

LIFE ON THE EDGE: ELITES, WEALTH AND INEQUALITY IN SONORA 1871-1910

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ABSTRACT

This paper engages with and aims to contribute to the ongoing discussion regarding the role of economic and political elites in inequality dynamics and their reproduction over time. We reconstruct the distribution of wealth employing a sample of wills from the *El Colegio de Sonora* database covering the period of 1871-1910. We show that the rapid industrialisation and modernisation process that occurred in northern Mexico during the late-19th and early-20th centuries led to a continuous increment in wealth concentration at the top of the distribution. The Gini index measure of 0.58 for the 1871-1885 period rose to 0.80 in 1901-1910. Rather than a natural or «Kuznetsian» inevitability fundamental (kuznetsian) necessity, however, our subsequent analysis of the wills of the upper classes suggests a critical role played by the political economy at the time and highlights the importance of control over natural resources on inequality dynamics.

Keywords: inequality, wealth inequality, elites, Mexico and social structure

JEL code: D63, E01, I3, N36, P16

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RESUMEN

La contribución de este artículo es la reconstrucción de la distribución de la riqueza empleando una muestra de la base de datos de testamentos de *El Colegio de Sonora* para los años 1871-1910. Mostramos como el rápido proceso de industrialización que ocurrió en el norte de México entre finales del siglo XIX y principios del siglo XX llevó a un continuo incremento en la concentración de la riqueza, pasando de un valor en el índice de Gini de 0.58 en el periodo 1871-1885 a 0.80 en el periodo 1901-1910. Más que una respuesta natural de un proceso kuznetsiano, nuestros datos sugieren un rol crítico de la economía política y muestra la importancia del control sobre recursos naturales en la dinámica de la desigualdad. El artículo contribuye a la discusión actual sobre el rol de las elites políticas y económicas en la dinámica de la desigualdad y su reproducción en el tiempo.

Palabras clave: desigualdad, desigualdad de riqueza, elites, México, testamentos, estructura social, Sonora

1. INTRODUCTION

Inequality is one of the most critical problems of our time. This is not because it is a particularly new phenomenon; inequality has been present since humanity started to organise in societies. Rather, its importance lies precisely in this very persistence throughout history. Despite undergoing manifold changes in form and level, the unequal distribution of resources consistently looms large over time. To properly understand its current levels, as well as its changing dynamics over the years, we need to go back in time to examine how the forces in our societies have shaped the evolution of inequality. When looking back historically, the primary determinant of inequality in agrarian societies is wealth inequality. As Bengtsson *et al.* (2017) argue, wealth is a crucial determinant of the standard of living. This is because in agrarian or pre-industrial societies people's livelihoods hinge on the productive capacity of the household, rather than wage labour. Subsistence agriculture was the main activity for the bulk of the population in such societies. Therefore, it is wealth, rather than income, which most influences inequality trends in pre-industrial times.

To improve our understanding of contemporary inequality dynamics, in this paper we reconstruct and examine the wealth distribution in the north-western Mexican state of Sonora during the late-19th and early-20th centuries with a unique dataset we have created based on recorded wills. There are both historical and practical reasons for focusing on Sonora. The historical motivation is that, although a distant and poorly connected

region of Mexico, Sonora would play a prominent role in the modernisation of the country; along with Chihuahua and Coahuila, it was one of the northern states that would rise in rebellion and spur large revolutionary armies to fight during the Mexican Revolution, ultimately emerging victorious. Their elites aimed to transform the country's institutions and its economy, and in the process, they attempted to propagate the example of their northern states. There was a world of the extension of the agrarian frontier, of modern agriculture, mining and manufacturing. The modernisation process after the Mexican Revolution maintained the commitment of the Porfirian regime to small owners, yeoman farmers as a class that could transform the country and combined it with a new corporatism to drive modernisation, in which crony capitalism was ever prevalent.

Additionally, local developments in these rather isolated northern states preceded national changes by a couple of decades, providing a prototype of sorts. Studying Sonora is therefore akin to analysing an earlier, small-scale version of the type of modernisation the country would experience over the 20th century. Key features of this development model are extractivism, violence and collusion. Sonora is a portrait of violence against indigenous populations, particularly the Yaqui, the Mayo and the Seris, and the intermingling of political and economic interests (Voss 1982; Aguilar Camín 1996).

Besides this historical reason, we have a powerful practical motivation. The study of wealth inequality through time, with all the challenges it presents, has recently gained impetus with studies such as Piketty (2014) and Lindert and Williamson (2016). Most of these studies focus on a subset of (predominantly high-income) countries, as their comprehensive administrative records grant authors access to large datasets through which in-depth analysis is possible. Nonetheless, for countries without statistics dating from centuries ago, other proxies for wealth need to be used. Such is the case of wills and probate inventories. While fraught with limitations of their own and less straightforward to translate into our contemporary accounting habits, they provide a glimpse of the concentration of wealth at different points in time.

Following Lindert (1981), with regards to the employment of wills and probates to perform historical economic analysis, the best option is to start from the most accessible data. Collecting wills and probates is a time-intensive activity, and also an expensive one, as it is often necessary to travel around the geographical area of interest to collect them. In that sense, Sonora represented a serendipitous opportunity as *El Colegio de Sonora* had already digitalised more than 1,400 wills from 1790 to 1910. In this study, we take advantage of these available raw data and rework them significantly in order to obtain samples suitable for analysis.

Mexico was undergoing a transformative period during the last few decades of the 19th century and the first few decades of the 20th century.

What we know as modern Mexico was determined during this period or is in some way directly associated with it. This is particularly true for its social, economic and political life. Similar to Levy (2016) in her study of the southern state of Yucatán based on a set of probate records from 1850 to 1900, we find the period to be crucial in relation to the formation of both the economic and political elites during a time of explicitly aspired modernisation, as well as the definition of the most vulnerable and often forgotten populations. Our data highlight the ethnic divide expressed at its crudest form in the Yaqui war and show how inequality can worsen under conditions of «progressive» institutional change, putting particular emphasis on the role of local elites in these processes.

To this end, in the following section we describe our methods, data and analysis. Section 3 discusses the dynamics of wealth inequality in a frontier society and the particular class conflicts it entails, and section 4 presents conclusions and extensions.

2. DATA METHODS AND ANALYSIS

For this study, we rely on the quantitative and qualitative analysis of a large wills database for Sonora spanning from the late-18th to the early-20th centuries, described below, which we complement with historical accounts of the region, particularly with regards to its elites.

Given that statistical records to estimate inequality before modern reporting started in 1989 with the ENIGH, we follow the strategy pioneered by Lindert (1981) and Lindert and Williamson (1983) to convert administrative proxies such as wills and probates into comparable units for the contemporary population¹. The use of administrative data, from tax records to wills and probates has been in popular use in the study of inequality over recent decades, for example in Kicza (1982) and Chowning (1999), the ground-breaking study by Johnson and Frank (2006), and more recently Piketty (2014), Lindert and Williamson (2016) and Alvaredo *et al.* (2018).

Although the estimate procedures for wills and probates present similar challenges and advantages, legally speaking, probates and wills fulfil different purposes. This results in particular implications for the inequality patterns their analyses reveal. Probates are the result of contested inheritances, mostly due to the lack of a will at the time of death. Wills, on the other hand, are usually not contested and contain the complete estate of the deceased. This difference matters because wills are often left by those who have an estate, while probates have a higher probability of including less well-off «testators». Will datasets such as those we use

¹ ENIGH, Household income survey from the Mexican National Statistics Office, INEGI.

here can have a stronger bias towards the rich. This makes the balancing of the sample to account for the lower classes more important.

For our estimates, we employed the digitalised wills collected in their raw form by *El Colegio de Sonora* under the leadership of Ignacio Almada Bay from 1996 to 2005. The full database contains 1492 wills from 1786 to 1910. From this resource, we selected a sample including all wills from 1871 to 1910, amounting to a total of 1,134 observations. From these 1,134 observations, we extracted the variables corresponding to gender, occupation, municipality, socioeconomic status or class, year, age and the estimated value of the assets contained in each will.

This first sample suffered from several problems that required correction. First, not all assets in the wills were expressed in monetary value, often including objects listed without valuation, farm animals, cattle, houses, terrains and in some cases money or the value of the assets. The lack of information regarding prices or values forced us to seek reasonable proxies in the historiographical literature from which to impute and calculate a monetary value for each will. As this requires finding a corresponding «translatable» value for each individual item, the process was cumbersome. We employed different contemporary sources, historical statistics including for instance the federal budget for 1874, books and, for several objects, compared different wills within our database, as some contained the valuation or prices of rare objects which others did not. Where foreign currency appeared in a will, such as German marks and Austrian florins, we used the historical exchange rates from the Bank of Japan (n.d.), Bank of Sweden (Lobell 2010) and Klovland (2004) to calculate cross-exchange rates to convert them to American dollars and then from dollars to current Mexican pesos for the year of the registry. Overall, the imputed values correspond to 24.6 per cent of the working sample (122 wills).

Since the Mexican economy at the time was extremely disintegrated, prices differed from region to region. We are not aware of any price series for Sonora during the period in question, allowing us to avoid the problem of constructing a price index to transform values into real pesos. However, since the objective of this study is to showcase the evolution of the distribution of wealth, rather than contemporary living standards, and the distribution of wealth remains unaltered whether presented in nominal or real currency, for our purposes using values in real or current pesos makes no difference².

