree the characteristic increase in inequality as industrialization accelerates. However, this is mostly in the 1930s, which was a period of rapid industrialization in Mexico. In the 1890s and 1900s, the increase in inequality seems to have been driven by other factors, especially the changing distribution of land. As several recent historical studies have emphasized, we need not look beyond inequality *within* the agrarian sector if we want to understand historical inequality (cf. Lindert and Williamson 2016; Bengtsson et al. 2018).

An explanation of growing inequality in the late 1800s that is especially focused on Latin America would be that by Williamson (2010, 2015) and Dobado & García (2010): that it was the commodity boom of the time that drove rising inequality. Here, we would argue that this event must be put into a political economy context. Leading industrialists were favored by an oligarchic government, which created monopolies and oligopolies for them. The first globalization cannot have been the primary driver of the high inequality levels in

1895 and 1910; a more likely culprit is the clearly politically created rents that skewed the distribution of income.

Third, Piketty's  $r > g$ , the changes due to taxation, and the policies related to the welfare state partially apply in the Mexican context of 1895 to 1940. The rate of return on capital for the period did on the whole exceed the rate of economic growth. The incomes of the possessors of capital, the large landowners and industrialists, greatly surpassed those of the popular classes. But after the Mexican Revolution a number of victories were won by the popular classes, in labor rights, healthcare services and education; income and inheritance taxes were created, and so between 1910 and 1930 we see an equalization in these respects.

Fourth, the Mexican Revolution of 1910–1921 would appear to be a prime case for the destruction mechanism claimed by Scheidel (2017). But, as we have argued, the Revolution did not destroy large amounts of capital. Hence, destruction of capital cannot be the cause of the levelling between 1910 and 1930. However, as in the institutionalist view, the revolution did indeed cause levelling, but in a subtle manner. It was the recognition of the peasantry and working class as legitimate political actors that wrested concessions from the elites. Moreover, it was the recognition of social rights and the need to pacify the country that turned out to be the great levelers.

Therefore, the Scheidel (2017) argument of revolution as a source of levelling may need to be thought about in a more complex manner. Here we would argue that the arguments of Piketty and Scheidel are at least partly compatible both with the institutional argument and, perhaps surprisingly, with Kuznets. Let us start with the institutionalists. Sokoloff and Engerman (2000) emphasized the vicious cycle of inequality in Latin America starting with extractive colonialism. Colonialists created extractive institutions that put political power into the hands of the few, creating great economic inequality, which in turn fed into political inequality because economic resources could be converted into political resources. Some such process appears to have affected Mexico in our period – and indeed after it. As we have discussed, the Díaz government of the 1890s and 1900s was closely enmeshed with economic elites and created unequal outcomes quite deliberately. The Revolution in haphazard ways attempted to break with this inequality, but, as we have seen, it was no clean break. Just as the institutionalists might predict, the underlying inequality was difficult to end (cf. Ager et al 2019 on elite persistence in the postbellum US South). However, the desire to redistribute did arise, and as noted above the 1910s and 1920s saw pro-egalitarian reforms in the labor market and land ownership. This is actually very much in line with Kuznets' argument on the egalitarian forces unleashed by industrialization. As he wrote, “in democratic societies the

growing political power of the urban lower-income groups led to a variety of protective and supporting legislation, much of it aimed to counteract the worst effects of rapid industrialization and urbanization and to support the claims of the broad masses for more adequate shares of the growing income of the country” (Kuznets 1955, p. 17). This kind of process is visible in Mexico in the 1910s, 1920s and 1930s. But it was not without its counterforces: oligarchic tendencies are strong in Mexico, and this may also explain why inequality from the long-run perspective (Figure 5) is so strikingly stable.

The Revolution did not make a clean break with the past. Gilly (1971) characterizes the Mexican Revolution as an economic elite fighting its rival factions for political power and access to rents, peasants who wanted to return the status quo to the pre-capitalist economy and stop exploitation and workers who wanted a post-capitalist arrangement with social, economic and political rights. Since the economic elite that eventually won had no ideological cohesion, but instead adopted a pragmatic approach to power during the conflict; all the conquests of workers and peasants that ended in the Mexican Constitution of 1917 were compromises. Nonetheless, although this was a dramatic improvement that freed capital and labor for more efficient employment (Womack, 2012), it did not entirely extinguish the political economy of the Mexican *ancien régime*, but merely included fractions of new groups in it.

Even if Cárdenas’ government (1934–1940) managed to successfully negotiate with all political sectors, including the newly enfranchised peasantry, and produce a better distribution of the gains of growth, it does not mean that it totally demolished the cronyism that allowed the political creation of rents (cf. Haber, Roza and Maurer 2003, Gilly 1994 p. 319). Perhaps for this reason, the long-term evolution of the Mexican income distribution is relatively constant through time. De Tocqueville (2006) in his 1856 book *The Old Regime and Revolution*, and Marx (2015) in his 1852 *Eighteenth Brumaire of Louis Bonaparte* concluded, when examining the French Revolution, that bourgeois revolutions change the economic and political *elites*, but not the political *structures*. Likewise, one could say that the Mexican Revolution ended up with a fragile equilibrium between all social classes, less different from the previous regime than one might have expected from the moniker of “revolution”.

As Bleynat, Challú and Segal (2017) point out, inequality in Mexico does not seem to follow the Kuznets process. The changes in inequality are more intertwined with the political sphere and the policies implemented by the ruling classes than to economic development alone. Milanovic and Bustillo (2008) argue that in Latin America the Kuznets hypothesis does not hold. Inequality appears to be rather persistent over time, regardless of the development level. This seems rather apt for the Mexican case (cf. Figure 5). Inequality

did fluctuate to a major extent between 1895 and 1910, and between 1910 and 1930, but the net change over the long run was small. Why? We see at least two possibilities that would be interesting to test in further studies. One possibility is that if we could extend the inequality estimates further back, the apparent persistence would become an illusion. Maybe at least income inequality is lower in the twentieth century than in the early nineteenth century or even before. If the persistence is real, however, the second possible extension can come from studying the so-called structural heterogeneity of the economy (Pinto 1973), the very different development paths that exist inside the productive sectors and the effect that they have on the distribution of resources. A hypothetical mechanism could be this: workers in the low productivity sectors, the stagnant traditional ones, find themselves in very different labor relations that imply not only lower wages and lack of social services, but also probably fewer opportunities for social mobility. Their scarcity is due to the greater inequality in the opportunities available, rooted, for example, in these workers' ethnicity, regional origin, gender, education, health and even the languages they can speak. In this way, the dualism – or structural heterogeneity – of the economy engenders a high level of income inequality over time. However, this is a subject for further research. The main contribution of this paper has simply been the archival work and the production of new inequality estimates for Mexico in 1895, 1910, 1930 and 1940. We hope that it will stimulate further discussion on the historical evolution and causes of inequality in Mexico and Latin America.

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**Table 1. Social Tables, 1895 and 1910**

	Occupational Group	1895		1910	
		Population Share	Income in 1990 USD	Population Share	Income in 1990 USD
1	Hacendados (large landowners)	0.0001	883,852	0.00006	1,760,399
2	Merchants-Financiers/Businessmen (mostly barcelonetes)	0.0003	119,146	0.0002	191,588
3	Government top bureaucracy	0.0003	29,349	0.0002	44,755
4	Rancheros (medium size landowners)	0.0097	10,348	0.011	10,256
5	Small businesses	0.0016	13,503	0.0012	15,189
6	Professionals (lawyers, medics, teachers)	0.0061	7,499	0.0052	10,314
7	Small cattle-owners	0.00083	7,018	0.00058	17,918
8	Small landowners	0.029	5,957	0.016	8,401
9	Government bureaucrats	0.0032	5,757	0.002	6,182
10	Hacienda foremen	0.0065	5,558	0.0046	6,347
11	Arrieros (transporters)	0.0076	3,354	0.0045	2,826
12	Manufacturing workers	0.075	3,207	0.060	3,250
13	Business dependants	0.033	2,515	0.023	2,967
14	Miners	0.012	2,133	0.0084	4,157
15	Domestic workers	0.20	1507	0.354	1,191
16	Construction workers	0.0067	1,470	0.011	1,950
17	Peasants	0.35	1,037	0.256	1,300
18	Military	0.0044	967	0.0029	1,358
19	Without occupation	0.24	400	0.235	400

Source: Authors' own calculations. Incomes in current prices. Between 1895 and 1910, CPI grew by 63.8 per cent (Arnaut 2018).

**Table 2. Mexican income inequality (the Gini index) 1895, 1910, 1930 and 1940**

	<b>1895</b>	<b>1910</b>	<b>1930</b>	<b>1940</b>
<b>Preferred estimate</b>	<b>0.4782</b>	<b>0.4699</b>	<b>0.41448</b>	<b>0.51479</b>
<b>Min</b>	0.3275	0.4583	0.3112	0.4168
<b>Max</b>	0.4886	0.6188	0.4516	0.5259
<b>Average (min max)</b>	0.4081	0.5386	0.3814	0.4713

Note. As stated in Section 3, our preferred estimate excludes children below 7 years of age and drops the assumption of 115 days of in-kind income for the peasants and domestic workers. See Appendix C for calculations with various adjustments to assumptions.

