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Keywords: Wealth, Encroachment, Mexico, Inequality, Institutions

JEL: D31, N36, N46, P48, O54

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The Sonoran Land Grab

Development of Wealth in 19th century Sonora

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Abstract

In this article, we investigate the effect of encroachment policies on wealth in late 19th century conducted by the Mexican state in the state of Sonora. Using a novel database of will inventories from the Mexican state of Sonora, we find that the upper-class saw large wealth gains as a result of access to new agricultural land and irrigation. We argue that encroachment policies had a substantial effect on wealth but that this effect is heterogenous across social groups. We highlight the role of institutions in shaping wealth and inequality in the early periods of American economic development.

Resumen

En este artículo investigamos el efecto de la política de usurpación conducida por el Estado Mexicano en la riqueza al final del siglo XIX en el estado de Sonora. Usando una nueva base de datos de testamentos del estado, encontramos que la clase alta tuvo grandes ganancias en riqueza como resultado del acceso a nuevas tierras agrícolas y fuentes de irrigación. Nuestro argumento es que las políticas de usurpación tuvieron un efecto substancial en la riqueza, pero este efecto es heterogéneo a través de distintos grupos sociales. Los resultados apuntan al rol de las instituciones en la desigualdad de riqueza en el proceso de desarrollo económico en América.

Introduction

In *Why Nations Fail* Daron Acemoglu and James Robinson argue that the Sonoran encroachment at the end of the 19th century where Mexican state expropriated indigenous people's lands is an example of an extractive institution that negatively impacted the Sonoran economy (Acemoglu & Robinson 2012). Moreover, they argue that the economic inequality we see in Mexico today stems from the extractive institutions created in historical times (Robinson 2018). Yet, we know very little about the drivers that led to economic inequality in the state of Sonora. In this paper we join a growing literature on highlighting the role of encroachment for a country's economic development. We test the hypothesis stated by Castañeda Garza and Krozer (2022) that inequality in Sonora rose as a consequence of the aforementioned encroachment.

The historical inequality literature over the last few years has moved its focus from pure measurement to the study of mechanisms behind inequality dynamics. Seminal works such as Piketty (2014) and Scheidel (2017) have pointed towards the effects that in theory wars should have for the distribution of income and wealth. Alfani and Di Tullio (2019) and Alfani, Gierok, and Schaff (2022) have shown how war can be connected to extraction rather than only destruction and be instead of a source for levelling a contributing factor to rising inequality.

Recent Mexican historical inequality literature is constructing a consensus about the unequalizing effects of the *Porfiriato*. Bleynat, Challú and Segal (2021) displays an increasing rent to wage ratio during the period; Castañeda Garza and Bengtsson (Forthcoming) report an increase in the Gini coefficient from .52 in 1895 to .57 in 1910 and an inequality extraction ratio of 70%; Castañeda Garza and Krozer (2022) in their study of wealth inequality in Sonora report a Gini coefficient of 0.89 during the *Porfiriato.* Finally, Castañeda Garza (2022b) in his study of wealth inequality through the 19th century finds a 13% increase in inequality, moving

from 0.75 to 0.85 in the same period. All of these studies point toward an increasing concentration of wealth.

Our empirical strategy builds on a novel dataset containing individual-level records of wealth and a two-way fixed-effects model to estimate the effect of encroachment on native Mexican lands in the late 19th century. This unique dataset allows us to answer questions which have previously been left unanswered. We find that the encroachment positively impacted the wealth of individuals within the upper class and had a small effect on the middle and lower class within Sonora. Our findings highlight the immediate impact of institutions for inequality and provides new evidence for how inequality grew in Northern Mexico.

The rest of this paper is structured in the following manner: In the next section we discuss the historical context and the literature related to our study. We then discuss the data and our empirical strategy. In *The Effect of Encroachment* we estimate the effect the encroachment had on wealth and show that the upper class benefitted from these policies. In the subsequent section *Robustness tests* we show that these findings are robust to several robustness tests, including a placebo and a sensitivity test. In *The Geography of Encroachment* we similarly show that class, not geography was the prime mover in the wealth effects following the encroachment. We relate our findings in the discussion section before concluding.

Historical context

After the French Intervention of 1861-1867 the Mexican state enjoyed a period of relative stability for the next four decades. In that period, it became possible to implement a set of liberal reforms aimed at the modernization of the Mexican economy and its integration to a certain extent to the global economy under the ongoing first globalization. The government of Porfirio Díaz (1877-1911), known as *Porfiriato*, best exemplifies this attempt of liberal modernization. The Díaz' government continued and expanded the policies of the Juárez and Lerdo administrations introducing changes in the acquisition of land, expelling indigenous communities from their lands, and trying to attract foreign investment to mining, railroads, and manufacturing. The goal of those liberal administrations was to create a class of yeomen farmers and small landowners following the U.S. example, yet the resulting land distribution in the country was that of more and larger latifundia. The Díaz government expanded on these policies and gave preferential access to investors, granted political protection and allowed large businesses to exercise near monopoly power.

In a sense, Díaz's government can be characterized as an early attempt of utilizing crony capitalism as a tool for government, what Haber (2002) calls "the commitment problem", that is the collusion of economic and political elites as a way of increasing the survival chances of the political regime due to the internal weakness of the government. The combination of state capture and a modernizing economy is a perfect breeding ground for inequality. The mechanism that produces rising inequality in such conditions are clear: first, the pure Kuznetsian forces increases the gap between winners and losers of industrialization (Kuznets 1955), the collusion amplifies the modernization effect by selecting winners and by default also selecting losers.