A second problem with the collected sample is that we were only able to include the monetary value of the wealth for 43 per cent of the

² It would matter if we attempted to compare the wellbeing of people intertemporally, or to show how much wealthier Sonora's society became over time. While interesting aspects in themselves, these questions are not considered here.

TABLE 1
ORIGINAL SAMPLE

Number of wills	Female	Male	Total wealth captured (current pesos)	Average wealth	Min. wealth	Max. wealth	Years	Average age
1,134	458	675	5,802,579.04	11,729	0	861,578	1871-1910	61.58

Source: Sample elaborated with data from *El Colegio de Sonora* will database.

observations. Therefore, we had to take a subsample from the original sample limited to the observations that contain a wealth value. This procedure shrank our database but left it with a number of observations comparable to Levy (2016) with 339 observations for the state of Yucatan and Frank (2004) with 669 observations for Brazil. Instead of performing a year-by-year analysis, as originally intended, we opted to group data in three clusters (1871-1885, 1886-1900 and 1901-1910) to aggregate sufficient data to construct a distribution for each period.

Another critical problem to solve with the remaining data, before we could adequately analyse it, was that, as with most wills and probates databases, the older and wealthier population are overrepresented and the young and the poor are underrepresented (see average age and wealth in Tables 1 and 2). This over-/under-representation produces unbalanced databases that can either overestimate or underestimate inequality (Lindert 1981; Lindert and Williamson 2016; Bengtsson, *et al.* 2017).

There are several strategies to solve the representation problems, some more appropriate than others, depending on the available data. One of these approaches is to employ the age reported in the observations and multiply each observation by the inverse mortality rate for that age group (Bengtsson *et al.* 2017, 2018). This procedure results in a database that gives more weight to the younger population so we can generalise from the sample analysis with more confidence. For the wills database collected by *El Colegio de Sonora* this approach is inappropriate, as several observations lack age recordings (224 wills, or 44 per cent of the working sample).

The alternative approach is to consider the known or «true» social class structure in the country and employ it as a weighting factor to balance the sample (Lindert 1981; Bengtsson *et al.* 2018). Ideally, we would have used the class structure shares for Sonora for each quinquennium, but they were not available. Therefore, we rely on the national social structure and employ it as a reasonable proxy. We obtained the shares for the upper, medium and lower classes from Iturriaga (2012), who estimated the class structure of Mexico for the year 1895, and we took the shares

TABLE 2
WORKING SAMPLE

Years	Number of wills	Female	Male	Total wealth captured (current pesos)	Average wealth	Median wealth	Coefficient of variation	Average age
Total (1871-1910)	509	207	302	5,802,579.04	11,729.07	931.05	5.18	62.46
1871-1885	106	42	64	607,935.63	5,845.53	1,265.20	2.54	60.6
1886-1900	213	81	132	2,372,758.83	11,139.71	1,157.24	5.70	60.87
1901-1910	190	84	106	2,821,884.58	14,852.02	1,171.24	4.28	59.62

Source: Sample elaborated with data from *El Colegio de Sonora* will database.

for that year as a benchmark for the state of Sonora³. These data solve half the problem; the other half requires us to reclassify the observations as either upper, medium or lower classes.

The sample we took contains a class categorisation assigned by the historians from *El Colegio de Sonora* based on the type of assets/goods contained in the wills. For some, however, the class registry was left unannotated. We decided to classify those missing observations based on their occupation and amount of wealth⁴. As shown in Table 7 below, the wills also contained very different goods for each class. Upper-class wills typically contained much property, financial assets, foreign currencies and cattle, whereas middle-class wills listed smaller houses, few financial assets, little cash and some animals, and lower classes often just featured a small house, few animals and clothing. Finally, we subtracted debts from all wills to obtain a sample that reflected the true wealth of the individuals (Johnson and Frank 2006).

Now with the full sample classified, we employed an analogue of the social tables method (Milanovic *et al.* 2011), as utilised by Castañeda and Bengtsson (2020) for the case of Mexican incomes. The result is a sample balanced by class or social structure that can be employed to derive synthetic measures of inequality, such as the Gini and Theil indexes (see also section VI, Table C in the online Appendix for further details).

For our qualitative analysis, we studied and coded all testaments in the database classified as upper-class manually, as well as a random sample of the remaining testaments, with specific attention to mentions of: types of wealth owned, inheritance patterns, kinship relations and political power held in life by the testator. We also ran a systematic check of last names for members of economic and political elites mentioned in secondary sources and crosschecked for potential family relation between namesakes to identify power clusters and networks.

3. DYNAMICS OF WEALTH INEQUALITY IN A FRONTIER SOCIETY

Mexico at the time was under the Díaz dictatorship (1877-1911), which continued and expanded the liberal policies of Juárez and Lerdo,

³ Iturriaga's class structure for 1895 is composed of 90 per cent lower class, 7.7 per cent middle class and 1.4 per cent upper class (see the online Appendix for details). As a predetermined 1895 structure for the entire 1871-1919 period could obscure potential changes, we compared the data for 1790 and 1842 presented in Pérez Toledo (2011), dating 100 years before Iturriaga's estimates, with our estimates. We found a rather similar structure: 89.4 per cent of the population in lower-class occupations in 1790, and 88.12 per cent in lower-class occupations in 1842. We thus assume that the class structure in 19th-century Mexico was rather stable. Iturriaga's estimate for 1895 thus serves as a reasonable approximation to society at the time.

⁴ As stated above, we respected classifications where present. For the observations lacking class assignment, we used the median wealth of those classified to classify the missing ones.

attempting to modernise the country. Díaz tried to create a class of yeomen farmers and encouraged national and foreign investors (from the United States and Europe) to do business in Mexico, granting preferential treatment, political protection and varying degrees of market power.

Natural conditions in the vast Sonora state, tucked between deserts, the Gulf of California and the border with the United States in northern Mexico, were always harsh. Its arid climate, unforgiving desert landscapes that cover over 90 per cent of its surface and the majestic Sierra Madre virtually cutting it off the rest of the country, have led to much of its population being concentrated around the remaining fertile lands, and pushed most cities towards the milder coastal areas. At the beginning of the 20th century, its population was sparse and concentrated in the cities of Hermosillo, Álamos, Arizpe and Guaymas. Predominately an agricultural society since long before the Mexican Revolution (starting in 1910), over the last few decades of the 19th century, Sonora was experiencing a profound transformation. It was a distant territory, poorly integrated into the Mexican national economy. As Coatsworth (1981, 1989) points out, the complex and rugged geography of Mexico, the existence of the *alcabala* tax between states (finally repealed in 1896), the lack of reliable transportation and the concerns for safety due to widespread banditry around the country prevented the nationwide integration of the economy⁵. Sonora's extensive territory of 179,355 square kilometres was extremely rich in natural resources—a situation that eventually led to the development of the mining industry, cattle production and vast agricultural lands, all profitable aspects of the vertically integrated hacienda economy.

However, the territory's wealth was not readily accessible to the small population of Sonora. There was plenty of land, but a lack of water for irrigation. The constant fighting with the indigenous population, the Yaqui and Mayo people, and the frequent incursions of the Apache, meant a permanent threat of conflict, which forced the white colonisers to employ part of their resources towards the defence of life and property.

Towards the end of the 19th century, however, these «constraints» began to diminish, often due to the use of force against the indigenous peoples (see below), leading to an incremental polarisation of wealth among the population. Mapping the inequality dynamics that emerge from our dataset of Sonora at the end of the 19th and the beginning of the 20th century, we estimate a 37 per cent increase in inequality as measured by the Gini index over four decades. This result deserves a more in-depth analysis of the trajectory of the concentration of wealth. Thus, in the following section we examine the main inequality trends at the time and lay out the political

⁵ The *alcabala* was an intra-state commerce tax dating back to the colonial period. There were several unsuccessful attempts to repeal it prior to 1896.

circumstances that drove the economic modernisation of Sonora, and the significant political economy arrangements that made the *Hacendado* class (large landowners) and financiers the main winners, and the indigenous population and peasants the principal losers.

3.1 Trend towards Increasing Inequality

Far from a constant feature of developing contexts, the wealth distributions we find are changing dynamically and highly contingent on contextual circumstances. Sonora, like the rest of Mexico at the time, was an agrarian society. Such societies are characterised by land ownership, this being the main factor that drives the dynamics of inequality (Turchin and Nefedov 2009; Bengtsson *et al.* 2017; Castañeda and Bengtsson 2020). From Table 3, we can observe the evolution of wealth inequality in Sonora from 1871 to 1910. The results show an increase over time as the region experienced a process of economic modernisation.

Inequality displays the hallmark evolution driven by Kuznetsian forces (Kuznets 1955), but with the twist of factors in the political economy shaping its trajectory. The command over natural resources, political connections and exploitation of the indigenous population drove inequality upwards.

The evolution of wealth inequality displays a trend that supports the historiographical literature of the economic development of Sonora in the late-19th and early-20th centuries. A stable and high, though not excessively so, concentration of wealth dominates during the first 15 year period, hovering at about 0.584 between 1871 and 1885. For the ensuing 1886-1900 period, however, we find a sharp increase of 22 per cent in the Gini index, from 0.584 to 0.716. This period follows the defeat of Cajeme (1885), the leader of the Yaqui rebels, and control over the water resources of the Yaqui and Mayo rivers by the *hacendados*.