**Table 3. Incomes and ratios between occupational groups, 1990 USD**

	1895	1910	1930	1940
Workers *	3,207	3,250	3,544	3,740
Peasants	1,037	1,300	1,833	1361
Businessmen	119,146	191,588	94,748	85,008
Large landowners**	883,852	1,760,399	190,432	32,316
Ratio workers/peasants	3.093	2.50	1.93	2.74
Ratio businessmen/workers	37.15	58.95	26.73	22.72
Ratio businessmen/peasants	114.89	147.38	51.68	62.47
Ratio Large Landowners/workers	275.56	541.70	53.73	8.64
Ratio Large Landowners/peasants	852.33	1354.25	103.87	23.75
Ratio Large Landowners/businessmen	7.42	9.19	2.01	0.38

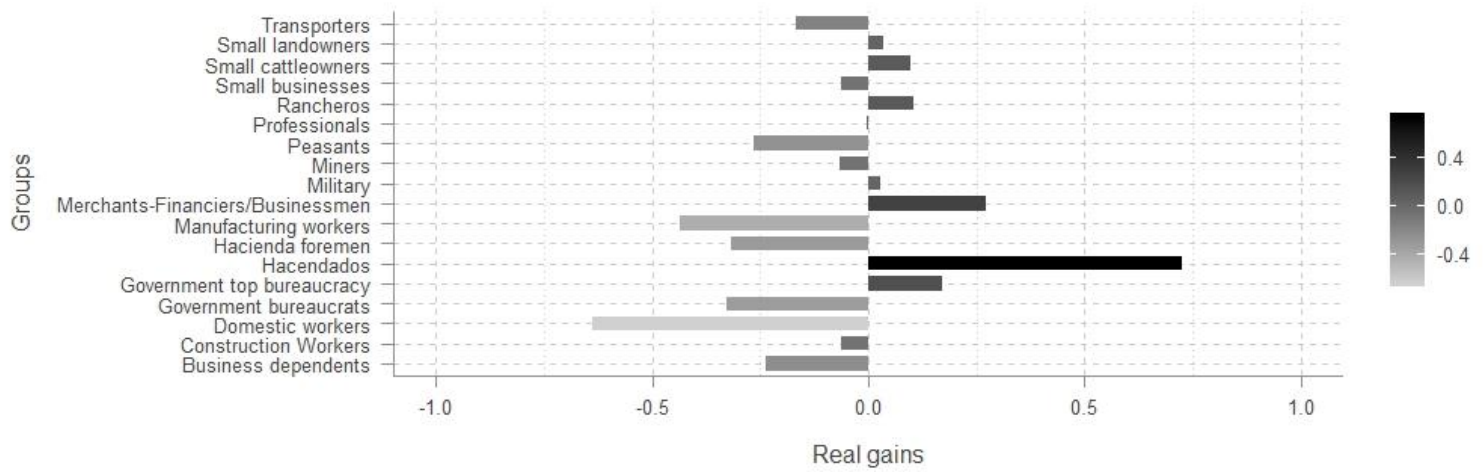
\*For 1930 and 1940, the worker wage is the average of industrial occupations.

\*\* Large landowners' income includes only the agricultural value of land; the mining sector is not taken into account because it belongs mostly to foreigners not included in our social tables.

Note. An important aspect for the 1930 and 1940 values for peasants is that our social tables do not register the monetary income derived from the bracero program (the remittances that Mexican rural workers in the US sent back to Mexico)

Source: Authors' own calculations.

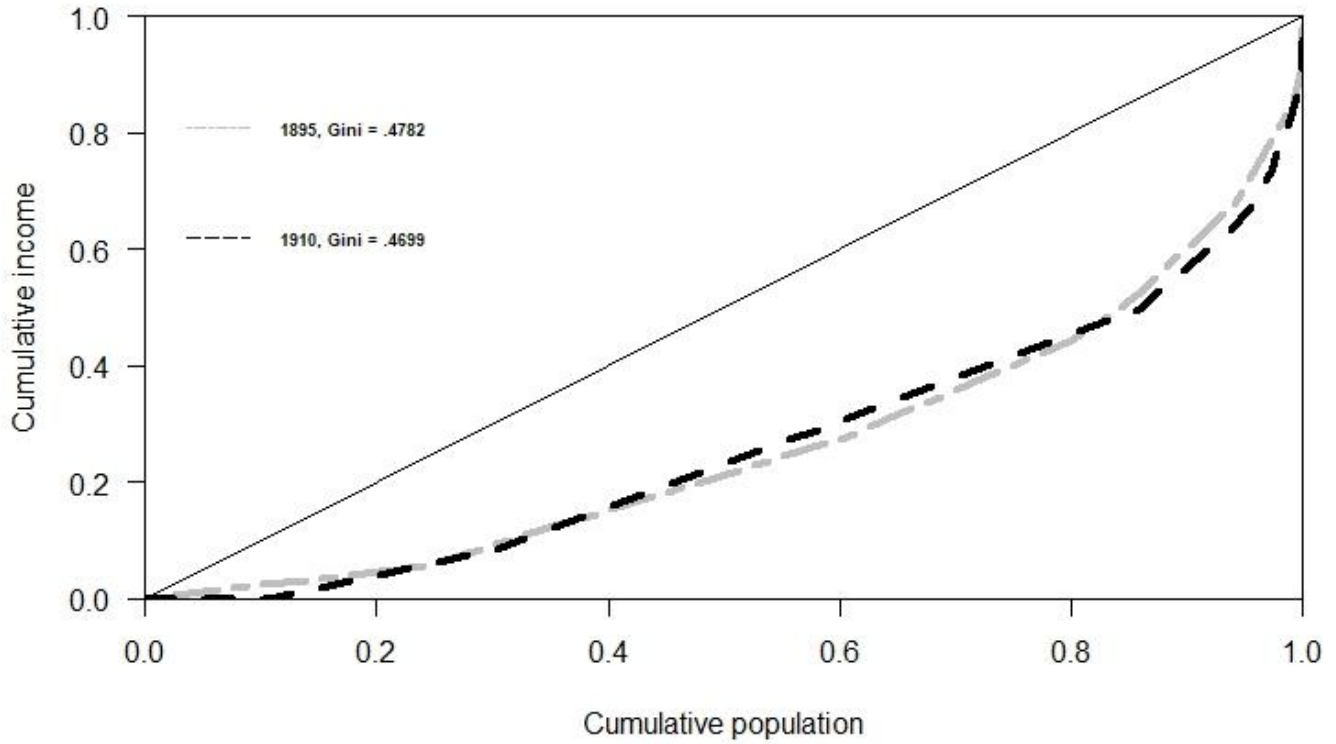
**Figure 1. Winners and losers, 1895–1910**



*Source:* Authors' own social tables.

*Note.* Incomes constructed for the social tables as explained in the text. 1910 incomes deflated with the wholesale price index of Arnaut 2018 (an average of 0.72 per cent inflation per year between 1895 -1899 and a 6.02 per cent inflation per year between 1900 and 1910)

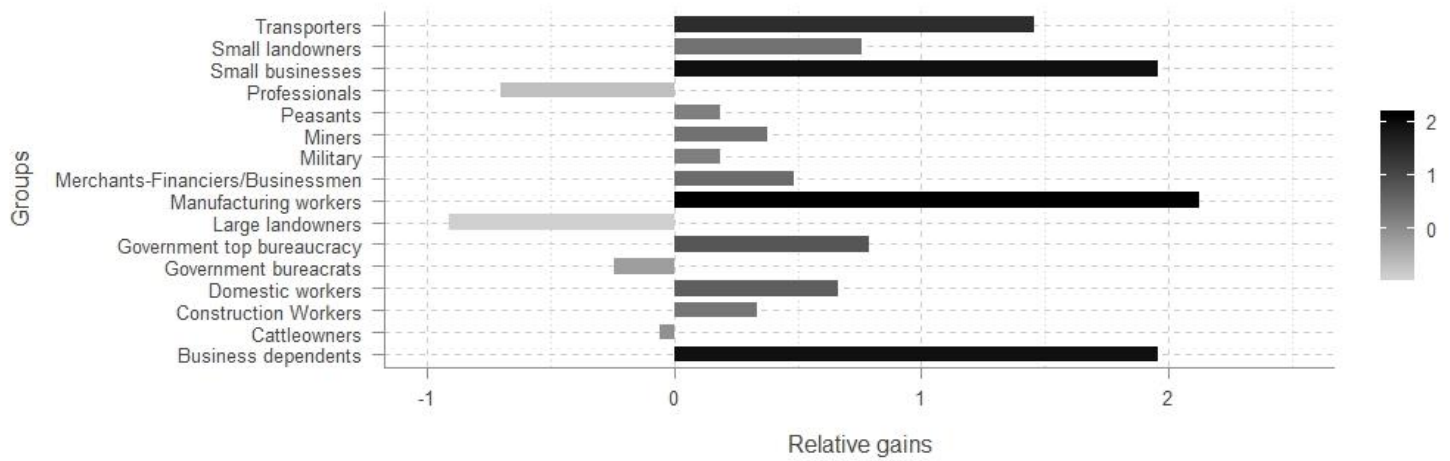
**Figure 2: 1895 & 1910 Lorenz curves.**



*Source:* Authors' own social tables.

*Note:* The 1895 and 1910 Lorenz curves show no Lorenz dominance; the curves cross each other at different points. This shows that at the bottom and top of the income distribution in 1910 different groups made income gains. At the same time some groups at the middle of the distribution suffered income losses.

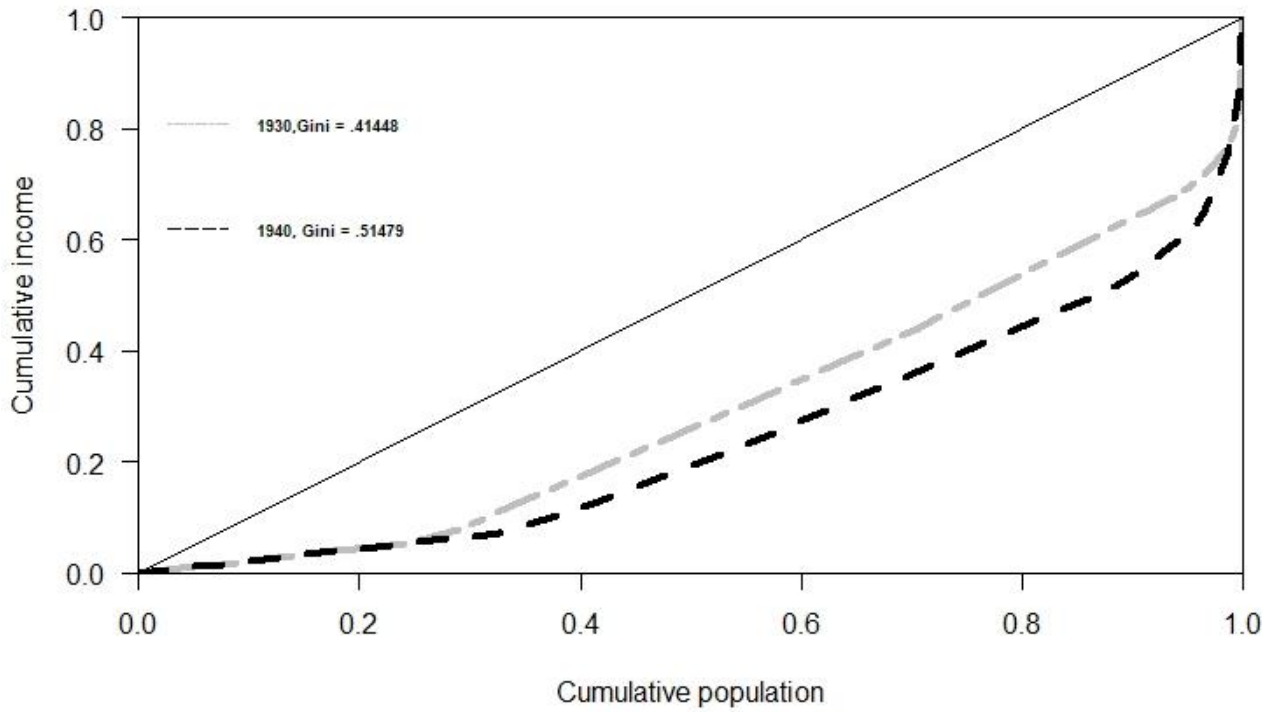
**Figure 3: Winners and losers, 1930–1940**



*Source:* Authors' own social tables.