Among this complex political economy dynamic lies a reform of special interest for the case of Sonora, the 1883 Colonization Law "*Ley de Colonización y Compañias*

Deslindadoras" that allowed private national or foreign investors to acquire land that was deemed "non-productively used" at preferential prices. The new Colonization Law intensified the campaign against the indigenous Mayo, Yaqui and Seris that inhabited the Yaqui and Mayo River valleys.

Figure 1. The state of Sonora's location in Mexico

Sonora's extensive territory is rich in natural resources and particularly well suited for irrigated agriculture and mining, both water intensive activities. Therefore, control over the rivers was key to the economic exploitation of Sonora's natural resources. The Colonization Law provided an incentive to accelerate the ongoing conflict with the indigenous population as the political and economic elites in the state of Sonora coveted the water resources in those lands. Aguilar Camín (1996), Tinker Salas (1997) and Voss (1982) describe this development, as a process of consolidation of large estates, the fortunes of economic elites increased land grab after land grab. Castañeda Garza and Krozer (2022) argue that the process of "land reclamation" encouraged by the Colonization Law fuelled the 1885 War against the Yaqui and Mayo people, although the war ended with the defeat of the leader of the Yaquis Cajeme, it

would extend as a guerrilla warfare for several more years. The end of the conflict saw the expulsion and near enslavement of the Yaqui and Mayo and ultimately is thought of as a major driver of wealth inequality in Sonora.

After 1885, the control of the Yaqui and Mayo rivers enabled huge increases in agricultural productivity, exports to the U.S. boomed, the mining sector expanded and the large investments to connect these lands by building railroads reinforced these dynamics by producing rapid urbanization. Castañeda Garza and Krozer (2022) argue that the rising trend in their estimates of wealth inequality can be explained by three factors. First, the use of the Yaqui and Mayo people as a source of cheap labor. Second, the higher returns to private investors, particularly foreign investors and the structural change that worked against the traditional sector of the economy and non-wage earners. Third, the collusion of economic and political elites that enabled the mobilization of the military to connect the economy and their land holdings in what is usually known in the literature as the expansion of the agrarian frontier, (Rodríguez Weber 2018, Bértola et al. 2009).

The colonization enabled the reproduction of the capitalist system in Sonora (Toro 1986) in what was a common trend in the Latin American economies during the 19th century. In this period over 10,000 property titles were awarded to the Sonoran elites, more than 3.5 million hectares of some of the best agricultural land (Tutino 1988 Appendix D). The concentration of wealth in the form of large landholdings, control of natural resources, and the expansion of agriculture to serve both domestic and foreign markets occurred in Mexico, Chile, Argentina and other countries. Similar to the encroachment on the Yaqui and Mayo, the Argentinian "conquest of the desert" campaign that followed the legal reforms of the decade of 1870 produced high levels of inequality (Santilli 2020). Another similar case was that of the Mapuche in Chile, which suffered a similar encroachment policy in the decade of 1880 to

accommodate the need to expand agricultural and mining lands allocated to the preferred members of the elite (Bengoa 2014).

The combination of these three mechanisms, cheap labor, high return to foreign investors and collusion of economic and political elites, in theory could explain the rising inequality over the last decades of the 19th century up to the Mexican Revolution in 1910. However, although theoretically these mechanisms are convincing and matches the rising trajectory of wealth inequality estimated by Castañeda Garza and Krozer (2022), and the historiography of similar events in Latin America, there is not a formal test to show their validity. In this article we propose such a test, exploiting Castañeda Garza and Krozer (2022) data and expanding it backwards in time up to the 1850s we are able to test for the mechanisms behind the rising inequality.

Data

The data employed builds on Castañeda Garza and Krozer (2022) that presents 509 wills from the period 1871 to 1910 and expands it backwards to 1850 adding 130 additional wills. The data comes from the El Colegio de Sonora database, a collection of Sonoran wills ensembled under the direction of Ignacio Almada Bay and his team of historians. The raw data from the El Colegio de Sonora database comprises 1492 observations, from this universe, we employed 639 wills that contained either the monetary value of their assets or some combination of valuations and assets that could then be value imputed using the average prices in other wills or the prices/values as reported in documents, for instance the federal budgets and the *Memorias de la Hacienda Publica*. The gender, city of residence, municipality, occupation and class variables are extracted from each individual will. Among these, the class variable is of key importance, the class or socioeconomic status classification was done by the team of historians from El Colegio de Sonora in a 3 classes system, low, middle and high. Each will was put under

one of those three categories according to the assets reported on their wills and their declared occupation. These categories of class or socioeconomic status allow us to compare the wealth trajectories of each group.

Table 1 presents descriptive statistics from the database. Even though the observations of wills from people from the middle and lower classes by far exceeds the number of observations of people from the upper class, the upper class must still be overrepresented with 16 per cent of all observations. The disproportionate number of upper-class people is obvious considering the mean wealth of all wills. 10,787 pesos in 1890 was equivalent to 163 times the annual minimum wage for an unskilled worker.[4] Moreover, the gender ratios are skewed as men make out 61 per cent of all observations.