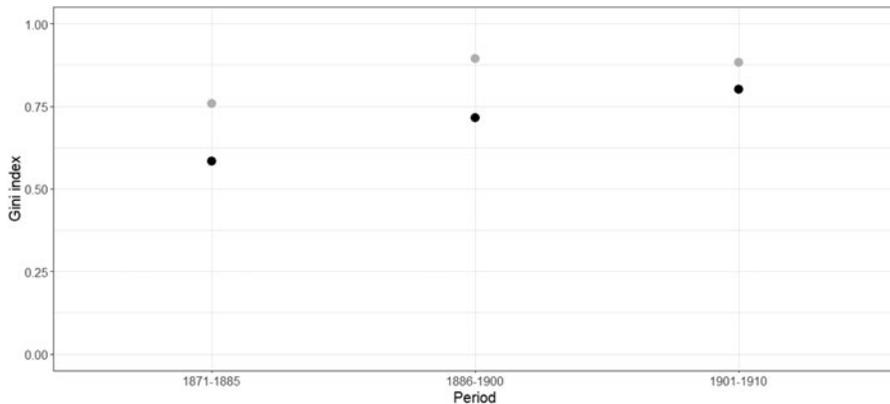
How can we explain the evolution of wealth inequality displayed in Table 3 and Figure 1? First, it is important to mention that the levels of inequality displayed should be taken as lower and upper bound estimates. As the Gini index is not particularly sensitive to changes in the extremes of the distribution, it requires extraordinarily high increases at the top to reflect the change in its number. This means that parts of the wealth polarisation go unaccounted for by this particular indicator. At the same time, the higher levels of inequality presented in the unbalanced sample overestimate the amounts held by the upper class due to its overrepresentation in testament samples. On the contrary, although the balanced sample corrects for the underrepresentation of the lower class, it still overrepresents lower class wealth, as the poorest among the poor in society did not leave wills. To illustrate the extreme division between those few owning

TABLE 3
WEALTH DISTRIBUTION, 1871-1910

Years	Gini wealth unbalanced	Theil wealth unbalanced	Gini wealth balanced	Theil wealth balanced	10/90 ratio balanced	Palma ratio (10/40)
1871-1885	0.757	1.271	0.584	1.295	362.95	21.69
1886-1900	0.895	2.556	0.716	1.959	11,471.90	119.26
1901-1910	0.882	2.107	0.801	2.448	1,380.27	158.99

Source: Calculations based on the wills database, see section 2 and the online Appendix for details.

FIGURE 1
EVOLUTION OF INEQUALITY IN SONORA 1871-1910, UNBALANCED (GREY) VS. BALANCED (BLACK) SAMPLES.



Source: Calculations based on the wills database, see online Appendix (section VI) and text.

Notes: In Figure 1, we observe the wealth inequality trend from the balanced and unbalanced samples, respectively, both taken from the original *El Colegio de Sonora* database. For reasons of representativeness explained above, we favour the balanced estimate for our analysis. However, the fact that the unweighted estimate displays the same pattern as our balanced sample, although at higher levels of inequality, is a strong indication that even if the exact point estimates contain a significant margin of error, the trend is correct. As mentioned in section 2, the over- or underestimation of inequality is a common issue of wills databases and probate inventories (adjustments are necessary, if different, for other sources, such as tax records or household survey).

significant wealth and the many left virtually assetless more clearly, Table 4 includes the shares of wealth held by each decile over the period considered.

Despite these caveats, it is immediately obvious that the upper classes hold disproportionate amounts of overall wealth, while the lower deciles

TABLE 4
DECILES OF WEALTH BY PERIOD (UNBALANCED SAMPLE)

1871-1885	Share of wealth (%)	1886-1900	Share of wealth (%)	1901-1910	Share of wealth (%)
I	0.171	I	0.007	I	0.064
II	0.509	II	0.107	II	0.095
III	0.899	III	0.201	III	0.135
IV	1.286	IV	0.402	IV	0.252
V	2.269	V	0.569	V	0.669
VI	3.715	VI	0.977	VI	1.010
VII	3.072	VII	2.076	VII	1.990
VIII	9.333	VIII	3.206	VIII	3.924
IX	16.595	IX	6.832	IX	8.541
X	62.150	X	85.622	X	83.321

Source: See text.

are left with virtually nothing. Understanding thus our estimates as upper and lower bounds, which factors gave them that shape? As documented by Aguilar Camín (1996) and Voss (1982), the upper class of Sonoran society consolidated large estates at the beginning of our period of analysis comprising 1871-1910. Some of their fortunes were amassed through the outright stealing of the lands of the indigenous population over previous decades and the policy of land reclamation that was encouraged by both the Díaz federal government and the local authorities, in which large extensions of land could be bought at low prices⁶.

Their political connections enabled the economic elites to thrive in the country (Haber 1989, 2002; Knight 1999; Kuntz 2002), and they begin to invest heavily in a diverse set of industries, ranging from railroads and mining to banking and agricultural production (Wasserman 2015). However, the case of Sonora presented a significant difference compared with the general industrialisation process that was taking place in the rest of the country under the Porfirian regime. Sonora was an environmentally harsh region, and the colonisers and their economic elites faced strong opposition from the Yaqui and Mayo people in their attempts to appropriate its resources. A long and (particularly for the indigenous

⁶ Aguilar Camín (1996) mentions prices as low as 1 peso per hectare.

peoples) costly war, the Yaqui War, had to be fought to fully unleash the forces of industry and modernisation of the state.

In 1885, the political elites both at federal and local levels started waging their brutal war against the Yaqui resistance under their leader Cajeme⁷. Upon defeating him and arranging a peace accord with his successor, the large landowners of Sonora secured the command of the Yaqui and Mayo rivers. With the waters of the rivers under their control, the value of their lands and levels of productivity soared (Aguilar Camín 1996). Although the war against the indigenous population continued in the form of Yaqui guerrilla warfare and frequent insurrections over the next few decades, the face of Sonora had changed. The new economic activities fostered rapid urbanisation, and an economic boom ensued.

The distributional changes caused by these developments are reflected in our empirical data, neatly tracing inequality dynamics. As such, starting out with a wealth Gini of 0.584 in the first period, we observe a clear break in the trend from the moderately high but somewhat stable wealth inequality prevailing during the first two decades of the period⁸. In the 1886-1900 and 1901-1910 periods, inequality spikes to reach 0.801, representing a 37 per cent increase over the four decades.

This pattern is consistent with the general historiography. Sonora at the time was yet to experience its economic boom. It was still very disconnected from the rest of Mexico and the economies of California and Arizona in the United States, as the first railroad line was finished in 1881 and only connected the cities of Guaymas and Hermosillo in Sonora (it reached Nogales in 1882). It would not be until the 1890s and 1900s that the railroad was significantly extended to connect Sonora's main cities to both the rest of Mexico and the United States.

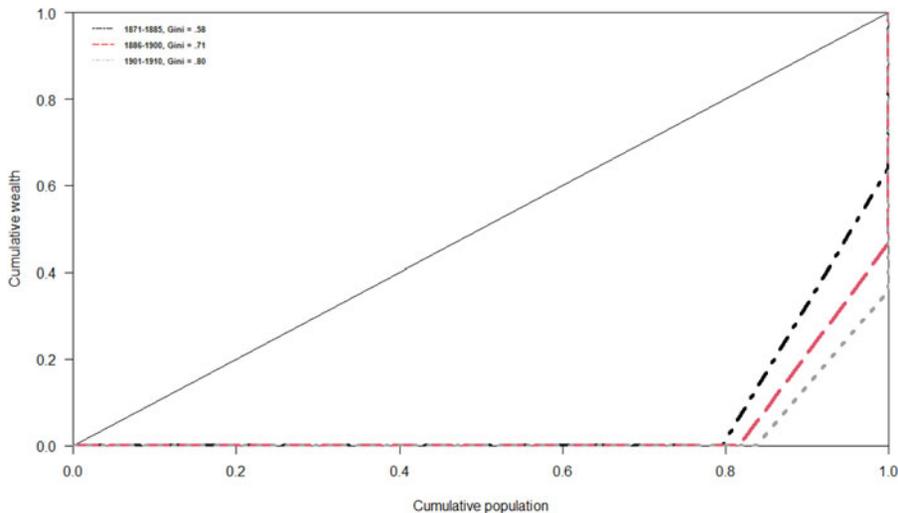
Therefore, the combination of a lack of connectivity, the arid land and the lack of control over water resources to increase land productivity prevented an even higher accumulation of wealth. Unproductive land is of lower value, and without connectivity it is harder to trade, to move the raw materials for industrial endeavours, or to transport the extraction from mines. Without these preconditions, Sonora was not that attractive to foreign investment, and was constrained by the lack of availability of capital for investment.

In Figure 2, containing the Lorenz curves for all three periods, we can discern this development more clearly. The spike in inequality registered

⁷ For a detailed discussion of the relationship between the Yaqui and competing religious, political and economic elite factions, see Hu-DeHart (2016).

⁸ As explained in the previous subsection, due to the data constraints we do not claim that these estimates are accurate point values, but we are confident that they display the most likely trend of the evolution of inequality during the 1871-1910 period. For robustness checks, see the online Appendix.