*Note.* Incomes from the social tables; income growth deflated with the Mexico City Index of wholesale prices in the Historical Statistics of México pp. 805. This period shows years of high deflations such as 1931 and 1932 with 10.45 and 9 per cent deflations and years with high inflation such as 1937 with 18.75 per cent.

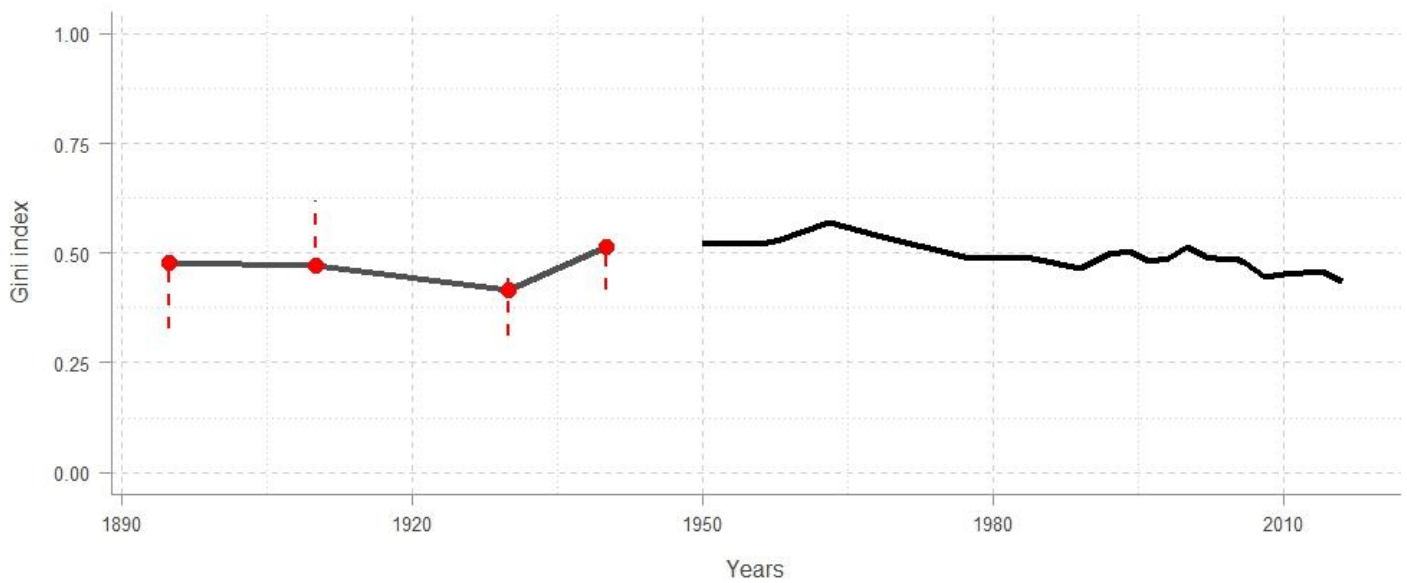
**Figure 4: 1930 & 1940 Lorenz curves**



*Source: Authors' own social tables.*

Note: The Lorenz curves from 1930 and 1940 do not cross each other, the 1940 curve lies above the 1930; therefore we can conclude that the 1930 income distribution was more egalitarian than the 1940 income distribution.

**Figure 5: The evolution of inequality 1895-2016.**



*Sources* for 1895 – 1940 are authors' social tables; 1950-2004 Székely (2005), 2005 – 2016 INEGI.

*Note:* The red dots show the Gini values from our social tables, the dashed lines show the range of the alternative calculations we performed for different assumptions.

## Appendix for Income Inequality in Mexico, 1895–1940: New Data and Estimates

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*This version: 3 March, 2020*

This collection of appendices for the paper “Income Inequality in Mexico 1895–1940” is included in said paper for online publication as part of the working paper series LUPEH (Lund Papers in Economic History). The appendices provide important background information on the data used and detailed references for the archives (Appendix B), the construction of the social tables (Appendix B and C), a robustness check (Appendix D), and a robustness check on the estimated per capita income (Appendix E). The content is as follows:

Appendix A. Description of the sources	p. 2
Appendix B. The 1930 and 1940 social tables in full	p. 10
Appendix C. Social Tables Construction and Alternative Measurements.	p. 17
Appendix D. Alternative 1930 Social Table	p. 21
Appendix E. Robustness check: per capita incomes ...	p. 28
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## Appendix A. Description of the sources

The construction of social tables is a data-intense process. This challenge is ever more difficult for developing countries in which official statistical sources often do not reach back more than a century. To be able to produce a reliable estimate with such data quality and quantity restrictions, it is necessary to follow different strategies. Work with primary sources in archives, employ secondary sources such as reports, period accounts and newspapers and the available statistical reconstructions.

To construct our 1895 and 1910 social tables, we started with the 1895 and 1910 official censuses produced by the General Directorate of Statistics of the Díaz's government (Dirección General de Estadística). The censuses are available on the INEGI site and can be requested on digital format. From this census, we extracted the population and occupational categories that provide the core structure of the 1895 social table.

The 1895 and 1910 censuses contain 149 occupational categories. Unfortunately, it does not contain the incomes associated with such categories. This lack of information on incomes poses the first major challenge in the construction of our estimates. To construct social tables is necessary to combine, occupations or classes with population shares and incomes, therefore the next step was to obtain the incomes.

The available sources that contain incomes are scarce and not of the best quality, the Social Statistics from the Porfiriato (SSP) and Mexico Historical Statistics (MHS) are the more readily available sources as can be requested from INEGI. For this reason, these are the first sources from which to obtain occupational incomes. However, the incomes registered in these sources only correspond to general descriptions such as manufacturing workers, construction workers, peasants, military and only for wage jobs not upper-class occupations like businesspeople and landowners.

To solve this initial problem, we collapse the 149 occupational categories into 19 that correspond to the descriptions available on the SSP and MHS plus the categories of hacendados, small landowners, merchant financiers and the different types of government bureaucrats and professionals (see Appendix C for an example). Both the SSP and MHS have problems. The SSP suffers from the problem of having an unknown methodology for their construction. The

MHS, on the other hand, has been developed by INEGI based on the work of Rosenzweig (1965) and therefore has less methodological issues; however, it still suffers from the fact that the data were collected only at the main cities at the time, not the whole country. We employ the MHS as our source.

The MHS did not solve all our problems, we still needed to find sources for the not wage earner classes and to find a way to account for the in-kind income that some occupations such as the peasants and the military obtained, if we do not take into account the in-kind income we would be biasing the inequality levels upwards. For this type of problems, the best possible sources are fiscal registers as employed by Lindert and Williamson (2016). Unfortunately, there are not available for the period. However, following their lead, we encounter a solution to the problem of in-kind income for the peasants and military. The solution was to make the following assumption a 250 days working year plus 115 days of in-kind equal to the general minimum wage registered on the MHS. Later this assumption was dropped for the peasants as we lacked historiographic sources to back up the assumption that all peasants engaged to the same extent in subsistence agriculture. We also dropped this assumption for domestic workers. The assumption was kept for the military as there is ample historiographic sources that point to soldiers performing other tasks to supplement their income. See Appendix E for alternative calculations where we include the assumption of 115 days of in kind production, and also comparisons of the per capita income estimates resulting from various assumptions, with estimates from other researchers with other methodologies.

To obtain the incomes we lacked for our 1895 and 1910 social tables we combine the MHS data with the available yearbooks of 1893 and 1894 published by the General Directorate of Statistics and available at INEGI, payrolls from private organizations available at the National Newspaper Archives in the UNAM at Mexico City (Hemeroteca Nacional de México). The yearbooks helped us check the MHS data for some categories and the payrolls from the Guadalajara School of Engineering to obtain the incomes from professionals and service workers such as domestic ones.

The top incomes, those corresponding to the Hacendado, large owners and merchant financier categories were constructed employing a combination of primary and secondary sources. For the hacendado class, we employ the data from the Francisco I. Madero Archive at the National Palace in Mexico City and the Madero Family Digital Fund (Fondo Digital de la Familia

Madero) available at the Ministry of Finance inside the National Palace in Mexico City. The archive contains the correspondence, bookkeeping records and financial transactions of Francisco I. Madero one of the richest men in the Mexico of his time and his family, one of the most prominent hacendado families.

Initially, we considered that the 830-850 hacendado families account for most of the fertile land in the country and therefore made the conservative assumption that 50 per cent of the agricultural production divided among the members of the families was a reasonable estimate. The data from the Francisco I. Madero Archive gave us a number that closely matched that assumption, and therefore we adopted the Madero income as our benchmark for the hacendado occupational category.

The work by Wasserman (1985) studying the life of Enrique C. Creel, another of the most powerful and wealthy individuals of the time suggest that our chosen value for the hacendado class is reasonable. In addition, the account of Friedrich Katz (1998) about Luis Terrazas and his family, one of the richest men of his time, closely matches our estimates.

For the merchant financiers also known as “barcelonetes”, we combined the data from Haber (1989) reconstruction of the rates of return on the company shares of the principal firms active in Mexico in the period 1890-1940. Once we had the rate of returns, we needed the value of capital owned by these individuals. The number of individuals and the value of their capital was obtained from another archive, Mexico’s City Historical Archive of Notaries (Archivo Histórico de Notarías de la Ciudad de México) which contains registers of the firms legally created, their owners and their salaries and company shares.

Knowing their salaries, the value of capital they have invested in the company and combining them with the rates of return from Haber (1989) we can derive an income for our social tables for 1895 and 1910.

For the 1895 and the 1910 social tables, the combination of sources was of critical relevance, no single source primary or secondary provides enough information, relying on a mixture of sources and historiographical accounts was a time-consuming task. However, it was unavoidable if reasonable estimates were expected. To obtain access to the different Archives, we contacted the different institutions requesting access and physical access was granted for

the Francisco I. Madero, Madero Family Digital Found and Mexico's City Historical Archives of Notaries in December 2018 and January 2019 during a brief visit of one of the authors.