Table 1. Descriptive statistics. Average values and ratios

Variable		Share
Social status	Middle and lower class	0.84
	Upper class	0.16
Gender	Female	0.39
	Male	0.61

Source: El Colegio de Sonora database

Table 2 presents the mean wealth by social status and gender. The differences are striking both considering the variation within the social status groups and differences between social classes. Upper-class women's mean wealth was only 32 per cent that of upper-class men. Similar differences are found within the middle and lower classes. Women's wealth was only 27 per cent of the mean wealth of middle- and lower-class men. The largest difference in mean

[4] Author's calculation of unskilled wages from Estadísticas históricas de México 2014.

wealth, however, was between social classes. The mean wealth of the middle and lower classes was only 7 per cent of the mean wealth of the upper class.

Table 2. Descriptive statistics. Mean wealth by social status and gender

Social status	Gender	Mean wealth
All		9,626
Upper class	All	49,137
	Female	15,532
	Male	62,306
Middle and lower class	All	2,005
	Female	1,325
	Male	2,469

Source: El Colegio de Sonora database

The lower levels of wealth for women (only 25% of the men's wealth in the upper class and 54% in the middle and lower class) is expected. While we know that the legal inheritance rights were the same for both genders after Independence, in practice inheritance for women was limited up until 1884 when the inheritance system was reformed. (Krozer & Castañeda Garza, 2022)

Figure 2 presents the geographical distribution of the number of observations and the mean wealth per locality in Sonora. On average, the greatest fortunes belonged to people in Guaymas de Zaragoza Villa de Cananea, and Hermosillo. Hermosillo was the largest city as well as the capital of Sonora and Guaymas de Zaragoza was an important port city. Accordingly, it is not surprising that the greatest fortunes came from these places. Villa de Cananea, however, was only a small village for which there only is one observation of a very large fortune. The left-side map in Figure 2 shows that most observations come from Hermosillo, Guaymas de

Zaragoza, and the mining town of Alamos. The mean wealth values for other localities could therefore be sensitive to large values.

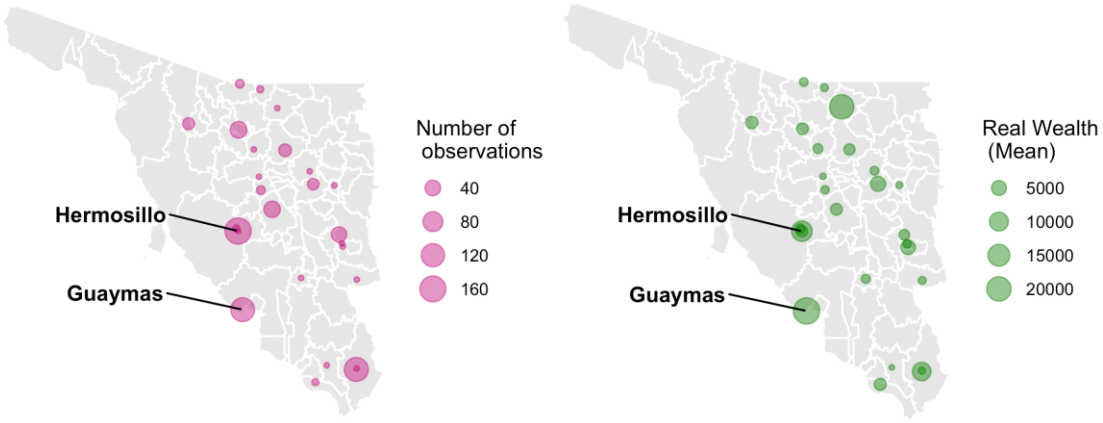

Figure 2. Number of observations and mean real wealth in towns in Sonora, 1850–1910

Figure 3 presents the number of observations by social status and location. Overall, the upper class was concentrated in Hermosillo, Guaymas de Zaragoza, and Alamos. This is unsurprising considering the mean wealth of these locations as well the economic and political importance of these towns. By contrast, the middle and lower classes were more evenly distributed across the entire state. Although the largest number of middle- and lower-class people are also observed in Hermosillo, Guaymas de Zaragoza, and Alamos.