FIGURE 2
LORENZ CURVES 1871-1885 VS. 1886-1900 VS. 1901-1910 (BALANCED SAMPLE).



Source: See text.

between 1871 and 1885 and the following two periods appears to be driven by an improvement in the levels of wealth of the middle and upper classes, and it displays a first-order Lorenz dominance that signals an unequivocally more unequal distribution compared to 1871-1885. Overall, the picture from these three periods strongly indicates an unequal but relatively stable concentration of wealth at the top.

It is during the second period that we observe a rapid rise in the level of wealth inequality. Again, this trend is entirely consistent with the historiographical literature of Sonora's economic transformation. As we argue in this sub-section, the defeat of the Yaqui leader Cajeme in 1885 allowed the *Hacendado* elite to control the Mayo river and with that, the floodgates of investment in irrigation were opened. Natural resources play a prominent role in the evolution of inequality, as they enable rents to be extracted, and productivity in key sectors such as mining and agriculture to increase. To these ends, in the desert terrains of Sonora, control over water is as important as control over land.

As cities and towns began to grow and spawn, we observe the classical pull-factors that drive urbanisation to gain momentum; as Krugman (1991) argues, the centripetal forces of commerce and industry attract people and require connectivity to move raw materials and goods. Only once railroads had finally connected the Sonoran cities scattered across the

desert to the United States and other places around Mexico, did the real economic boom ensue. This boom, driven by colossal investment in local industries, took the capital gains of the economic elites, both local and foreign, to the heights described by Voss (1982) and Aguilar Camín (1996).

This process resulted in the pattern observed in the second and third Lorenz curves from Figure 2. Wealth inequality shoots up to a staggering 0.71 Gini index value in 1886-1900, to then jump again to 0.80 in 1901-1910. As we explain in the next section, the political and economic elites over this period strongly favour local oligarchs and enable «second-tier» entrepreneurs to profit from the economic boom they engineered.

3.2. Winners and Losers of Economic Modernisation

Starting in the 1880s and attracted by the promise of abundant resources to be readily exploited and appropriated, Sonora saw an influx of settlers predominately from the United States, Germany, Britain and other industrialised countries. Haber (1989), Wasserman (2015) and Castañeda and Bengtsson (2020) examine the role played in the country by American investors and the so-called *barcelonetes* (European investors encouraged to come to Mexico by the Díaz government⁹). These were mainly businessmen looking to make their fortunes with investments in mines and large-scale *Hacendado* agriculture.

Sonora's very low population density was paired with high land abundance. This constellation led to a (land) rent-wage ratio favourable to workers, an observation also made by Arroyo Abad (2013). As Katz (1974) argues, *hacendados* faced a shortage of workers in their fields, and in order to compete for them with the mining industry, they needed to offer higher wages. Historical accounts reveal that the average minimum wage for the North Pacific region amounted to 0.43 pesos in 1900, but according to Aguilar Camín (1996), in Sonora American investors paid between 2 and 6 pesos. Using the minimum wages for the North Pacific region reported in *Estadísticas Históricas de México*, we can observe a similar pattern, with the minimum wages increasing by 53 per cent between 1877 and 1911¹⁰.

⁹ The term *Barcelonetes* is sometimes used to describe rich French migrants invited by the Díaz government; however, here we employ it in its more general sense of referring to all migrant European businessmen.

¹⁰ It is important to point out that although the income and wealth distributions can mimic each other, this is not always the case. Wealth tends to be more concentrated as it is derived from assets and capital, whereas income is traditionally more connected to work. Therefore, even if workers make income gains, wealth inequality can grow.

This high-wage economy relative to the rest of the country allowed the lower classes to save a little more and accumulate some resources, which could explain why inequality did not surge that drastically initially. Everybody seemed to gain from these emerging economic circumstances. Our will sample from the *El Colegio de Sonora* database classifies about 15 per cent of all wills as pertaining to the lower classes¹¹. Considering that members of the lower classes do not generally tend to leave wills, and wills and probate inventories tend to overrepresent the rich (Lindert 1981; Bengtsson *et al.* 2017), the actual size of the lower-class population is arguably much larger, 90 per cent according to Iturriaga (2012). What this indicates, however, is that a segment of the lower classes was actually able to accumulate some wealth, too. The higher wages combined with a less dynamic economy could, then, explain why inequality is less severe from 1871 to 1885.

Notwithstanding, this begs the question of why the same labour scarcity and the higher wage–rent ratio do not continue having the same effect from 1886 through 1910. A number of factors seem to have coincided to change this dynamic from the 1890s onwards. One possible explanation is that after the defeat of Cajame and the draconian persecution of the Yaqui and Mayo people, the *Hacendado* class and other landed classes lost the backbone of their labour force (Aguilar Camín 1996). Between 1830 and 1860, the indigenous population was the target of powerful campaigns to incorporate them into the labour force due to the population scarcity, often barely stopping short of slavery (Tinker Salas 1997). After the federal government persecution of the rebellious Yaqui and their expulsion and eventual mass deportations to the south to be exploited in the henequen plantations of Yucatán in the decades leading up to the 1910 Revolution (Turner 1911; Hu-DeHart 1974), the landed elites in Sonora decided to hide indigenous workers so they could keep them working. Since both the Yaqui and the Mayo were persecuted groups, they did not have any leverage and could be more easily exploited.

A second possible explanation for the substantial increase in wealth inequality could be related to the vast amounts of money being invested by the community of by now established foreigners with ever-increasing political influence and economic weight. According to Acemoglu *et al.* (2001), such settler economies would either result in colonial institutions modelled on home country examples (if foreign settlers were to physically remain in the «new» lands) or foster extractivist foreign elites uninterested in local circumstances beyond the fulfilment of their wealth expansion

¹¹ As explained above, we correct for the overrepresentation of the upper classes, as detailed in the online Appendix. However, finding a relatively large share of lower-class wills before adjustments to the sample signals that even among the lower classes there were important differences in wealth.

TABLE 5
MAIZE, WHEAT AND CHICKPEA PRODUCTION AND MERCHANDISE
TRANSPORTED BY TRAIN, 1894-1907

Year	Maize (hl)	Wheat (kg)	Chickpea (hl)	Merchandise (tonnes)
1883	–	–		24,202
1894	262,398	539,407	11,942	66,834.50 ¹
1907	356,680	13,328,650	48,607	331,452
Growth (%)	35.93	2,370.98	307.03	1,269.52

Source: Statistical yearbooks of Mexico, 1894-1907.

¹Average amounts transported in 1893 and 1895.

objective. We do not observe this dichotomy. Instead, we find a significant wealthy migrant community not only adjusting to local institutions and circumstances, but actively forming alliances with the local elites, thriving alongside these in both economic and political terms. Our wills database shows a significant number of foreigners who made their lives in Sonora and profited hugely from commerce, mines, railroads and cattle production (we provide a more detailed portrait of the economic elites at the time in the following section). As the owners of larger tracts of land, together with the local elites, they raked in huge profits from the economic boom in Sonora, reflected by the dramatic increase in agricultural production around the turn of the century, as seen in Table 5.

While benefiting the producers of these crops and merchandise, price hikes simultaneously meant higher living costs for the rest of the population, which saw the cost of their staples increase dramatically thanks to continuous speculation over basic goods, particularly wheat, by the region's elites. This behaviour led to repeated wheat shortages when merchants fought among themselves for control over rents, employing relentless tactics to inflate prices and monopolise production (Tinker Salas 1997). The costs of their speculative manoeuvres were to be borne not only by their competition, but mainly by the poorer population.

Companies such as the Richardson Construction Co., a U.S.-American enterprise which owned 176,000 hectares of land near the Yaqui river (Aguilar Camín 1996), serve as examples of the disparate compensation, not only with regards to the difference between owners and workers of these production sites but also, significantly, between workers of Mexican and foreign origin. U.S.-American owners were among the main beneficiaries of the unfolding economic panorama thanks to their ownership of both the train concessions and the agriculturally essential

irrigation systems, with preferential access to the river. Yet, their workers did not fare as well. A lack of access not only to capital, but also to water, land and transportation hampered potential efforts to set up their own business endeavours, and simultaneously kept them dependent on their own labour to make a living. Moreover, data on wages reported by Romero Gil (2001) show that in Sonora U.S.-American workers in the Cananea copper mine, owned by the foreign consortium of the Cananea Consolidated Copper Company, earned wages more than twice those of Mexican workers¹².

The resulting patterns of strong gains for the economic elites and stagnation or even losses for the rest of the population are confirmed by the trends of income inequality in the country during the same period. Mapping the winners and losers of the economic developments of that time period, Castañeda and Bengtsson (2020) report strong income gains for the *Hacendado* class, the financiers and the top government bureaucracy, smaller gains for most of the other groups and losses for low-income groups such as domestic workers, as displayed in Figure 3.