We are grateful to the Federal Government of Mexico for granting access to the archives inside the National Palace. To the government of Mexico City for access to the Notaries records. Finally, to INEGI for the digital access to all the statistical sources mentioned in this article.

The 1930 and 1940 Social Tables:

For the 1930 and 1940 social tables, we build on the work done for the 1895 and 1910 pair. For example, the work that was done before for the merchant financiers "barcelonetes" provided us with the estimates for these tables as the Haber (1989) series of the rate of returns runs up until 1940 and the data from Mexico's City Historical Archive of Notaries contains information for the same period.

From the decade of 1930 and moving forward in time, statistical data available is of much better quality and availability. We have statistical sources such as the population censuses of 1930 and 1940 from which we obtain fine-grained occupational categories that consist of 98 and 101 groups, respectively. For this large number of groups, we have very detailed data regarding their incomes. The data comes from the first and second industrial censuses of 1930 and 1940, the agrarian censuses of 1930 and 1940, the ejidal censuses of 1935 and 1940, and the yearbooks of 1938, 1941 and 1946-1950. All these sources produced by the General Directorate of Statistics (Dirección General de Estadística) and now available under request at INEGI.

These sources have several significant advantages, one of them is that they match each other in occupational groups and the incomes related to those groups, which allow us to cross-check and reduce the possible margin of error that is common when constructing social tables.

From here, it is a straightforward process to come with the 1930 and 1940 social tables. The only categories that present a challenge are the new ones that correspond to the new group ejidatarios. The ejido was a communal type of property that emerged from the land reform in the 1917 Constitution. Ejidatarios were the owners of the land and many of them for the first-time owned land. The land reform was a massive type of redistribution that had a significant effect on the levelling process after the Mexican Revolution.

The issue with the ejidatarios group is that even if in the ejidal censuses we know their numbers and the land area they controlled we still need to assign an average income to the group. To do this, we take advantage of the values reported on the censuses regarding the production value of ejidos and then from it derive an average value. The same process was taken for the incomes of the new landholding groups. The agrarian censuses classify the owners of land in large and small landowners if they own more than 5 hectares of land, they are large if own less than 5 they are small. Taking the aggregate production value of both type of property and dividing it among the number of owners we can arrive at the average for the tables.

For the industrial occupations that now constitute a large chunk of the 1930 and 1940 social tables, we encountered a potential obstacle that we were able to turn into an advantage. The 1930 industrial census is not available at an aggregate level. Instead, it is disaggregated by state. To extract the incomes for the social table was a time-consuming process that required aggregating the data of 32 states for almost 100 occupational categories in each state.

In the process of doing so, we had the idea to take advantage of the disaggregation. A common problem with social table estimates is the underestimation of within-group inequality, the fact that we work with averages tends to produce a downward bias on the results. The way the 1930 industrial census is presented help us avoid this issue because in a country with poor infrastructures such as roads, ports and airports and very jagged geography, regional markets had difficulties in integrating. We can observe this in the regional divergences in prices and labor markets.

This divergence in the labor markets means that there are some regional variations on the wages earned by different occupations, for example, we observe higher wages in states with big cities such as Mexico City, Nuevo Leon and Jalisco and lower wages in more disconnected states with smaller populations. Taking advantage of this, we construct an alternative 1930 social table that includes these regional variations. For this, we computed the maximum and minimum values of income for each occupational category and the number of people that earned that amount. Then left the rest of the population with the average as in the original construction of the 1930 social table.

In theory, if we account for within-group inequality, we would expect a higher inequality value and the result was in line with that expectation. This alternative 1930 social table shows a little more inequality but still very close to the original estimate. For this reason, we consider this exercise as a robustness check and an extension of the 1930 social table (see Appendix D).

The production of this pair of tables was very time consuming as the available data is not in a digital data format; it exists only in paper and INEGI provided them in PDF files under request. Scrapping each PDF file and then producing new datasets was part of the construction process.

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Notaría 99, notario: Ignacio Burgoa. Fondo: antiguo, escritura 54, 15/01/1879, sociedad: J. Ollivier y cia.

Notaría 99, notario: Ignacio Burgoa. Fondo: antiguo, volumen: 651, escritura: 78, 22/02/1886, sociedad: Garcín, Faudon y cia.

Notaría 31, notario: Francisco Diez Bonilla. Fondo: antiguo, volumen: 1, escritura: 50, 04/05/1886, sociedad: A. Reynaud y cia.

Notaría 294, notario: Miguel Maria Garduña. Fondo: antiguo, volumen: 2006, escritura: 54, 28/03/1887, sociedad: Signoret, Honorat y cia.

Notaría 99, notario: Ignacio Burgoa. Fondo: antiguo, volumen: 655, 30/01/1888, sociedad: J. Tron y cia.

Notaría 444, notario: Rafael Morales. Fondo: antiguo, volumen: 3023, escritura: 56, 23/03/1888, sociedad: J.B. Ebrard y cia.

Notaría 697, notario: Agustín Roldan. Fondo: antiguo, volumen: 9225, escritura: 107, 07/03/1899, sociedad: Lambert, Reynaud y cia.

Notaría 25, notario: Juan M. Villeda. Fondo: antiguo, volumen: 13, escritura: 38, 04/02/1889, sociedad: A. Richaud y cia.

Notaría 725, notario: José Villela. Fondo: antiguo, escritura: 2, 03/01/1889, sociedad: S. Robert y cia.

Notaría 5, notario: Bernardo Cornejo. Fondo: contemporáneo, volumen: 8, 23/02/1904, sociedad: S. Robert y cia.

Notaría 5, notario: Bernardo Cornejo. Fondo: contemporáneo, volumen: 31, 5/03/1907, sociedad: J. Ebrard y cia. Sucesores.

Notaría 5, notario: Bernardo Cornejo. Fondo: contemporáneo, volumen: 35, escritura: 2436, 23/02/1904, sociedad: CIDOSA.

Notaría 5, notario: Bernardo Cornejo. Fondo: contemporáneo, volumen: 54, 15/11/1910, sociedad: J. Ebrard y cia. Sucesores.

Notaría 5, notario: Bernardo Cornejo. Fondo: contemporáneo, volumen: 54, escritura 4539, 15/11/1910, sociedad: L. Faudon y cia. Sucesores.

Organisation for Economic Co-Operation and Development. Employment Statistics. Available Online: <https://stats.oecd.org/index.aspx?queryid=54741> [Accessed 20 April 2019].

## Appendix B. The 1930 and 1940 social tables in full

As mentioned in the main body of the paper, the great detail of the 1930 and 1940 social tables – 98 and 101 groups, respectively – is a great strength of the paper. But presenting them becomes quite cumbersome and therefore we only present them in full here in the Appendix.

**Appendix B. Table 1. 1930 Social Table**

	<b>Occupational Group</b>	<b>Population Share</b>	<b>Income 1930 (1990 USD)</b>
1	Large landowners	0.000211477	190431.6393
2	Very high government bureaucracy	2.14552E-07	99721.69811
3	Businessmen	0.001192266	94748.15904
4	Cattle owners	0.005329901	35954.55507
5	High government bureaucracy	2.18128E-05	34902.59434
6	Professionals (lawyers, teachers)	0.000366526	18466.98113
7	Government bureaucracy	0.000195385	12963.82075
8	Small landowners	0.003862937	10425.19268
9	Medics	0.001051019	10363.66981
10	Electric machines makers	7.824E-05	8262.28302
11	Forestry	0.001014903	6583.193655
12	Management employees	0.000944529	5669.996907
13	Printing and lithography workers	0.000608541	5280.321753
14	Government workers	0.004437365	4986.084906
15	Metal manufacturing workers	0.000831246	4813.263655
16	Electricity workers	0.001185757	4537.040892
17	Science, Artistic and Literature professionals	0.002121705	4432.075472
18	Chemical industry workers	6.79415E-05	4305.160239
19	Oil industry workers	0.000344213	4305.160239
20	Paper industry workers	0.000125155	4249.550936
21	Edification workers	0.004385014	4058.699612
22	Metallurgy industry workers	0.000492969	3949.985199
23	Mining workers	0.003235087	3840.319528
24	Glass industry workers	2.36722E-05	3800.435031
25	Cigar industry workers	0.000182369	3768.979027
26	Cigarettes industry workers	0.000201107	3768.979027
27	Photography and cinematography employees	0.000160199	3735.101949
28	Oil industry workers (exploration)	0.000133094	3571.514151
29	Pharmaceutical industry workers	4.73445E-05	3570.606776
30	Crystal industry workers	9.61908E-05	3553.995996
31	Wood industry workers	0.000191094	3328.557175
32	Rubber manufacturing workers	6.1791E-05	3316.851141
33	Coffe toasters	0.000178436	3277.881564
34	Bank employees	5.87157E-05	3219.549549
35	Salt mining workers	0.000228999	3177.908915

	<b>Occupational Group</b>	<b>Population Share</b>	<b>Income 1930 (1990 USD)</b>
36	Sand mining workers	6.77984E-05	3177.908915
37	Beer and Wine industry workers	0.000528728	3162.125203
38	Bread bakers	0.002855759	3145.565819
39	Non-specified industry workers	0.000228641	3102.45283
40	Land transport carriers	0.006945907	3047.051887
41	Cooking oil and vegetal butter industry workers	0.000133666	2977.711149
42	Customs employee	5.49968E-05	2954.716981
43	Matchsticks makers	0.00013009	2901.472244
44	Soap industry workers	0.000342425	2868.061973
45	Ice and ice-cream industry workers	0.00021069	2794.884097
46	Glue industry workers	5.93594E-06	2686.48408
47	Military	0.005565193	2585.377358
48	Smiths and smelters	0.002214177	2452.415094
49	Tiler makers	0.000148041	2452.415094
50	Shredders of cotton and other fibers	0.000874371	2390.782002
51	Air transport carriers	1.31592E-05	2382.240566
52	Hair combs and buttons makers	4.84172E-05	2295.925903
53	Upholsterers	4.33395E-05	2293.257543
54	Canned food industry workers	6.87282E-05	2287.371389
55	Entertainment industry workers	0.000122009	2278.825472
56	Dry cleaning workers	0.000909057	2226.895246
57	Boudoir workers	0.001320496	2226.895246
58	Policemen and firefighters	0.000746713	2216.037736
59	Flours, starches, pastes and starches workers	0.000274627	2208.201294
60	Yarns, fabrics and prints workers	0.00407799	2141.593305
61	Tanners and taxidermists	0.000534091	2131.158226
62	Hosiery, stockings, shirts workers	0.000375895	2120.520478
63	Dairy industry workers	0.000139602	2090.127971
64	Shoemakers	0.003418886	2016.7964
65	Manufacture of cardboard and cardboard artifacts workers	6.76554E-05	2011.569782
66	Manufacturing of construction materials workers	0.000602748	2005.04477
67	Trimmings and galleries workers	2.96797E-05	1961.531723
68	Paints, varnishes and inks workers	3.81187E-05	1949.086642
69	Servants	0.013327899	1946.419811
70	Clothing, hats and clothing for women makers	0.003319334	1874.54686