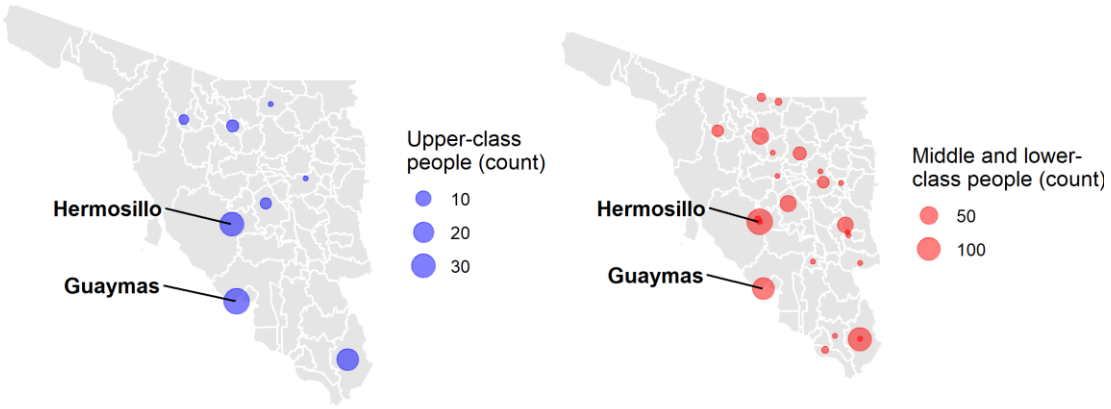

Figure 3. Number of observations by social status

As all wills or probate databases, our database overrepresents the rich and old and underrepresents the poor and young. There are several methods to account for these issues and produce a balanced sample. The most common method is the so-called estate-multiplier or mortality multiplier method, that multiplies each observation to the inverse of the mortality rate at the age of death (Atkinson and Harris 1978). However, the estate-multiplier method is of no use if there is not enough data about the age of death. Another option is to construct a social table using the known or true class structure like Castañeda Garza and Krozer (2022). Alternatively, it is possible to fit the data into a theoretical-lognormal distribution to obtain a weight for each observation (Castañeda Garza 2022b). Finally, Alfani and Ammannati (2017) argue that lack data is data and that no correction is needed as the poorest people would have not left wills. Given the nature of the data, and the fact we are interested in the evolution of individual-level wealth but not in estimating the wealth distribution, we decide to make no

corrections or alterations to the data, and thus not introduce further sources of uncertainty. The results that we produce should nonetheless be valid for a large portion of the Sonoran population even though the indigenous population and the poorest strata of society are excluded.

The will as an institution fulfills an important purpose on societies. Wills unlike probates, contain the complete uncontested estate of the deceased, and were elaborated at a cost by the trusted notary. Wills are by its nature left by people who has something to bequest. They are not an instrument for debt settlements or accounting exercises like probates. This key difference assumes that poor people do not leave wills a credible one, since testators without property or assets to bequest would not formalize their inheritance in the constitution of a will, or those below certain thresholds would not incur in the cost of notary.

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 probated have a higher probability of including less well-off testators.

Empirical Strategy

In this paper we estimate the effects of the encroachment and expropriation of several river valleys and lands in Sonora during the late 19th century. The question we are trying to answer is if this encroachment on indigenous lands had an effect on wealth in the state of Sonora.[5] To do this we employ a two-way fixed effects strategy where we examine the effects encroachment had on the upper-class (*Alto)* individuals and the middle- and low-class (*medio* and *bajo*). Our strategy is simple: because the upper-class were the ones who owned land which benefitted from irrigation following the encroachment, we should observe a disproportional increase in wealth for the upper-class following 1890 when the war against the natives was over and encroachment was fully realize. The upper-class serves as a sort of treatment group, having their wealth be exposed to the shock of the encroachment, while the middle- and low-class serves as a control group.

In our model we construct three key dummy variables; upper-class which is a dummy variable equal to one if the individual belonged to the upper-class; encroachment which equals one if the observation was done after 1890:

$$Wealth_{i,l,t} = Constant + \beta_1 upperclass_{i,l,t} + \beta_2 encroachment_t + \beta_3 upperclass * encroachment_{i,t} + \beta_4 gender_i + \gamma + \lambda + u_{i,t,l} \quad (1)$$

Where wealth is normalized wealth for individual *i* in location l and year *t, γ* is a set of yearly dummies, λ a set of locality fixed effects and *u* is an error term. β_3 is the central coefficient to estimate, it shows the effect of being upper-class and observed after the encroachment. We cluster standard errors at the locality level.

[5] As was suggested by Castañeda Garza and Krozer (2022)

We include a control variable for gender as we expect gender to be correlated with both social status and wealth.

The key assumption in this model is that the two groups, upper class and non-upper class followed parallel trends before the encroachment. In figure 4 we plot the annual mean wealth, for the two groups. The middle and lower class is in the long-term stable, from 1850-1910 there doesn't appear to be any significant changes. There is slightly more movement in the wealth of the upper-class, particularly between 1875 and 1885 from where the two trend lines become balanced again. We draw the conclusion from this graphical analysis that the classes more or less follow similar trends before 1890.