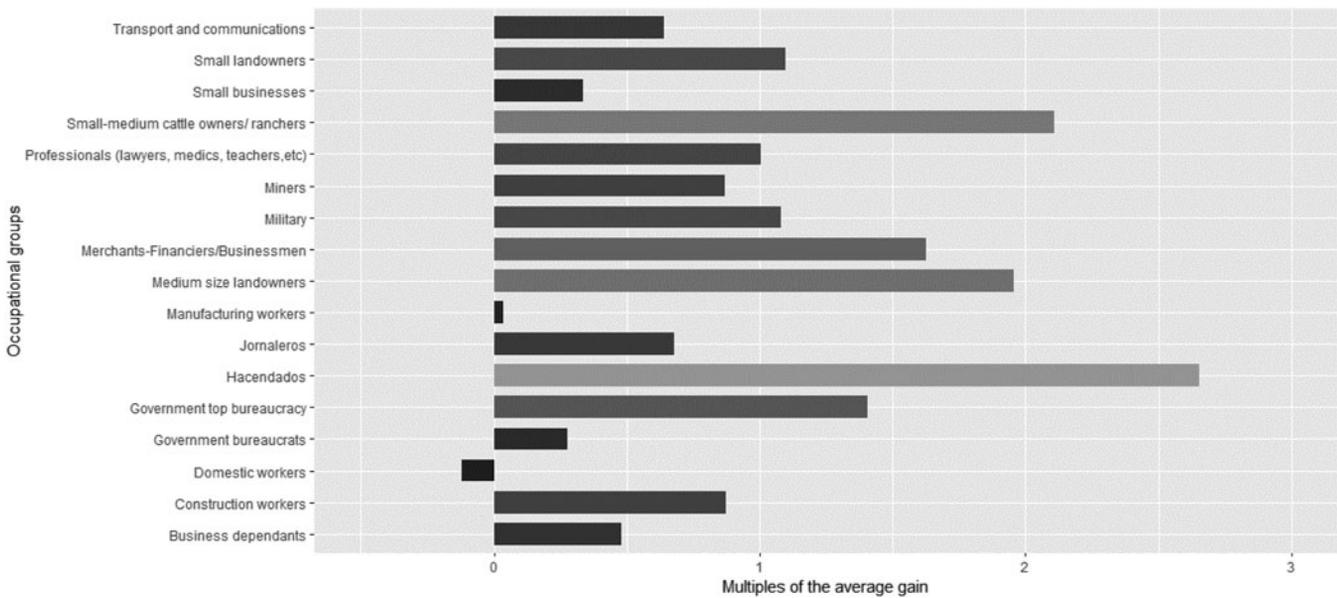
One consequence of this process of industrialisation was the pulling away of an emerging middle-income group from those at the bottom. While clearly the largest wealth gap remained between the rich owners of capital and land compared with the rest, the main change in distributional dynamics over the period considered concerns the increasing difference between businessmen and those workers with some resources and likely regular incomes, compared with peasants, miners, domestic servants and other low-income groups that could not rely on savings in times of crises. Table 6 depicts the increase in the wealth ratio between the upper, middle and lower classes based on our wills database.

These insights, triangulated with information in Tables 2 and 4 about the increase of both total wealth and its share among the upper classes, reflect the overall changes in the distribution of economic power. The lower classes see their ability to accumulate wealth decrease at a moment when, nonetheless, their wage labour increased as a share of total income (with minimum wages increasing by 53 per cent). While the latter suggests that workers' pre-industrial entitlements now underrepresent their economic standing, in an increasingly industrialised-capitalist economy income inequality also starts to matter more and these dualist dynamics result in a deepening of economic inequality.

A third possible factor working in conjunction with the previous two consists of the increased profitability of land holdings for the local economic elites. Their political connections and capacity to mobilise military

¹² Nonetheless, wages for Mexican workers were still significantly higher than those in the rest of the country, thus attracting labour from other states in search of higher incomes.

FIGURE 3
WINNERS AND LOSERS IN MEXICO, 1895-1910.



Source: Elaborated with data from Castañeda and Bengtsson (2020).

TABLE 6
WEALTH RATIOS AMONG SOCIAL CLASSES

Class ratio	1871-1885	1886-1900	1901-1910
Upper to lower	72.64	153.80	272.11
Upper to middle	8.99	15.53	21.36
Middle to lower	8.07	9.90	12.73

Source: See text.

force helped expand the cities and towns of Sonora and connect them to the southwest American economy. A common historical factor for growing inequality in the Latin American context is the expansion of the agrarian frontier. It explains the high levels of inequality during the 19th century in countries such as Chile after the War of the Pacific (Rodríguez Weber 2016), Argentina and Uruguay (Bértola *et al.* 2009). The expansion of the agrarian frontier as a mechanism for growing inequality highlights the impact of an oligarchic modernisation project.

Perhaps, the best example of this mechanism is the governor of Sonora from 1887 to 1891 and also between 1895 and 1899, and eventual vice-president of Mexico, Ramón Corral¹³. He presided over the conquest of the Yaqui and Mayo people, the grand irrigation projects to extend land use and productivity, the attraction of foreign capitalists and he was able to pass some of his political power on to his associates. He became a financial adviser to American investors and was able to earn more than 600,000 pesos per year (Aguilar Camín 1996). To put this in context, 600,000 pesos in 1897 is 2,000 times the median wealth of the lower classes in our database during the 1896-1900 quinquennium; 200 times the median of the middle-class wealth and twenty-two times the median of the upper-class wealth.

3.3. Mechanisms of Wealth Preservation among the Elites

Similar to the disequalising impacts of the henequen boom in Yucatán reported by Levy (2016), which occurred roughly at the same time, modernisation in Sonora thus also resulted in higher inequality for the local population. An economic and political elite was able to «monopolise» its benefits by controlling not only means of production, but also its inputs (such as water), and leaving the rest of the population to run dry. It is

¹³ After his two periods as governor of Sonora, Corral became vice president of Mexico in 1904, a position that further enabled him to pursue profitable businesses, like other members of the elite such as his fellow cabinet member, Enrique C. Creel.

TABLE 7
TYPICAL INHERITANCE CONTENT AMONG SOCIAL CLASSES

Class	Type of goods in wills
Upper	Several houses (3-5), one or more ranches, agricultural lands, rights over the use of water (irrigation channels), several heads of cattle (40-100+), several horses, business stock, life insurance both in pesos and U.S. dollars, cash (500-1,000+ pesos)
Middle	A house, some cash (100-500 pesos), property rights over plots of land, small agricultural lands, some heads of cattle (10-30), household items, ongoing agricultural produce, fractions of land or houses
Lower	Few heads of cattle (1-12), a house, small plot of land, 1-2 horses, clothes, some furniture

Source: Elaborated from a random sample from *El Colegio de Sonora* wills database.

important to stress that this result is not based on a natural law or necessity, but on the specific policy decisions made at the time, as well as the disproportionate power accumulated by a small wealthy elite and their deliberate practices. This group's grip over society extended far beyond owning most of the wealth, with its related perks, to the virtual control of political institutions, economic development and, by extension, the life chances of the remainder of the population.

The entanglement of economic and political power was pursued through both conscious status-increasing strategies and favourable external developments. Expectedly, it led to the consolidation of a small wealthy elite including the main *hacendados*, but also an upwardly mobile emerging bureaucratic segment deriving its economic wealth from political capital, and some financiers taking advantage of their positions as brokers for international trade. Such is the case of will owner no. 881 in 1887, for instance. Having served as chief of police in Hermosillo in 1865 during the French invasion, he recalls bookkeeping favours he granted to his «dear old friend Juan Camou»¹⁴ (of the influential and wealthy Camou brothers) among other businessmen. Although he claims a sense of responsibility for the country motivated him to do so, we might speculate that these favours were repaid in kind. The crony capitalism of Corral and his successors enabled the local oligarchs to thrive and profit as agricultural production, mining and the railroads became more important. Eventually, only sixty-four people among the richest families, related to each other and to the governors of the state, dominated the Congress of

¹⁴ All translations from the wills database are our own.

Sonora from 1879 to 1911 (Aguilar Camín 1996; Almada Bay and Medina Bustos 2017, pp. 216-217).

Moreover, this interconnected oligarchy also thrived thanks to particular cultural patterns of elite reproduction, enabled by a context of friendly relations between the political and economic sectors, few social obligations, little oversight by the state, a favourable regulatory environment and inheritance practices that encouraged the creation of wealth dynasties. Beyond helping us understand the inequality dynamics of the time, our wills database gives unique insights into the mechanisms of status reproduction among the region's dominant groups.

In Sonora, as in other parts of the country since colonial times, notaries operated as a *de facto* cadastral system, recording all transactions affecting ownership of land. They also provided the only reliable records of property ownership until the emergence of public property registries in the late-19th century (Levy 2016). From examining the contents of the wills, we are able to reach some conclusions about social customs and cultural traditions among wealthy groups at the time.

Comparing what wealthy individuals list for their inheritance shows that not only is there a difference in the sheer quantity of assets owned, but the types of resources vary significantly, especially between the upper and lower classes. As shown in Table 7, while those poorer people who do leave wills typically own a small plot of land for subsistence agriculture, a small house, possibly with a cow and may be a horse, upper-class individuals leave elaborate testaments of many pages describing the numerous houses, ranches, lands, herds of marked cattle (their personal brand) as well as financial assets, and increasingly large life insurance and often substantial amounts of cash. In general, their endowments contain both a larger amount and a broader variety of items including, in some cases, exotic goods such as «pearls made in Europe» worth 13,500 pesos, «instruments and books» for 8,000 pesos (compared with a house on main street bought for 500 pesos) and the monetised value of children's education in Europe, as in the case of will no. 972 from 1873, as well as watches, gold and jewellery. In some cases, the ranches come with the service personnel «belonging to it» («*servidumbre*») included, as in the case of will no. 969 in 1873.