	<b>Occupational Group</b>	<b>Population Share</b>	<b>Income 1930 (Mexican Pesos of 1930)</b>
71	Postmen, telegraphists and telephone operators	0.000273268	1846.698113
72	Sweets, chocolate and syrups workers	0.000305951	1844.329164
73	Peasants	0.202868332	1833.401887
74	Carpenters	0.004605788	1832.784649
75	Yarns, fabrics and twists of hard fibers workers	0.001792654	1798.230351
76	Sellers	0.01907632	1725.554717
77	Butchers	0.000969203	1718.101164
78	Sea transport carriers	0.00042374	1717.429245
79	Jewelry makers	0.000320898	1717.214987
80	Furniture makers	0.000180081	1672.954944
81	Service sector employees (hotels, restaurants)	0.000272338	1662.028302
82	Other industries	0.000117503	1610.501762
83	Saddlers	0.000484244	1604.39687
84	Vehicle manufacturing workers	0.000311673	1572.323314
85	Domestic workers	0.372215486	1557.135849
86	Hunters and fishers	0.000443264	1551.226415
87	Tonic makers	0.000237867	1528.758599
88	Occupations not sufficiently specified	0.014731928	1503.212264
89	Clothing and hats for men (excluding palm hats) makers	0.001646687	1500.787357
90	Brooches, brushes, brooms, sieves makers	7.50217E-05	1446.883237
91	Attendants	0.001167091	1429.34434
92	Oils and greases for industrial use makers	2.52456E-05	1413.679245
93	Manufacture and repair of scientific and precision apparatus workers	1.57338E-06	1171.334232
94	Dough, tamales, tortillas and atole makers	0.00100961	1159.457565
95	Ejidatarios (peasants with communal property rights)	0.038275507	1139.666454
96	Explosives, gunpowder, pyrotechnics or rocketry makers	0.000244446	1125.236203
97	Potters	0.001088923	941.9723162
98	Manufacture and repair of musical instruments	9.29725E-06	531.4386791
99	Manufacture of art objects.	4.29819E-05	462.4671025
100	Sugar, alcohol and brown sugar or brown sugar	0.004058037	450.7168594
101	People without occupation	0.249272964	400

Source: Authors' own calculation.

**Appendix B. Table 2. 1940 Social Table**

	<b>Occupational Group</b>	<b>Population Share</b>	<b>Income 1940 (1990 USD)</b>
1	Businessmen	0.001143969	85007.69394
2	Very high government bureaucracy	1.65753E-07	70147.22021
3	High government bureaucracy	3.81231E-06	49098.14433
4	Large land holders	0.007365988	32315.73992
5	Cattle owners	0.004257631	22072.49649
6	Explosives, gunpowder, pyrotechnics or rocketry makers	1.57465E-05	11179.61729
7	Small land holder	0.024439993	8782.831964
8	Government bureaucracy	0.000369904	6719.431753
9	Medics	0.000220782	6403.790621
10	Oil industry workers (exploration)	0.001295688	5438.394152
11	Professionals (lawyers, teachers)	0.000247634	5174.595623
12	Bank employees	0.000579195	4822.58166
13	Postmen, telegraphists and telephone operators	0.000443001	4766.298517
14	Electricity workers	0.000579858	4449.614628
15	Management employees	0.00104739	4383.991143
16	Air transport carriers	6.22125E-05	4322.622519
17	Customs employee	2.45314E-05	4287.901142
18	Manufacture and repair of musical instruments	3.86756E-07	4219.393225
19	Pharmaceutical industry workers	0.000106468	3981.996788
20	Science, Artistic and Literature professionals	0.002112627	3945.400626
21	Metallurgy industry workers	0.001042252	3743.407118
22	Manufacture of art objects (from ivory, tortoiseshell, bone, horn, shell, feather, etc.)	1.10502E-06	3739.818144
23	Crystal industry workers	0.000136691	3735.006952
24	Printing and lithography workers	0.000442891	3731.076413
25	Yarns, fabrics and prints workers	4.29299E-05	3601.364041
26	Cigarettes industry workers	0.000229844	3463.01978
27	Land transport carriers	0.005219824	3459.872161
28	Metal manufacturing workers	0.000894788	3334.230942
29	Electric machines makers	4.735E-05	3328.559256
30	Rubber manufacturing workers	0.000165532	3323.781416
31	Clothing, hats and clothing for women makers	5.74609E-06	3254.424266
32	Photography and Cinematography employees	0.000543945	3225.174306
33	Mining workers	0.003154105	3224.890911
34	Chemical industry workers	0.000610411	3158.496703
35	Glass industry workers	0.000241943	3143.562278
	<b>Occupational Group</b>	<b>Population Share</b>	<b>Income 1940 (1990 USD)</b>
36	No specified industry workers	0.00124005	3047.185719
37	Dry cleaning workers	0.00124005	3047.185719
38	Government workers	0.00398436	2991.912165
39	Sellers	0.026705664	2868.673776

40	Paper industry workers	0.000276365	2851.296021
41	Manufacture of cardboard and cardboard artifacts workers	0.000276365	2851.296021
42	Hair combs and buttons makers	2.49734E-05	2849.283259
43	Upholsterers	4.16039E-05	2825.580873
44	Clothing and hats for men (excluding palm hats) makers	3.4145E-05	2816.05916
45	Other industries	0.000114867	2808.167674
46	Vehicle manufacturing workers	3.29848E-05	2780.411142
47	Entertainment industry workers	0.000654667	2722.525491
48	Matchsticks makers	0.000110888	2715.208379
49	Beer and Wine industry workers	0.000442836	2700.291306
50	Trimmings and galleries workers	1.44757E-05	2656.475045
51	Potters	2.24871E-05	2581.379609
52	Dairy industry workers	3.79573E-05	2578.859203
53	Soap industry workers	0.000210395	2551.113326
54	Yarns, fabrics light fibers	0.004265421	2510.532013
55	Paints, varnishes and inks workers	3.67971E-05	2492.00717
56	Tiler makers	9.16059E-05	2472.382868
57	Forestry	0.001030373	2451.264388
58	Edification workers	0.000544773	2378.685945
59	Ice and ice-cream industry workers	7.71302E-05	2371.334735
60	Hosiery, stockings, shirts workers	8.74621E-05	2332.727091
61	Servants	0.010002061	2298.0422
62	Tanners and taxidermists	0.000172659	2294.57616
63	Saddlers	0.000172659	2294.57616
64	Jewelry makers	1.873E-05	2283.894584
65	Cooking oil and vegetal butter industry workers	0.000139453	2249.817576
66	Flours, starches, pastes and starches workers	0.000143652	2235.89239
67	Manufacture and repair of scientific and precision apparatus workers	2.81779E-06	2154.998019
68	Sea transport carriers	0.000216694	2127.372302
69	Tonics	0.00013763	2097.752344
70	Furniture makers	3.75153E-05	2075.653135
71	Manufacturing of construction materials workers	0.000177963	2071.94085
72	Bread bakers	0.000581294	2003.484611
73	Carpenters	0.000217744	1974.199113
74	Wood industry workers	2.67414E-05	1947.488523
	<b>Occupational Group</b>	<b>Population Share</b>	<b>Income 1940 (1990 USD)</b>
75	Yarns, fabrics and twists of hard fibers workers	0.000291338	1945.6189
76	Canned food industry workers	0.000133155	1926.251875
77	Military	0.005525085	1921.649485
78	Sweets, chocolate and syrups workers	0.000125254	1893.947894
79	Sand mining workers	5.92842E-05	1890.940702
80	Glue industry workers	4.25432E-06	1868.816602
81	Oils and greases for industrial use makers	4.25432E-06	1868.816602
82	Cigar industry workers	2.75702E-05	1829.448819
83	Boudoir workers	0.000951475	1753.795673

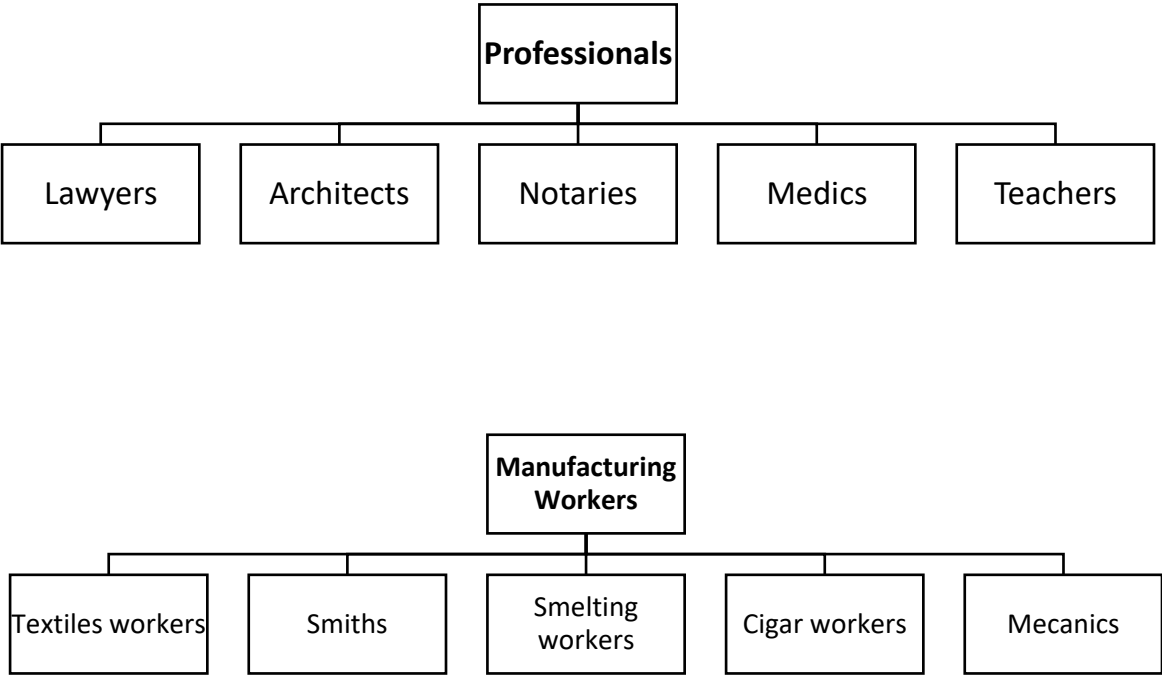
84	Sugar, alcohol and brown sugar or brown sugar	0.000965564	1741.517827
85	Policemen and firefighters	0.000702238	1729.484536
86	Oil industry workers (refining)	4.97258E-07	1729.057503
87	Coffee toasters	2.22661E-05	1557.027224
88	Domestic workers	0.348247656	1539.688274
89	Service sector employees (hotels, restaurants)	0.000768539	1492.85074
90	Smiths and smelters	3.61893E-05	1430.364391
91	Peasants	0.115082272	1360.72
92	Occupations not sufficiently specified	0.020303306	1325.649897
93	Brooches, brushes, brooms, sieves makers	1.873E-05	1298.354822
94	Shoemakers	0.000164648	1261.166305
95	Hunters and fishers	0.000507534	1106.389691
96	Ejidatarios (peasants with communal property rights)	0.067563999	1096.803617
97	Salt mining workers	0.000134757	1014.864929
98	Butchers	0.000412061	872.4590125
99	Dough, tamales, tortillas and atole makers	0.000879428	664.2157237
100	People without occupation	0.326325997	400