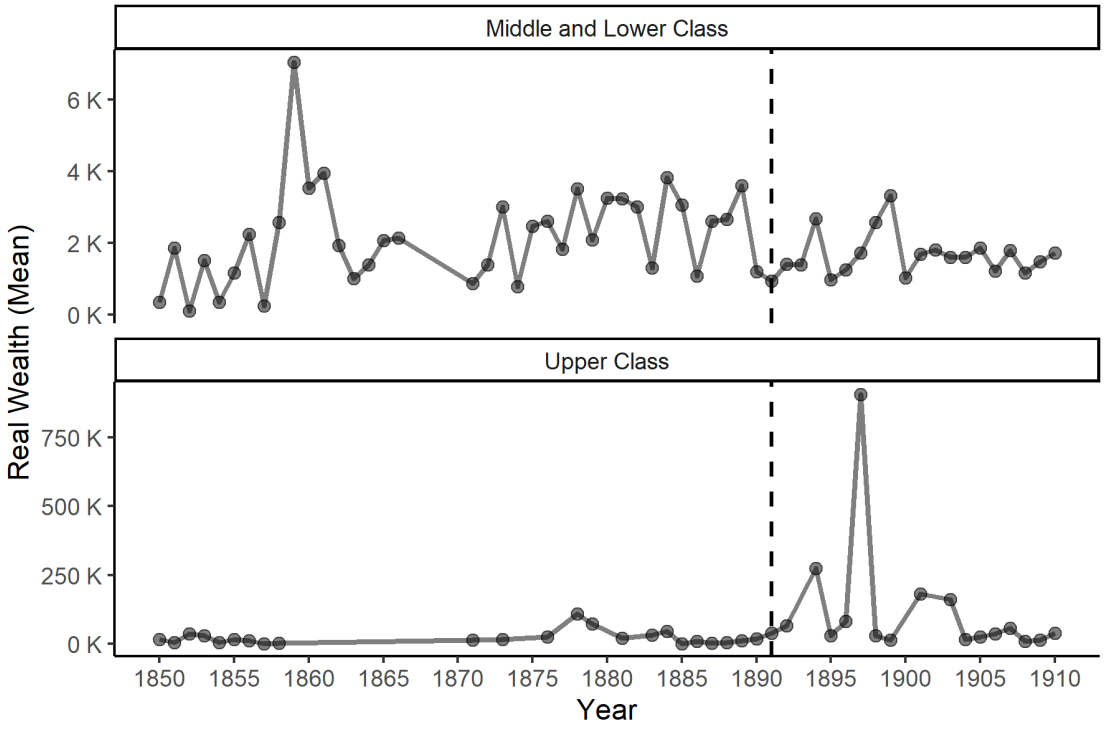

Figure 4. Mean real wealth by social status and year in Sorona, 1850-1910

The Effect of Encroachment

In this section we estimate four versions of equation one all of which employ the same empirical strategy but with different specifications. Model one is a pooled OLS regression, model two builds on this model by adding time-fixed effects. Model three includes locality fixed-effects and model four, our preferred model, controls both for locality fixed-effects and time fixed-effects. Model five uses a continuous time trend, testing if there is any linear trend that confounds our estimates.

In Table 3 the estimations are presented. Note that the upper-class variable, signifying if an individual of the upper class was wealthier than others is insignificant (it does, however, have the predicted positive sign). The Encroachment dummy is insignificant across all models without yearly fixed effects.[6]Our interaction variable, the key variable of interest, shows a large positive effect which is robust across all specifications. Gender is in turn consistently negative across all models. This confirms the pattern observed in table two where women had consistently lower wealth in both the upper class and the low- and middle classes.

[6] When including yearly fixed-effects, the encroachment dummy falls of as a consequence of the dummy trap.

Table 3. The impact of the Sonora encroachment on wealth

	(1)	(2)	(3)	(4)	(5)
	ln (1 + Value of assets)	**ln (1 + Value of assets)**	**ln (1 + Value of assets)**	**ln (1 + Value of assets)**	**ln (1 + Value of assets)**
Social status					
Upper Class	0.60	0.42	0.57	0.41	0.57
	(0.766)	(0.746)	(0.759)	(0.737)	(0.754)
Encroachment	0.17		0.22		0.09
	(0.245)		(0.278)		(0.648)
Gender	-0.80***	-0.93***	-0.79***	-0.91***	-0.80***
	(0.167)	(0.127)	(0.192)	(0.145)	(0.210)
Upper Class * Encroachment	3.1***	3.3 ***	2.9***	3.1***	2.9***
	(0.725)	(0.720)	(0.744)	(0.697)	(0.753)
No. obs.	637	637	637	637	637
R^2	0.204	0.361	0.233	0.388	0.234
Unit FE	No	No	Yes	Yes	Yes
Time FE	No	Yes	No	Yes	No
Time trend	No	No	No	No	Yes
No. clusters	27	27	27	27	27

Notes: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The stability of our interaction coefficient, β_3 suggests that the relationship is robust. In economic terms the effect seems to be massive. The encroachment had an effect of approximately 290% to 330% on wealth levels for the upper class, a fact we largely contribute to the relatively low levels of wealth before the war and encroachment.

In figure five we plot the estimates from our pooled OLS regression using a margins analysis. The margins analysis uses the regression model to estimate the dependent variable at specified values of the independent variables and the average value at the non-specified. In the graph we see the effects of the land grab for two groups, the upper-class and the rest of the population. This margins analysis is clear – the upper class saw large wealth gains whereas the middle – and lower class saw no wealth gains.