Likewise, wealthy testators often report owning a wooden or metal chest to keep all their property titles and other important documents, indicating their concern with financial planning and proprietary matters through the preventive elaboration of wills and other legal procedures (in the case of will no. 1078 from 1883, «the property title in question is hidden between my papers in a metal can, which is kept inside a larger wooden box»), whereas wills of poorer individuals often describe the widow or offspring of a deceased person, reporting belongings to the notary, who writes them down only at that moment.

The social stratification system of pre-revolutionary Mexico was based on a racialised class structure with somewhat blurred boundaries based on cultural and racial-somatic characteristics (Nutini 1995). Sonoran elites at the time were either foreign-born and recent migrants, or non-indigenous Mexicans. The only entry in our entire database featuring a person with an identifiably Yaqui surname corresponds to a labourer from Álamos described as «poor» by the record¹⁵. Although they had been the legitimate owners of their lands prior to the arrival of Spanish missionaries, the indigenous populations of the region had been impoverished by the massive land grabbing during the period of modernisation described.

On the flipside, these circumstances led to increasing wealth concentration. Depending on the year, over the time period considered, between four and twenty individuals (less than 20 per cent of our wills) control up to 93 per cent of all the wealth recorded in the database. Inheritance practices among this upper class reveal strategies of intergenerational wealth protection, such as the setting up of perpetual incomes for family members (for instance, will no. 877 from 1894 grants lifelong annuities of «\$500 in American gold» to his three siblings) and trusts. Likewise, the incorporation of clauses as to when grandchildren inheriting some wealth will be able to access their funds, and sometimes even what they are allowed to use them for, or the prohibition to sell certain assets, aims to insure the durability of the estate. For instance, several declare that should their spouses (usually widows) remarry, they will lose the right to their heritage (see also Couturier 1985), or, as in the case of will no. 1331 from 1901, which instructs for a grandson to be allowed to recover expenses for his education upon turning 20.

For dynastic preservation, the question of who should inherit wealth and how much is of critical importance. Although not all wealthy families at the time had as many children as will holder no. 1051 from 1879, who, between two marriages and extramarital offspring reached a total of twenty-three children, it was common for nuclear families to be significantly larger than the contemporary 3.7-person household size (INEGI 2015). At the time, the family was «the basic social unit on which the entire structure rested» (Arrom 1985). Notwithstanding, dividing overall wealth among a large number of household members could risk diluting wealth concentration. Therefore, there is a clear hierarchy among heirs, which is indicated not only by the order of appearance in the will but also the absolute amount and fraction of total inheritance bestowed upon each person.

¹⁵ We are unable to exclude the possibility of additional testators with origins among indigenous peoples, as they could have «hispanicised» their names (a practice observed for instance among Mayan people in Yucatán), and their backgrounds are not always referenced in the wills.

How did this hierarchy come about? Legally, in colonial New Spain the position of the propertied, particularly women, in the inheritance process was marked by the institutions of dowry (advance payment of a woman's inheritance to the couple upon marriage)¹⁶ and strict partible inheritance (all legitimate offspring inherit equally) (Couturier 1985)¹⁷. However, upon independence from the Spanish crown, institutions such as the dowry became optional in Mexican law and petered out in the 19th century, with only a few exceptions among very wealthy families, and testamentary freedom was introduced in 1884. While not intrinsically disequalising, this led to a system based on the goodwill of husbands, who could improve the position of wives by granting them larger shares of the estate (as we observe in some of our testaments) or worsen it by prioritising other heirs¹⁸.

The timespan covered by our data falls into a period of change with regards to gender dynamics among the elites, and consequently overall distributional outcomes¹⁹. Although the majority of wills belong to men, and the rich women included in the sample are mainly widows relying on their inheritance (compare also Metcalf 1990 for the case of Brazil), significant capital is brought into marriages by women, either in the form of dowry or prior inheritance and in rare cases through business income—sometimes even outstepping the initial capital endowment of the will owner; this is the case of will no. 890 in 1878, where the owner's wife contributes double his original capital. The end of a system governed by *legítimas* (the four-fifths of an estate reserved for legal heirs) and *mejoras* (the remaining fifth to be decided freely), combined with the disappearance of the dowry, reduced the economic protection particularly of daughters (Arrom 1985). At the same time, it decreased wives' bargaining power within marriage and—coupled with male privilege to land inheritance, position as household head and legal right to administration of the couple's property—increased women's overall vulnerability

¹⁶ The *carta dotal* described the property from the bride's family wealth brought into the marriage contract, sometimes supplemented by a contribution from the husband called *arras*, up to 10 per cent of his goods, and which he was obliged to return in value in his will (Couturier 1985).

¹⁷ On the gap between formal and real equality with regards to women's rights and access to property, particularly land, in the process of adapting egalitarian regulatory norms into local practice (such as virilocal residence patterns and cultured gender expectations), see Deere and León (2002).

¹⁸ The default republican marital regime of *gananciales* (partial community property), where upon dissolution of the union each spouse retained their individual property plus half of the common wealth, was complemented in 1870 by an option of separation of property (Deere and León 2005). The establishment of testamentary freedom in 1884 broke with legal codes of forced inheritance following kinship relations up to fourth degree (spouses were included with parents in the second order of inheritance following legitimate children).

¹⁹ For a more detailed discussion of women and means in Latin America, see Deere and León (2002, 2005), Dore (2000), Kuznesof (1989) and Arrom (1985).

(Nazzari 1991; Deere and León 2005)²⁰. It did not harm wealth concentration prospects.

Despite these changes (and a certain flexibility in the application of legal regulations), the actual inheritance patterns we observe mostly uphold similar proportions, whether due to lagging cultural adjustments or emerging concerns over family prosperity. Consequently, we do not observe practices of primogeniture where the bulk of the inheritance is left to the first-born son, but instead find a broader distribution among the next-of-kin, which helps create a solid foundation for future generations' wealth creation. In descending order of frequency and size of share, belongings tend to be left to: the wife; the children in equal parts; disproportional amounts to unmarried children, particularly daughters; to nephews and foster children; grandchildren (particularly if their parents had passed away); to siblings and to parents. This means that there is an intergenerational transfer of wealth, keeping it «in the family».

The endogamy of the upper classes can also be observed when considering the origins of their wealth: many rely on significant endowments from their parents and/or in-laws, either directly or through their spouses' inheritance. Moreover, strategic alliances to increase wealth can be observed not only via inheritance or business relations with friends, but importantly in terms of the assortative marriage patterns documented. Marriage patterns are an important factor in the consolidation of inequality in two somewhat opposing trends. On the one hand, assortative mating can diminish intrahousehold inequality (usually not included in inequality accounts based on household incomes or wealth), an important dimension with regards to gender inequality. On the other hand, it contributes significantly to overall inequality, as the union of two individuals who both bring wealth into the union and taking into account the household multiplier effect, disproportionately improves this household's situation over others.

Throughout colonial times, marriage was one of the key institutions both to strengthen relationships and networks between families and to facilitate control over property across generations, especially among the elite (Bird 2013). Combining their respective funds allows for spectacular growth of the estate. As will owner no. 972 in 1873 declares, «after celebrating our marriage, with the capital each one of us introduced into the union, and which together amounts to 69,600 pesos we have started businesses such as our commercial activity, transportation firm, horsecart companies, investment in and promotion of cattle, horse and mule breeding on our multiple ranches etcetera. [...] These businesses have provided us with a bit of profit that has enabled us to acquire a couple of urban fincas and real estate

²⁰ Only in 1917 did women gain legal control over their own property (Deere and León 2005).

in the bay area, as our respective property titles certify, as well as furniture, personal belongings and whatever else exists on our realty».

Such understatement of wealth owned is not uncommon: will no. 1153 from 1903 prepares his heirs for modest shares «considering the scarcity of my resources», and no. 546 in 1876 speaks of «the few cattle I own» (which amount to more than forty oxen yokes, plus horses and «eight carts in good conditions with ten mules each, as well as 15 or 20 spare mules»). Although this false modesty contrasts with the ostentatious listing of his livestock, it might reflect contemporary cultural values of expressed frugality. On the other hand, the general difficulty of accurately locating oneself in terms of income distribution is well documented in the literature on subjective inequality (Kuziemko *et al.* 2015; Dawtry *et al.* 2015). Among elites it is not uncommon to believe they rank lower in relation to wealth distribution than they actually do (Hecht 2017; Krozer 2020). In this sense, these statements might also reflect a perception of «relative affluence» (Krozer 2018) among elites that compare their own «modest» wealth with much richer peers, without much consideration for the living conditions of the poor. In hindsight, we cannot unambiguously define whether such self-deprecating comments are genuine self-perceptions or cynical practices that serve the purpose of avoiding too much scrutiny into their affairs. Either way, as we mostly find this phrasing among the very wealthiest, it also serves to divert attention from their exceptional privilege compared with their employees, as well as the general population.