*Source:* Authors' own calculation.

Appendix C. Social Tables Construction and Alternative Measurements.

Examples of how categories were aggregated for the 1895 and 1910 social tables:

**Appendix C Figure 1. Examples of aggregated occupational categories.**



Source: Author’s own elaboration

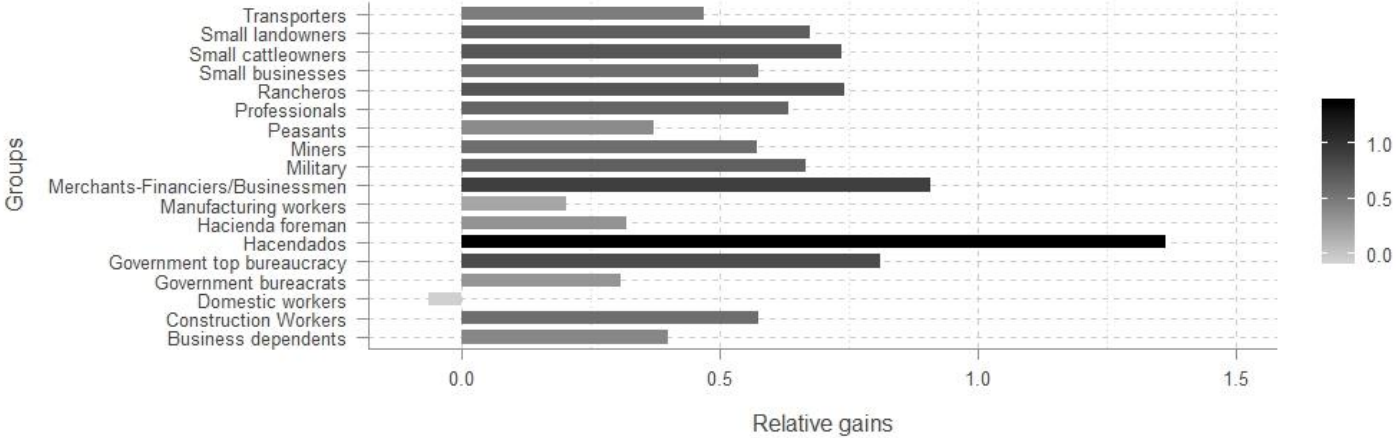
To address the fact that for some occupational categories wage information was not available to the same level of detail, we aggregated categories from occupations belonging to the same aggregate sectors.

For the 1930 and 1940 categories two occupational categories were created. First, "ejidatarios", employing as the source the ejidatal and agrarian censuses. Second, the category "people without occupation" was aggregated from the "unemployed" and the "people without productive occupation" in the population census.

**Winners and losers?**

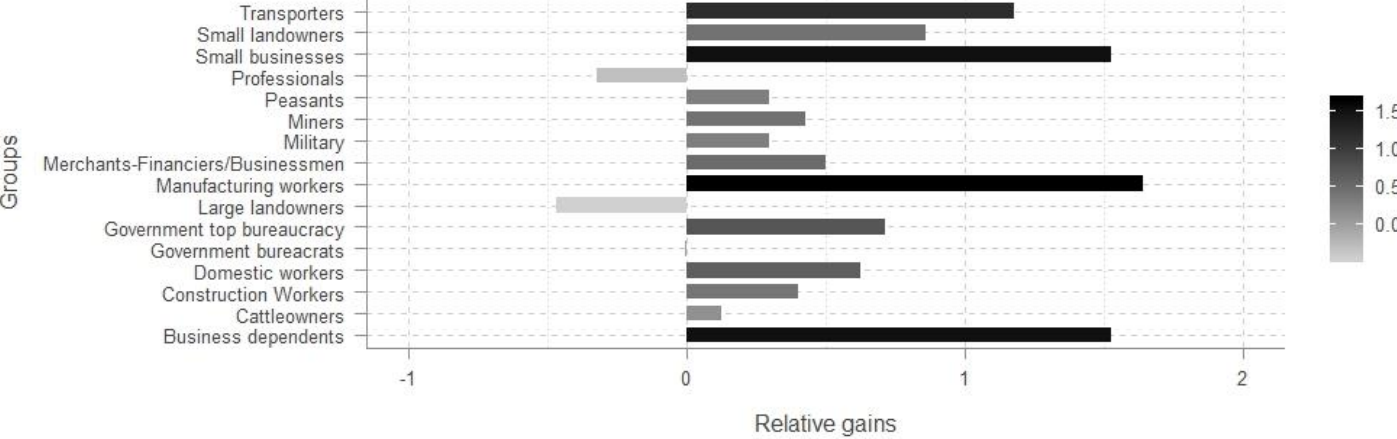
Another way to observe the winners and losers between 1895-1910 and 1930-1940, is to construct alternative relative growth bars for Figure 1 and Figure 3.

**Appendix C Figure 2: Relative Winners and losers 1895-1910.**



Source: Author’s own social tables. Note: the values are normalized by dividing the income gains in nominal pesos by the average of all the groups income gains.

**Appendix C Figure 3: Relative Winners and losers 1930-1940.**



Source: Author’s own social tables. Note: the values are normalized by dividing the income gains in nominal pesos by the average of all the groups income gains.

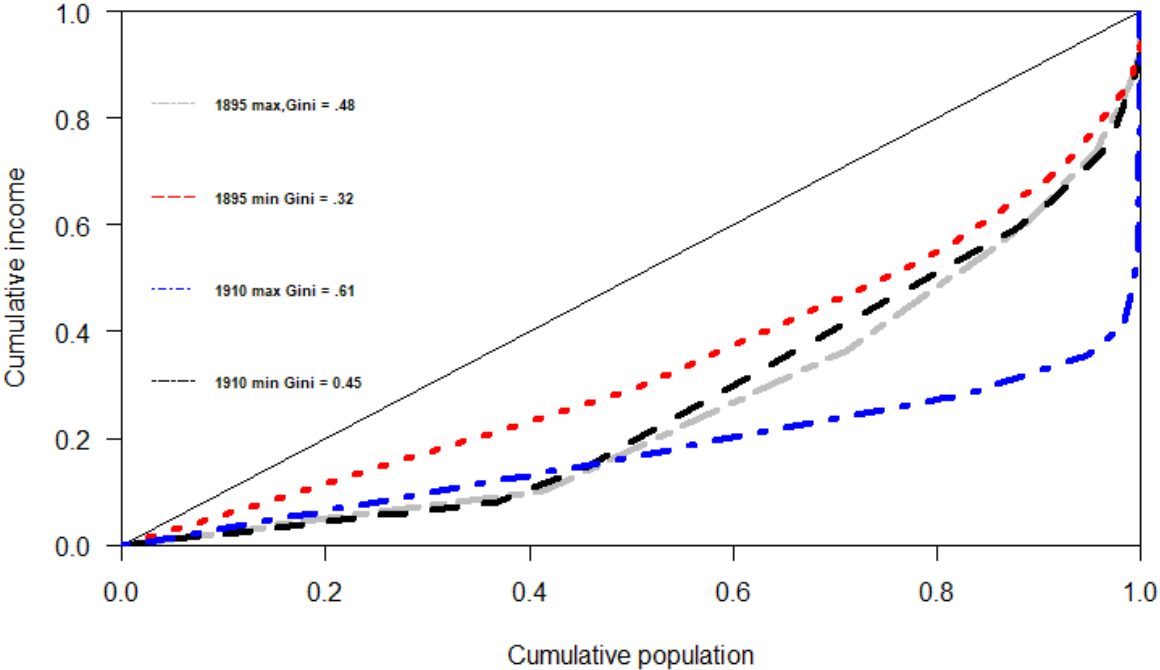
Figures 2 and 3 of this appendix shows that the income gains by occupational categories are normalized by the average gains of all occupational categories according to the social tables. Both show the gains and losses as proportions, for example, between 1895 and 1910 the hacendado class shows gains 2 times higher than the average gain. In the 1930-1940 period, the

small business category shows a gain of 1.7 times de average gain. This is an alternative way to rank and observe who won and who lost from the distributional changes at those times.