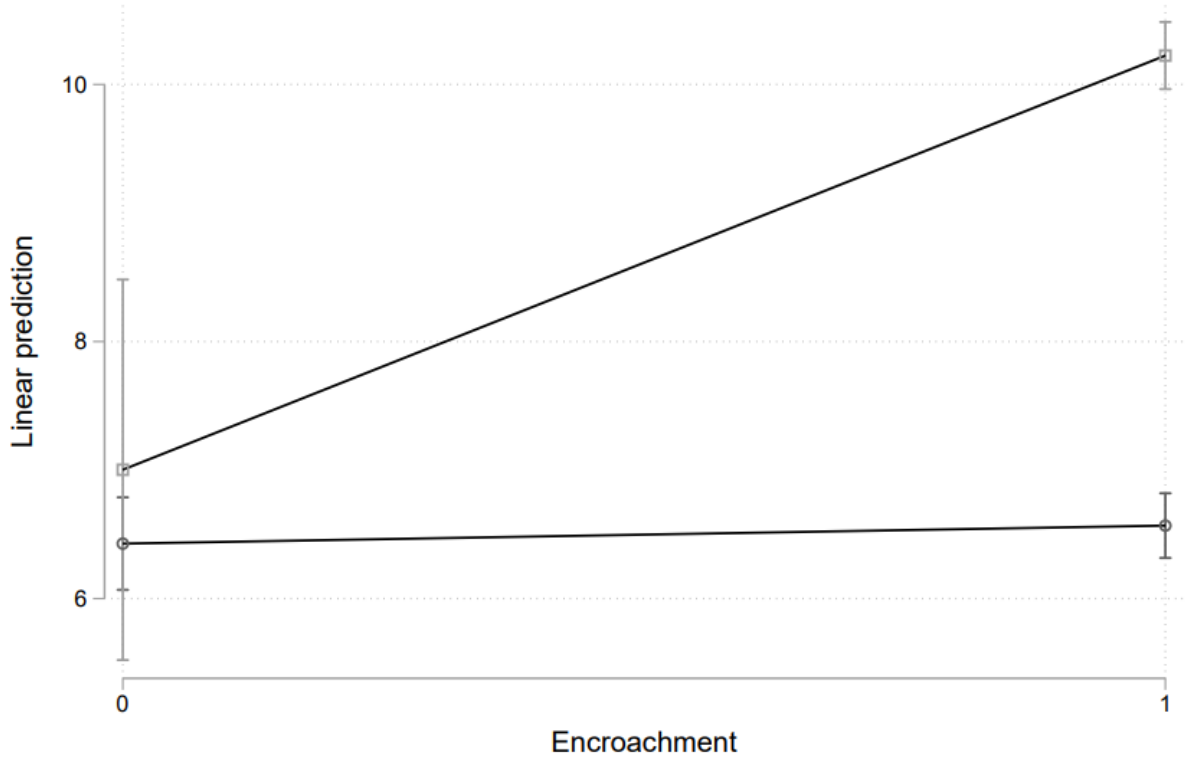

Figure 5. Margins analysis

Note: Figure shows the estimated wealth by model three before and after encroachment for upper-class and non-upper class. Square = Upper class, circle = non-upper class

Robustness test

As a robustness check we do two tests: a sensitivity analysis and a placebo test. The sensitivity analysis is shown in Table four. This test moves the year for the encroachment away from 1890 to see if the regression is sensitive to changes in the treatment year and if we get any effects earlier than expected. Remember that the war lasted between 1885 and 1890 and that the colonisation law was enacted in 1883, if we find effects before 1883, we would be concerned that we're not properly identifying the effects of the law and subsequent encroachments.

We estimate the same regression as above but move the year of the treatment to 1900, 1892, 1888 and 1880. We find a significant result for 1900, 1892 and 1888. While the results from 1900 are somewhat worrying we believe this might speak to long-term effects of the

encroachment. The effects from 1892 and 1888 point to the fact that our analysis is not sensitive to which year we choose. We see no effects from the encroachment on the upper class when we move the treatment year back to 1880 confirming that the heterogenous wealth changes we observe are a result of the encroachment and war between 1885 and 1890.

These tests suggest that the encroachment was not a singular event but an ongoing process that had some lingering effects on inequality in Sonora.

Table 4. Sensitivity test

	1900	**1892**	**1888**	**1880**
	(1)	**(2)**	**(3)**	**(4)**
	ln (1 + Value of assets)	**ln (1 + Value of assets)**	**ln (1 + Value of assets)**	**ln (1 + Value of assets)**
Social status				
Upper class	1.3**	0.58	0.75	2.3****
	(0.553)	(0.727)	(0.809)	(0.327)
Encroachment				
Gender	-0.98***	-0.94***	-0.95***	-1.0***
	(0.161)	(0.154)	(0.169)	(0.191)
Social status * Encroachment				
Upper class * Encroachment	2.0***	2.9***	2.1**	-0.54
	(0.514)	(0.715)	(0.758)	(0.567)
No. obs.	637	637	637	637
R^2	0.360	0.383	0.363	0.345
Unit FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
No. clusters	27	27	27	27

Notes: Sensitivity analysis using all assets as outcome variable.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In figure six we show the results from a placebo test. There might be some worry that the coding from the original historians is faulty or non-systematic. Here we check if the class-coding is correct by randomly assigning 16% of the population to the upper-class and rerunning

the regression (in table one we showed that 16% of the sample was coded as upper-class). We loop this procedure a thousand times and collect the beta coefficients. Doing this exercise shows that we can't generate the same coefficient as in our main specification, in figure six represented by the vertical dotted line. This validates our class-coding and shows that our findings are robust. If we were able to find similar results in this placebo exercise, we would be concerned that the class coding, done not by us but, as mentioned above, by historians from El colegio de Sonora, is not properly reflecting the true upper class. If they, more or less, randomly assigned wills by class we would not be able to find the results we do – as suggested by this placebo exercise.