However, a certain amount of philanthropic activity can be observed as well, where donors wish to give to: the poor; churches and other semi-public institutions; graveyard monuments or friends. As such, no. 1342 in 1906 declares that 10 per cent of his wealth shall be given to the «proletarian class», additional to the 5,000 pesos he gifts towards the reconstruction of the church of Sahuaripa, 1,000 pesos to the city's poor, and another 1,000 pesos to the poor of Mulatos (whereas his billiard table went to his nephew). On some rare occasions, wealthy donors consider their staff, as for instance will no. 200 from 1886: «I declare that once all the above conditions [with regard to his inheritance] are fulfilled, it is my wish that our old and faithful servant Mrs. P.U. shall receive 200 pesos, and that 400 pesos shall be distributed with prudence among the poor of this city».

These philanthropic acts are not always altruistic. On several occasions they seem to serve to uphold paternalistic relations of patronage between the rich and the poor. For instance, testator no. 890 from 1878 wishes that «100 pesos shall be distributed among the poor that in solemnity come to mourn at my funeral» and no. 475 in 1871 orders for parts of his endowments to be spent on religious paraphernalia to the wellbeing of his' and his dear wife's soul. Nonetheless, he also designates the leftovers

of his assets (after distribution among his heirs) to become «handouts to those poor that really deserve it». Will no. 538 from 1890 specifies that 200 pesos of his riches should be given to the nurse taking care of him in the hospital, and the rest divided between the hospital and its owners (likewise, no. 1122 and no. 1130 from 1898 and no. 877 from 1894, among others, dedicate parts or the entirety of their wealth to the hospitals of their respective cities). Despite their sometimes minimal consideration, these philanthropic deeds show that rich people at the time were certainly aware of the vast inequality and dearth of public services provision surrounding them, and at least at times felt obliged to address this situation for ethical reasons, considerations of justice or calming of consciousness and personal protection even after death.

Taken together, these cultural traits of Sonoran elites helped perpetuate their situation in times of increasing polarisation and wealth concentration by fostering strategic wealth alliances with spouses, other family members and political or business friends; by investing in vast portfolios of transferable capital in the form of means and inputs of production in a context of rapid modernisation (as well as education of their children); and by displaying a minimum of philanthropy to soothe class differences and promote social cohesion, as in the cases of giving to public health, or religious institutions, where their function can be seen as a substitute for absent public services.

4. CONCLUSIONS AND EXTENSIONS

This paper contributes to the historiography of the evolution of historical inequality in Mexico by introducing new estimates of wealth inequality for the period 1871-1910. It combines quantitative and qualitative approaches to the study of the political economy of inequality. It explores an important period in the economic and political history of Mexico that foreshadows the changes that were to come at the national level. The combination of macroeconomic and individual wealth-enhancing mechanisms produced the very high levels of wealth concentration that we observe, and the pattern from less severe inequality to extreme inequality. The result is an increase in inequality due to the modernisation process that Kuznets (1955) expected, yet with a twist of Gerschenkron (1952) influence, as cronyism enabled huge amounts of capital to accumulate quickly, the promotion of rapid modernisation and the concentration of wealth at the top.

To some degree, the beginning of the modernisation of the Sonoran economy reflects the changes that the rest of Mexico was either experiencing or about to see as well. The expansion of the agrarian frontier at the expense of local communities, large infrastructure projects, the increased technological upgrading of the agricultural sector and the

coalescence of political and economic interests with higher wages and opportunities for a segment of the working population, foreshadow the corporatist arrangement that would tend to dominate the whole country after the end of the Mexican Revolution. These results speak directly to Coatsworth's (2008) argument in relation to the export-led economy and the role of railroads and access to land as drivers in rising inequality. The wealth Gini coefficients reported in this paper are in the same range as those estimated by Johnson and Frank (2006) for Rio de Janeiro and Buenos Aires or by Jones (1980) for Massachusetts. Although based on entirely different methods and data, our results of rising inequality during the Porfiriato are also in line with those of Bleyat *et al.* (2020).

In recent additions to the literature of inequality in Latin America, Arroyo Abad (2013) and Arroyo Abad and Astorga Junquera (2017) argue that in the case of Mexico the expansion of the agrarian frontier reduced inequality. Our results point in the opposite direction. The expansion of the agrarian frontier increased inequality due to the violent land grabbing and expropriation of natural resources from the indigenous population that accompanied it. The resulting concentration of land and, importantly, the control of the rivers in Sonora allowed large landowners to increase the yields of their properties and therefore to accumulate more wealth.

One reason behind this divergence between the results presented by Arroyo Abad and Astorga Junquera and ours might be due to the data used. Arroyo Abad and Astorga Junquera's data come mainly from central Mexico, ignoring the northern and southern dynamics. Scrutinising other regions reveals different dynamics, as we show for the case of Sonora. Evidently, generalising from a region to the whole country might bias results in a highly heterogeneous country. Therefore, a step forward for the literature on the Mexican case would consist of a more in-depth analysis of the wealth and income distributions throughout its different regions.

The Sonoran economy of the late-19th and early-20th centuries was dominated by an oligarchy, a trend that is present in almost all Mexican states to these days. Ernest Labrousse, in his theory of revolutions, said that one should not judge a revolution by what it changes, but by what it leaves the same. Post-revolution Sonora continued to be ruled and the economy driven by a few names, much like in the times of Corral.

Access to additional data, such as probates and wills, business payrolls, accounting books and so forth, could certainly improve the estimates presented here, and, where available, advance research of historical inequality for other Mexican states as well. Such sources would allow us to gain further insights into the origins of persistent inequality and its dynamics, and potentially persuade us to finally learn from our past mistakes and build a more egalitarian society.

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SOURCES AND OFFICIAL PUBLICATIONS

Bank of Japan. *Foreign Exchange Rates: Demand Draft (1893-1926)*: «Reference Book of Financial Matters» of the Financial Bureau of the Ministry of Finance. Dirección General de Estadística (1894, 1895, 1898, 1899, 1901, 1902, 1903, 1904, 1905, 1906, 1907): *Anuarios Estadísticos de la República Mexicana 1894-1907*. Oficina de la Secretaría de Fomento. El Colegio de Sonora. *Testamentos de Sonora. 1786-1910*. Instituto Nacional de Geografía, Estadística e Información (1994): *Estadísticas Históricas de México* Tomo II. Talleres Gráficos del Instituto Nacional de Geografía, Estadística e Información, Aguascalientes: México. Klovland, J. T. (2004): «Historical Exchange Rate Data 1819-2003», in Øyvind, E., Klovland, J. T., and Qvigstad, J. F. (eds) *Historical Monetary Statistics for Norway 1819-2003*, Norges Bank Occasional Papers no. 35, Oslo. Lobell, H. (2010): «Foreign Exchange Rates 1804-1914», in Edvinsson, R., Jacobson, T., and Waldenström, D. (eds) *Historical Monetary and Financial Statistics for Sweden: Exchange Rates, Prices, and Wages, 1277-2008*. Stockholm, Sweden: Sveriges Riksbank. Secretaría de Hacienda y Crédito Público (1874): *Presupuesto de ingresos y egresos de la Federación para el año económico quincuagésimo que comienza en 1 de julio 1874 y termina en el 30 de junio de 1875*.

REFERENCES

- ACEMOGLU, D., ROBINSON, J., and JOHNSON, S. (2001): «The Colonial Origins of Comparative Development: An Empirical Investigation». *The American Economic Review*, 91 (5), pp. 1369-1401.
- AGUILAR CAMÍN, H. (1996): *La frontera nómada: Sonora y la Revolución Mexicana*. Mexico City: Fondo de Cultura Económica.
- ALMADA BAY, I., and MEDINA BUSTOS, J. M. (2017): *Historia panorámica del congreso del Estado de Sonora, 1825-2000*. El Colegio de Sonora.