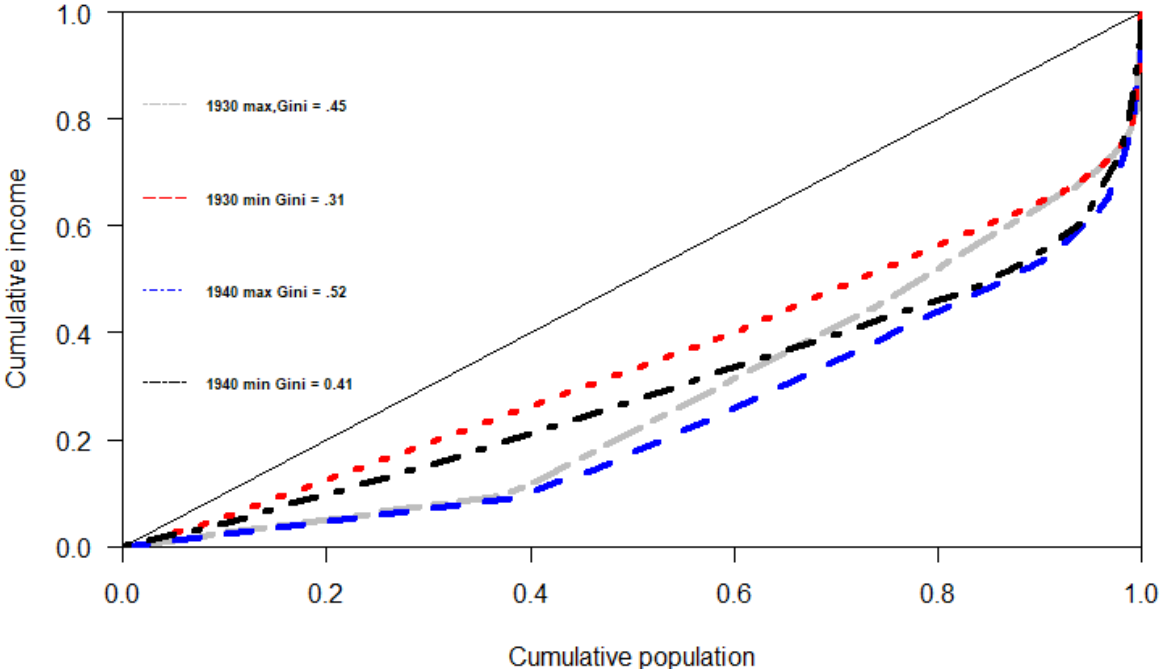
**The min-max alternative social tables.**

Here we present the result from the Gini index levels and the Lorenz curves from the alternative specification of our social tables, these social tables contain the full count of the unoccupied population (not excluding the children) and the 115 days of minimum wage work assumption for the peasant occupation. Even if we do not consider these as our main estimates, we consider them a good robustness check as our preferred estimate is close to these levels and displays a similar trend.

Appendix C Figure 4: Mexico's Lorenz curves 1895 & 1910 min max levels



Appendix C Figure 5: Mexico's Lorenz curves 1930 & 1940 min max levels



## Appendix D. Alternative 1930 Social Table

As discussed in the paper, a classical problem of social tables studies is that they by design miss information on within-group inequality. However, for 1930 we have some information about such inequality. Appendix D Table 1 shows income estimates with min and max within group incomes for a large number of employees and social groups. We will then use these figures on within-group inequality to calculate a Gini with these within-group differences considered.

The Industrial censuses have a problem that we turn into an advantage. The 1930 industrial census reports its data at the state level, so, we had to aggregate it at the national level for each industry. The process was time-consuming but worth it, the data of incomes and number of people in each occupation categories matches or closely matches the population census, from this we can conclude the estimates are robust. Also, we find a practical advantage in the way the data was disaggregated; it allows us to mitigate even more the underestimation of within-group inequality.

**Appendix D Table 1. 1930 Social Table: within inequality robustness check (in 1930 Mexican Pesos)**

<b>oc</b>	<b>Occupational Group</b>	<b>nshare1930</b>	<b>income1930</b>
1	Hacendados	0.000209026	51560.03517
2	Muy alta burocracia	2.12066E-07	27000
3	Empresarios	0.001178451	25653.39683
4	Ganadería y cría de animales pequeños	0.005268143	9734.822062
5	Alta Burocracia	2.156E-05	9450
6	Jurisprudencia	0.000362279	5000
7	Mandos medios	0.000193121	3510
8	Max	2.2479E-05	3167.273585
9	Rancheros	0.003818178	2822.657533
10	Medicina y arte de curar	0.001038841	2806
11	max	1.58343E-05	2514.066964
12	Fabricación e instalación de aparatos eléctricos en general	5.88837E-05	2237.042146

13	max	0.000109426	2030.314599
14	Silvicultura (explotación de bosques)	0.001003143	1782.422803
15	max	0.000304032	1622.021158
16	max	7.21024E-06	1539.509804
17	Empleados de administración	0.000906582	1535.171576
18	max	2.70738E-05	1474.718016
19	max	6.8568E-05	1458.145361
20	max	9.26022E-06	1436.977099
21	Imprenta, litografía y encuadernación	0.000296256	1429.66566
22	max	1.55515E-06	1418.454545
23	max	0.00011706	1369.923913
24	empleados gubernamentales	0.004385949	1350
25	Productos metálicos manufactureros	0.000729154	1303.208039
26	max	1.48446E-05	1275.671429
27	max	1.69653E-06	1266.458333
28	max	3.17392E-05	1250.427617
29	Generación, transformación y transmisión de energía eléctrica	0.001050363	1228.419756
30	max	1.84497E-05	1227.383142
31	Profesiones científicas, artísticas y literarias	0.002097121	1200
32	Acidos, gases y productos químicos	3.97977E-05	1165.637255
33	Refinación y destilación del petróleo (gasolina, aceites lubricantes, naftalina, parafina, etc)	0.000340225	1165.637255
34	Fabricación de papel y artefactos de papel	0.000123705	1150.580841
35	max	5.73992E-05	1122.761084
36	max	3.13151E-05	1113.406321
37	max	4.11408E-05	1102.33677
38	Edificación y construcción	0.004300274	1098.907175
39	max	1.41377E-05	1071.695

40	Metalurgia (beneficios y fundición de minerales y metales)	0.000482733	1069.472365
41	max	1.93687E-05	1060.70073
42	Extracción de minerales	0.003197602	1039.78
43	Espejos, emplomados y vidrieras	9.18953E-07	1028.981132
44	Fabricación de puros	0.000180256	1020.464309
45	Fabricación de cigarros y picadura	8.00903E-05	1020.464309
46	Fotografía y cinematografía	0.000158343	1011.291971
47	max	1.15929E-05	1004.006098
48	max	1.62584E-06	992.8695652
49	max	4.3827E-06	987.1774194
50	max	8.03023E-05	968.1338028
51	Exploración y explotación de petróleo crudo	0.000131552	967
52	Productos farmacéuticos	1.31481E-05	966.754325
53	Vidriería y cristalería	3.43547E-05	962.2568981
54	max	0.000234545	902.3601567
55	Corte, aserradero y maderería	0.00018068	901.2185456
56	Artefactos de hule y gutapercha	6.1075E-05	898.0490956
57	min	8.90677E-06	888.6587302
58	Tostadores y molinos de café	0.000161594	887.4979459
59	Bancos	5.80354E-05	871.7043478
60	Explotación y beneficio de sal y tequesquite calcedonia	0.000226345	860.43
61	Arena, canteras, caolín y calcedonia	6.70129E-05	860.43
62	Cerveza, pulque, vinos, licores y vinagres	0.000452054	856.1565045
63	Pan, levaduras y maltas	0.002784921	851.672993
64	Hilados, tejidos y estampados (Maximo)	3.69702E-05	847.5277247
65	Ocupaciones no especificadas	0.000225992	840
66	Min	4.52407E-06	836.28125
67	Transportes terrestres	0.006865425	825
68	max	4.54528E-05	819.8958009

69	Desfibración y despepite hilados, tejidos y entrapados (MAXIMO)	0.00061789	815.0249399
70	max	0.000104478	810.4181326
71	Aceite de comer, manteca y mantequilla vegetales	0.000119888	806.2257516
72	Agencias comerciales, aduanales, de investigación, etc.	5.43596E-05	800
73	Fósforos y cerillos	2.00756E-05	785.5838005
74	Jabonería y velería	0.000294772	776.5378521
75	max	2.12773E-05	767.0631229
76	max	9.87521E-05	766.1725125
77	Hielo, nieves y paletas	0.00019913	756.7246853
78	max	2.68617E-05	756.5631579
79	max	6.82853E-05	754.4855072
80	max	1.95101E-05	744.2789855
81	max	1.76722E-06	744
82	min	1.32188E-05	743.1657754
83	Colas y pegamentos	5.86716E-06	727.375
84	max	8.07265E-05	715.4588441
85	max	7.77575E-06	704.1363636
86	max	8.48264E-07	703.8333333
87	Militares	0.005500709	700
88	max	7.8111E-05	675.0615385
89	max	3.64047E-05	674.1320388
90	Calcetería, medias, camisetas, bonetería, etc.(Maximo)	0.000218993	670.8160103
91	Herrería, plomería, hojalatería y cerrajería	0.002188521	664
92	Loza, porcelana y azulejos	0.000146326	664
93	max	7.76162E-05	656.5728597
94	Desfibración y despepite hilados, tejidos y estampados de fibras blandas	0.000243169	647.3126237

	(algodón, lana, lino, seda y seda artificial)		
95	Pasamanería y galonería (maximo)	3.03961E-06	646.0232558
96	Transportes aéreos	1.30067E-05	645
97	max	3.13151E-05	622.1128668
98	Botones, peines, peinetas y abanicos	3.75357E-05	621.6300018
99	Tapicería y colchonería	3.19513E-05	620.907534
100	Conservas alimenticias	3.02547E-05	619.313837
101	max	3.46374E-06	618.2040816
102	Diversiones	0.000120595	617
103	max	4.8351E-05	607.6827485
104	Tintorerías, lavanderías y planchadurías	0.000898524	602.9397089
105	Aseo personal y tocador	0.001283423	602.9397089
106	max	2.68617E-06	600.8947368
107	Policía y bomberos	0.00073806	600
108	Harinas, féculas, almidones y pastas	0.000271444	597.8782559
109	min	1.22291E-05	586.1618497
110	Hilados, tejidos y estampados	0.003990304	579.8439089
111	Curtidería y taxidermia	0.000446045	577.0185746
112	Calcetería, medias, camisetas, bonetería, etc.	9.40866E-05	574.1383671
113	Leche, queso, mantequilla y crema	0.000126533	565.9094891
114	min	2.61548E-06	559.9189189
115	min	9.26022E-06	555.2671756
116	max	4.53114E-05	549.9391576
117	Calzado y guantes	0.003140768	546.0547085
118	Fabricación de cartón y artefactos de cartón	9.3309E-06	544.6395833
119	Fabricación de materiales de construcción	0.000562258	542.8729134
120	min	9.68435E-06	534.4817518
121	Pasamanería y galonería	2.00756E-05	531.0916031
122	max	2.89824E-06	527.9512195