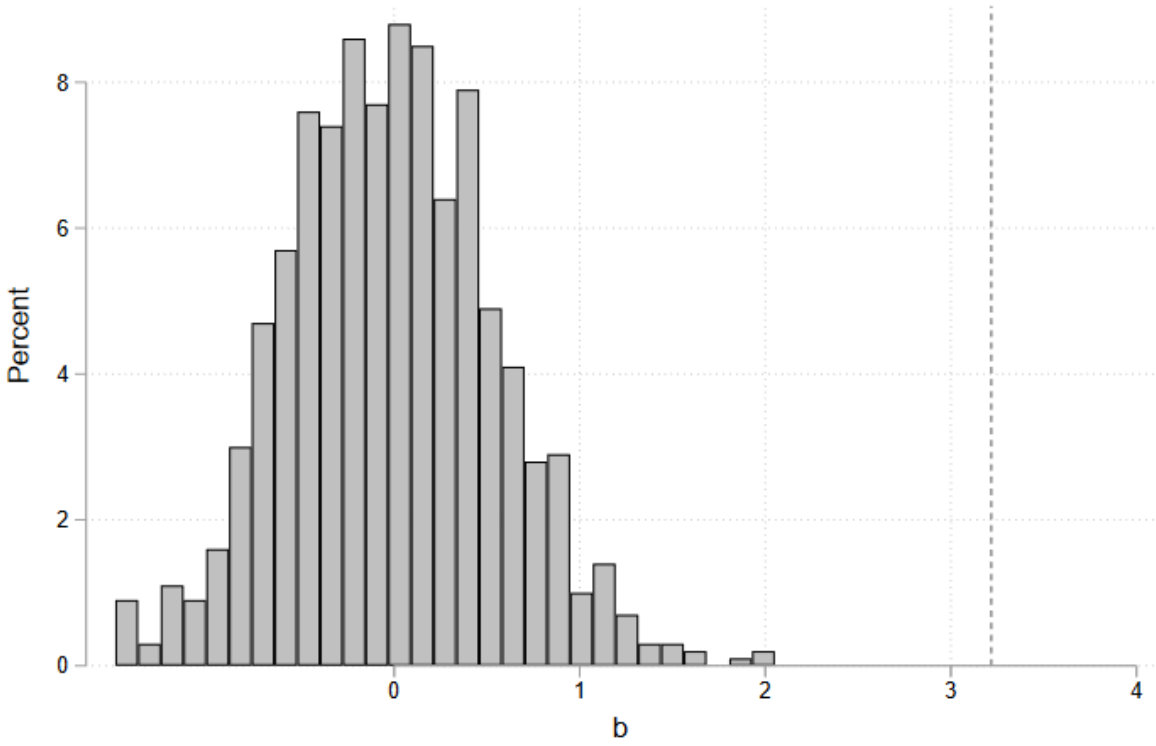

Figure 6 - Placebo test

Note: Horizontal line shows value of coefficient from table three, column four.

Notice that not only does the placebo exercise never generate similar results to the ones we receive using the actual coding, the results it does generate are typically clustered around a coefficient value of 0. The coding is similarly validated by looking at the assets of individuals coded in the upper class. In Table five we look at types of assets present in the upper-, middle- and lower-class.

One might be concerned that our encroachment variable captures not just the encroachment but a myriad of factors, such as changes to the financial or industrial landscape. To deal with this issue, we make use of the descriptions of asset types in the wills to code the assets as either agricultural, real estate, financial, or consumer goods. Since the descriptions are crude and do not state the value of every item, the coding is an approximation. However, this coding allows us to test through which asset types the increased wealth for the upper class manifested itself.

Table 5. Asset types by social class.

Social class	Asset type
Upper (Alto)	Large landholdings (haciendas, ranches, mines), cattle and horses, financial assets, real state property in urban areas.
Medium (Medio)	Small landholdings (small ranches, estates), some cattle/horses, residential or commercial real state in urban areas.
Low (Bajo)	Small plots of land, small houses in urban areas, consumer goods (clothes, tools, kitchen instruments), pocket money.

Table five displays the type of assets more common in our sample of wills. The upper-class wealth is constituted mainly by large land extensions used for agricultural, cattle grazing or mining purposes. These types of assets are accompanied by financial assets such as bonds, foreign currency and debt certificates. The medium class is more connected to the commercial aspect of the economy; its main properties are more concentrated in the urban centers but are often combined with some agricultural land. The lower class, in contrast, primarily owns assets

like pocket money, clothes and other consumer goods and small plots of land for subsistence agriculture.

We run our four models again but this time we drop all observations where the assets are are not related to agricultural activities. The results are presented in Table six below. The results from the regressions show that our main coefficient of interest, the interaction between upper class and encroachment, changes slightly. However, the coefficient increases in magnitude, which further supports our main hypothesis, that the encroachment increased the wealth of the upper class in Sonora substantially. If our findings from Table three were biased by changes to the financial, industrial, or other non-agricultural sectors we would see a smaller coefficient and less or non-significant.[7]

Table 6. Excluding wills with non-agricultural assets

	(1) **ln (1 + Value of assets)**	**(2)** **ln (1 + Value of assets)**	**(3)** **ln (1 + Value of assets)**	**(4)** **ln (1 + Value of assets)**	**(5)** **ln (1 + Value of assets)**
Social status	0.04	-0.11	-0.01	-0.20	-0.02
	(1.17)	(1.05)	(1.13)	(1.05)	(1.11)
Encroachment	-0.12		-0.01		-0.40
	(0.298)		(0.300)		(0.782)
Gender	-0.51**	-0.58**	-0.49**	-0.50*	-0.51**
	(0.201)	(0.240)	(0.209)	(0.248)	(0.238)
Social status * Encroachment	4.1**	4.1***	3.9**	4.0***	4.0**
	(1.53)	(1.03)	(1.56)	(1.06)	(1.45)
No. obs.	458	458	458	458	458
R^2	0.042	0.279	0.082	0.323	0.085
Unit FE	No	No	Yes	Yes	Yes
Time FE	No	Yes	No	Yes	No
Time trend	No	No	No	No	Yes
No. clusters	20	20	20	20	20

Notes: Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

[7] In Appendix A we also show that our findings in table six are robust to the same sensitivity analysis as for our main regressions.