- ALVAREDO, F., ATKINSON, A. B., and MORELLI, S. (2018): «Top Wealth Shares in the UK over more than a Century». *Journal of Public Economics*, 162, pp. 26-47.
- ARROM, S. (1985): «Changes in Mexican Family Law in the Nineteenth Century: The Civil Codes of 1870 and 1884». *Journal of Family History* 10 (3), pp. 305-317.
- ARROYO ABAD, L. (2013): «Persistent Inequality? Trade, Factor Endowments, and Inequality in Republican Latin America». *The Journal of Economic History*, 73, p. 1.
- ARROYO ABAD, L., and ASTORGA JUNQUERA, P. (2017): «Latin American Earnings Inequality in the Long Run». *Cliometrica*, 11, pp. 349-374.
- BENGTSSON, E., MISSIAIA, A., OLSSON, M., and SVENSSON, P. (2017): «Wealth Inequality in Sweden, 1750-1900». *The Economic History Review* 71 (3), pp. 772-794.
- BENGTSSON, E., MISSIAIA, A., NUMMELA, I., and OLSSON, M. (2018): «Unequal Poverty and Equal Industrialisation: Finnish Wealth, 1750-1900». *Scandinavian Economic History Review* 67 (3), pp. 229-248.
- BÉRTOLA, L., CASTELNOVO, C., RODRÍGUEZ WEBER, J., and WILEBALD, H. (2009): «Income Distribution in the Latin American Southern Cone during the First Globalization Boom and Beyond». *International Journal of Comparative Sociology* 50 (5-6), pp. 452-485.
- BIRD, J. (2013): *For Better or Worse: Divorce and Annulment. Lawsuits in Colonial Mexico (1544-1799)*. Doctoral Thesis, Department of History, Duke University.
- BLEYNAT, I., CHALLÚ, A. E., and SEGAL, P. (2020): «Inequality, Living Standards, and Growth: Two Centuries of Economic Development in Mexico». *The Economic History Review*, 74, pp. 584-610.
- CASTAÑEDA GARZA, D., and BENGTSSON, E. (2020): «Income Inequality in Mexico 1895-1940: Industrialization, Revolution, Institutions». *Lund Papers in Economic History*, General Issues 2020, p. 212.
- CHOWNING, M. (1999): *Wealth and Power in Provincial Mexico Michoacán from the Late Colony to the Revolution*. Stanford: Stanford University Press.
- COATSWORTH, J. (1981): *Growth against Development: Economic Impact of Railroads in Porfirian Mexico*. De Kalb: Northern Illinois University Press.
- COATSWORTH, J. (1989): «The Decline of the Mexican Economy, 1800-1860», in LIEHR, R. (ed.), *América Latina en la época de Simón Bolívar. La formación de las economías nacionales y los intereses económicos europeos, 1800-1850*, Berlin: Colloquium, pp. 27-53.
- COATSWORTH, J. (2008): «Inequality, Living Standards, and Growth: Two Centuries of Economic Development in Mexico». *Journal of Latin American Studies*, 40(3), pp. 545-569.
- COUTURIER, E. (1985): «Women and the Family in Eighteenth-Century Mexico: Law and Practice». *Journal of Family History*, 10 (3), pp. 294-304.
- DAWTRY, R.J., SUTTON, R.M., and SIBLEY, C.G. (2015): «Why Wealthier People Think People are Wealthier, and Why it Matters: From Social Sampling to Attitudes to Redistribution». *Psychological Science* 26 (9), pp. 1389-1400.
- DEERE, C. D., and LEÓN, M. (2002): *Género, propiedad y empoderamiento: Tierra, estado y mercado en América Latina*. México, D.F.: Universidad Nacional Autónoma de México/FLACSO Sede Ecuador.
- DEERE, C. D., and LEÓN, M. (2005): «Liberalism and Married Women's Property Rights in Nineteenth-Century Latin America». *Hispanic American Historical Review* 85(4), pp. 627-678.
- DORE, E. (2000): «One Step Forward, Two Steps Back: Gender and the State in the Long Nineteenth Century», in DORE, E. and MOLYNEUX, M. (eds), *Hidden Histories of Gender and the State in Latin America*. Durham: Duke University Press, pp. 3-32.

- GERSCHENKRON, A. (1952): *Economic Backwardness in Historical Perspective, A Book of Essays*. Cambridge Massachusetts: The Belknap Press of Harvard University Press.
- FRANK, Z. (2004): *Dutra's World: wealth and family in nineteenth-century Rio de Janeiro*. Albuquerque: University of New Mexico Press.
- HABER, S. (1989): *Industry and Underdevelopment: The Industrialization of Mexico 1890-1940*. Stanford: Stanford University Press.
- HABER, S. (2002): «The Commitment Problem and Mexican Economic History», in BORTZ, J. and HABER, S. (eds), *The Mexican Economy 1870-1930: Essays on The Economic History of Institutions, Revolution, and Growth*. Stanford: Stanford University Press, pp. 324-334.
- HECHT, K. (2017): *A Relational Analysis of Top Incomes and Wealth: Economic Evaluation, Relative (Dis)advantage and the Service to Capital*. LSE International Inequalities Institute Working Paper No. 11. London: LSE.
- HU-DEHART, E. (1974): «Development and Rural Rebellion: Pacification of the Yaquis in the Late Porfiriato». *The Hispanic American Historical Review*, 54(1), pp. 72-93.
- HU-DEHART, E. (2016): *Yaqui Resistance and Survival: The Struggle for Land and Autonomy, 1821-1910*. Madison: University of Wisconsin Press.
- INEGI (2015): «Tamaño promedio del hogar por entidad federativa. Encuesta Intercensal 2015». Available at <https://www.inegi.org.mx/temas/hogares/>.
- ITURRIAGA, J. (2012): *La estructura social y cultural de México: Sociología, economía y política nacional*. Mexico City: H. Cámara de Diputados, Consejo Editorial de la LXI Legislatura.
- JOHNSON, L. L., and FRANK, Z. (2006): «Cities and Wealth in the South Atlantic: Buenos Aires and Rio de Janeiro before 1860». *Comparative Studies in Society and History* 48 (3), pp. 634-668.
- JONES, A. H. (1980): *Wealth of a Nation to Be*. New York: Columbia University Press.
- KATZ, F. (1974): «Labor Conditions on Haciendas in Porfirian Mexico: Some Trends and Tendencies». *The Hispanic American Historical Review* 54 (1), pp. 1-47.
- KICZA, J. E. (1982): «The Great Families of Mexico: Elite Maintenance and Business Practices in Late Colonial Mexico City». *Hispanic American Historical Review* 62 (3), pp. 429-457.
- KNIGHT, A. (1999): «Export-led Growth in Mexico: 1900-30», in CÁRDENAS, E., OCAMPO, J. A. and THORP, R. (eds), *An Economic History of Twentieth-Century Latin America Volume 1: The Export Age*. Basingstoke: Palgrave, pp. 133-165.
- KROZER, A. (2018): *Inequality in Perspective: Rethinking Inequality Measurement, Minimum Wages and Elites in Mexico* (Doctoral thesis). Cambridge University. doi:10.17863/CAM.37302.
- KROZER, A. (2020): *Seeing Inequality? Relative Affluence and Elite Perceptions in Mexico*. Occasional Series Paper 8 UNRISD; Geneva.
- KRUGMAN, P. (1991): «Increasing Returns and Economic Geography». *Journal of Political Economy* 99 (3), pp. 483-489.
- KUNTZ, S. (2002): «Institutional Change and Foreign Trade in Mexico, 1870-1911», in BORTZ J. and HABER, S. (eds), *The Mexican Economy 1870-1930: Essays on The Economic History of Institutions, Revolution, and Growth*. Stanford: Stanford University Press, pp. 161-204.
- KUZIEMKO, I., MICHAEL, N., SAEZ, E., and STANTCHEVA, S. (2015): «How Elastic Are Preferences for Redistribution? Evidence from Randomized Survey Experiments». *American Economic Review* 105 (4), pp. 1478-1508.
- KUZNESOF, E. (1989): «The History of the Family in Latin America: A Critique of Recent Work». *Latin American Research Review* 24 (2), pp. 168-186.

- KUZNETS, S. (1955): «Economic Growth and Income Inequality». *American Economic Review* 45 (1), pp. 1-28.
- LEVY, J. (2016): «A History of Institutional Function: Mexican Notaries and Wealth Distribution—Yucatan, 1850-1900». *The Journal of Peasant Studies* 43 (6), pp. 1249-1261.
- LINDERT, P. (1981): «An Algorithm for Probate Sampling». *The Journal of Interdisciplinary History* 11 (4), pp. 649-668.
- LINDERT, P., and WILLIAMSON, J. (1983): «English Workers' Living Standards during the Industrial Revolution: A New Look». *The Economic History Review New Series* 36 (1), pp. 1-25.
- LINDERT, P., and WILLIAMSON, J. (2016): *Unequal Gains: American Growth and Inequality since 1700*. Princeton: Princeton University Press.
- METCALF, A. (1990): «Women and Means.» *Journal of Social History* 24 (2), pp. 277-298.
- MILANOVIC, B., LINDERT, P., and WILLIAMSON, J. (2011): «Pre-industrial Inequality». *The Economic Journal* 121 (551), pp. 255-272.
- NAZZARI, M. (1991): *Disappearance of the Dowry*. Stanford: Stanford University Press.
- NUTINI, H. (1995): *The Wages of Conquest*. Michigan: University of Michigan Press.
- PÉREZ TOLEDO, S. (2011): *Trabajadores, espacio urbano y sociabilidad en la Ciudad de México 1790-1867*. Ciudad de México: Miguel Ángel Porrúa—Universidad Autónoma Mexicana.
- PIKETTY, T. (2014): *Capital in the Twenty-First century*. Cambridge: Harvard University Press.
- RODRÍGUEZ WEBER, J. (2016): *Desarrollo y desigualdad en Chile 1850-2009: Historia de su economía política*. Santiago: LOM Ediciones.
- ROMERO GIL, J. M. (2001): «La configuración del mercado de trabajo minero en el noroeste de México (1880-1910)». *Región y Sociedad* 13 (21), pp. 117-146.
- TINKER SALAS, M. (1997): *In the Shadow of Eagles: Sonora and the Transformation of the Border during the Porfiriato*. Berkeley: University of California Press.
- TURCHIN, P., and NEFEDOV, S. (2009): *Secular Cycles*. Princeton: Princeton University Press.
- TURNER, J. K. (1911): *Mexico Bárbaro*. New Delhi: Editores Mexicanos Unidos.
- VOSS, S. (1982): *On the Periphery of Nineteenth-Century Mexico: Sonora and Sinaloa*. Arizona: University of Arizona Press.
- WASSERMAN, M. (2015): *Pesos and Politics: Business, Elites, Foreigners, and Government in Mexico, 1854-1940*. Stanford: Stanford University Press.