123	Pinturas, barnices y tintas	3.03961E-05	527.7220539
124	Servidumbre	0.013173469	527
125	Ropa, sombreros y confecciones para mujer	0.003280873	507.540146
126	Correos, telégrafos, teléfonos y radio	0.000270101	500
127	Dulces, chocolate y jarabes	0.000224012	499.3585986
128	Jornaleros (Campesinos)	0.200517696	496.4
129	Carpintería y ebanistería y tonelería	0.004432957	496.2328806
130	max	7.06887E-07	486.9
131	Hilados, tejidos y torcidos de fibras duras (jarciería en general, cáñamo, yute, palma, lechuguilla, henequen, etc.)	0.001690166	486.8771833
132	Pasamanería y galonera (mínimo)	6.2206E-06	474.9318182
133	Comerciantes en general	0.018855283	467.2
134	Rastros, carnicerías, tocinerías y mantecas	0.000952883	465.1819244
135	Transportes marítimos y fluviales	0.00041883	465
136	Joyería, platería y relojería	0.00031718	464.9419888
137	Muebles en general y artefactos de mimbre y de corcho	0.000176863	452.9584268
138	Hoteles, restaurantes, fondas etc.	0.000269182	450
139	max	4.80683E-06	448.5294118
140	Otras industrias	2.03583E-05	436.0490085
141	Talabartería y artículos de cuero	0.000453114	434.3960873
142	Construcción y reparación de vehículos (excluyendo barcos y aeroplanos)	0.000301487	425.7120595
143	Domesticos	0.367902624	421.6
144	Caza y pesca	0.000438128	420
145	Aguas minerales, gaseosas y frescas	0.000230516	413.91676
146	Ocupaciones insuficientemente determinadas	0.014561229	407
147	Personas cuya ocupación se ignora	0.011310752	407

148	Cultos	0.000226628	407
149	Ropa y sombreros para hombre (excluidos los sombreros de palma)	0.001561513	406.3434479
150	max	6.78611E-06	398.6354167
151	Broches, cepillos, escobas, cedazos, etc.	6.03681E-05	391.7487179
152	min	6.36198E-07	388
153	Encargados	0.001153568	387
154	min	6.99818E-06	385.0707071
155	Aceites y grasas para uso industrial	1.88032E-05	382.7586207
156	min	2.54479E-06	369.5277778
157	min	4.59476E-06	364.3692308
158	min	2.19135E-06	347.2580645
159	max	4.87045E-05	342.3323657
160	min	9.18953E-06	336.5461538
161	Fabricación y reparación de aparatos científicos y de precisión	1.55515E-06	317.1428571
162	Calcetería; medias, camisetas, bonetería, etc. (Mínimo)	5.84595E-05	314.426844
163	Masa, tamales, tortillas y atole	0.000871238	313.927208
164	min	1.90859E-06	308.6666667
165	Ejidatarios	0.037832008	308.568695
166	Explosivos, pólvoras, pirotecnia o cohetería	0.000233979	304.661654
167	min	4.02925E-06	300.0175439
168	min	1.62584E-06	295.3043478
169	min	2.33273E-06	293.5151515
170	min	2.82755E-06	273.3
171	Alfarería	0.001027248	255.0423129
172	min	3.25168E-06	253.3478261
173	min	2.26204E-06	239.9375
174	min	3.32237E-06	226.4468085
175	Hilados, tejidos y estampados (Mínimo)	3.46374E-06	207.9183673
176	min	6.64473E-06	180.0212766

177	min	2.4741E-06	165.4285714
178	max	4.02925E-06	160.754386
179	min	1.2724E-06	157.8888889
180	max	4.24132E-07	150
181	Fabricación y reparación de instrumentos musicales	7.91713E-06	143.8888888
182	min	2.07825E-05	141.9217687
183	min	8.48264E-07	140.8333333
184	min	1.55515E-06	136.4090909
185	min	1.97928E-06	134.2142857
186	min	1.20171E-06	132.5882353
187	min	4.90579E-05	126.9884726
188	Fabricación de objetos de arte (de marfil, carey, hueso, cuerno, concha, pluma, etc)	3.36478E-05	125.2145922
189	min	2.82755E-07	125
190	min	6.64473E-06	123.1595745
191	Azúcar, alcohol y piloncillo o panela	0.003904842	122.0331727
192	min	1.62584E-06	114.3478261
193	min	2.82755E-06	113.25
194	min	1.83791E-05	111.6269231
195	min	6.36198E-07	109.8888889
196	min	3.95857E-06	104.75
197	min	2.54479E-06	97.83333333
198	min	2.07118E-05	93.20477816
199	min	2.82755E-07	91.25
200	min	6.5387E-05	86.72
201	min	2.74979E-05	81.01799486
202	min	4.80683E-06	80.35294118
203	min	4.24132E-06	79.91666667
204	min	2.19135E-06	73.16129032
205	min	3.88788E-06	54.34545455
206	min	9.89641E-07	49.92857143

207	min	5.74699E-05	27.900369
208	min	9.89641E-07	26.07142857
209	Desfibración y despepite hilados, tejidos y entrapados (MINIMO)	3.18099E-06	23.53333333
210	min	3.60512E-06	22.47058824
211	Personas sin ocupación	0.246384637	51.1

Appendix D Table 2 uses the within-group information from Appendix D Table 1 to estimate an alternative Gini coefficient. After introducing the regional variations within each category to approximate the maximum level of within group inequality we get a Gini Index of 0.44693 a number within a reasonable margin from our preferred estimate. This exercise can be seen as a robustness check on our 1930 estimates, also increasing our confidence in the rest of the results.

**Appendix D Table 2. Comparison of 1930 inequality estimates with and without within-group inequality**

	Baseline (preferred estimate)	With within-group inequality
Gini Index	0.41448	0.44693

# Appendix E. Robustness check: per capita incomes from the social tables compared with those from the Maddison project

The focus of our paper is to estimate income inequality in Mexico, not the level of incomes per se. However, of course building social tables also implies estimating the per capita income of the society under study, as we estimate both the occupational structure and the income for each occupational group. Therefore, a robustness check on the construction of the social table is to compare the implied per capita incomes from the social tables, to estimates of per capita incomes made with other methods and based on other sources.

Appendix E Table 1 provides such a robustness check, comparing the per capita incomes that we have estimated for 1895, 1910, 1930 and 1940 with the per capita incomes from the well-known Maddison project, the gold standard of international GDP comparisons. The column “baseline” presents the income estimate from our baseline estimate, while the “old” column presents the version where we assume 115 days of in kind income for peasants and domestic workers. Naturally, this assumption pushes up the average income (in the 1895 and 1910 years).

**Appendix E, Table 1. Comparison between the per capita income from social tables vs the per capita income from Maddison estimates**

	Income per capita: social table (baseline)	Income per capita: social table (old)	Income per capita: Maddison project	Difference with Maddison
1895	1,719.47	1,836.86	1,132.2	+ 52%
1910	1,749.89	1,952.80	1,694	+3%
1930	1,797.30	1,797.30	1,617.9	+11%
1940	1,809.85	1,809.85	1,852.0	-2%

Source: Author’s own calculation and Bolt et al (2018). Incomes in 1990 US dollars.

Overall, our estimates of per capita income align quite well with those of the Maddison Project, which is reassuring. Especially in 1910, 1930 and 1940, differences are very minor. In 1895 the difference is large, however, with our estimate 52 per cent higher. Given the very large

differences in methodology it is not surprising that we get different results, but the 1895 deviance is a bit worrying. However, Mexico in this time was a mostly agrarian economy with a large subsistence sector, so any estimate of GDP/capita and national income will to a large degree build on assumptions made for subsistence groups who did not live in a very monetized economy.

The divergence is especially driven by our decision to impute the unoccupied category with the equivalent at the time of 400 US dollars of 1990 following Milanovic, Lindert and Williamson (2011). This pushes the per capita income up, as this category contains a significant amount of people, particularly for 1895 with 24.9% of the population. Lowering their income to 0 reduces the difference among the per capita income estimates down to 43% for 1895 and -3 % for 1910.

For the subsistence sector we have made several alternative calculations, building on different assumptions on the incomes of subsistence groups. Especially, the treatment of peasants and of domestic workers matter. When we have assumed 115 days of in-kind income for these groups on top of 250 days of minimum wage work, this increases the divergence with the Maddison Project per capita income estimates. This is one reason that our baseline estimate is without these 115 days.

We have explained and defended our assumptions and estimates for the different social groups in a thorough and transparent way in the main body of the paper and in the Appendices, so we do believe in our estimates. Historical social tables estimates will never be 100 per cent accurate, but we believe that our estimates are precise enough to be relevant and interesting. As we discuss in the main body of the paper, the point estimates should not be seen as completely precise, but with a consistent methodology over time, the trends are well captured by our method.

Appendix E Table 2 shows the Gini coefficient estimates resulting from varying the assumptions of the incomes for three groups: peasants, domestic workers, and those without stated occupation.

**Appendix E, Table 2. Gini estimates after removing the assumptions from the peasant and unoccupied income groups**

Assumptions / Year	1895	1910	1930	1940
<b>Baseline</b>	<b>0.4782</b>	<b>0.4699</b>	<b>0.4144</b>	<b>0.51479</b>
1) Baseline + peasants imputed in kind income of 115 days	0.42961	0.46761	NA	NA
2) Baseline + peasants imputed in kind income of 115 days + domestic workers in kind income of 115 days	0.42923	0.40638	NA	NA
3) Baseline + Unoccupied income = 0	0.55195	0.54025	0.48294	0.60712
4) Baseline + unoccupied income = 0 + peasants imputed in kind income of 115 days + domestic workers in kind income of 115 days	0.49019	0.46106	NA	NA

Note. For years 1930 and 1940 assumptions 1, 2 and 4 were not made, the income for those categories in the sources for those years are more detailed and did not require the same treatment as the 1895 and 1910 data.

Appendix E Table 2 is reassuring in that the patterns discerned are stable also when varying the assumptions for those with no occupation. Inequality is stable between 1895 and 1910, then decreases to 1930, then grows to 1940.

For further research, it would be ideal to make more informative analyses of the living standards of subsistence peasants and for those without a stated occupation by using other sources like probate inventories or other studies of material living standards. Lindert and Williamson (2016) in their study of the United States can triangulate their income estimates with such probate-based studies by Alice Hanson Jones (1980) and others, but we have not been able to do that for Mexico in our period. And we have judged it to be outside of the scope of this paper, which already builds on extensive archival research, to also go into wealth sources. Levy (2016) provides a study of Yucatan from 1850 to 1900 in this vein.

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