The Geography of Encroachment

While it is clear that class played a key role in determining who benefitted from the policies of encroachment in Sonora, geography played a similar role. In this section we utilize the detailed nature of our dataset and estimate heterogeneous effects from encroachment across the state of Sonora. We do this in a two-step process. (1) First of all we look at the relationship between proximity to river and wealth. Revealing mechanisms behind the relationship between encroachment and who benefitted. From the analysis above, we hypothesize that no large or significant relationship should exist as those who benefitted, the upper class, were populated in large centers (2) Secondly, we utilize the fact that we know where the Sonoran economic and political elites lived and estimate the effect on living in three major hubs: Guaymas, Hermosillo and Alamos. Using this information, we test whether or not individuals in these hubs benefitted broadly or, again, if it was just the upper class.

We run four models, all mimicking equation one conceptually. For the rivers we run a version of equation one where we instead of interacting upper class with encroachment using an interaction with proximity to river and encroachment:

$$Wealth_{i,l,t} = Constant + \beta_1 upperclass_{i,l,t} + \beta_2 encroachment_t + \beta_3 Proximity\ to\ River_i * encroachment_{i,t} + \beta_4 Proximity\ to\ River_i + \beta_5 gender_i + \gamma + u_{i,t,l} \quad (3)$$

We then code individuals as living in an urban center if they live in Guaymas, Hermosillo and Alamos and use this in the interaction with encroachment. Notice that we do not include locality fixed-effects as this would perfectly predict both the proximity to rivers and whether or not one lives in an urban centre. We do include yearly fixed effects (γ) however.

$$Wealth_{i,l,t} = Constant + \beta_1 upperclass_{i,l,t} + \beta_2 encroachment_t + \beta_3 Urban\ centre_i * encroachment_{i,t} + \beta_4 Urban\ centre_i + \beta_5 gender_i + \gamma + u_{i,t,l} \quad (4)$$

Table seven reports the estimates from equation three and four. While rivers do in fact have a significant impact on wealth, they do not provide increased wealth following the encroachment. Notice that in column one, and two the interaction term is negative. In column one the significant interaction term suggests that living close to a river provided less value after the policies of encroachment. While this is not robust to including a control for the time trend, it does suggest that the value of rivers was diminished as irrigation and new lands in the… valleys were opened for exploitation.

Our analysis suggests, from the results in columns three and four, that the key factor in deciding who benefitted from the policies of encroachment was not geography but rather class. People in the urban centres did not generally benefit from the policies in terms of wealth. This exercise also confirms that the use of two-way fixed effects in our preferred model above is filtering away confounders such as geography.

Table 7. Geographical Analysis of Encroachment and Wealth

	(1) ln (1 + Value of assets)	(2) ln (1 + Value of assets)	(3) ln (1 + Value of assets)	(4) ln (1 + Value of assets)
Social status				
Upper Class	2.0***	2.0***	1.9***	1.9
	(0.467)	(0.444)	(0.493)	(0.464)
Gender	-0.91***	-1.0***	-0.99***	-1.1***
	(0.183)	(0.172)	(0.201)	(0.190)
Proximity to river	0.04***	0.03**		
	(0.013)	(0.014)		
Encroachment	1.1**		0.27	
	(0.390)		(0.448)	
Proximity to river * Encroachment	-0.03	-0.02		
	(0.021)	(0.022)		
Urban elite			0.05	-0.03
			(0.420)	(0.435)
Urban elite * Encroachment			0.65	0.76
			(0.518)	(0.524)
No. Obs.	637	637	637	637
R^2	0.162	0.317	0.161	0.320
Time fixed effects	No	Yes	No	Yes

Notes: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Discussion

The findings presented in this article demonstrates the importance of economic institutions to the changes in the distribution of wealth. Extractive institutions such as those legally implemented in México through the 1883 Colonization Law and similar laws implemented in other Latin American cases such as Argentina and Chile showcase the real costs of development policies that by design are not inclusive. Among those costs is the marginalization of indigenous populations, rising inequality and violence that eventually makes long-run or sustained economic growth impossible over time. Our findings have implications for both the past and the present. For the past in how we understand the development process in late 19th

and early 20th centuries, its costs and its political economy, who wins and who loses. For the present, it speaks directly to the experience for developing nations around the world that are currently enduring similar types of encroachments under the banner of economic modernization minimizing or even ignoring these costs.

Encroachment in the Americas is a widespread phenomenon throughout its history, what Cronon (2003) calls "changes in the land" has had important economic repercussions in the development of the region, especially on the trajectory of economic inequality. This article contributes evidence to the analysis of distributive forces unleashed by changes in the property of land. Changes in property rights, especially in regard to land ownership and use are unmistakable linked to the dynamics of wealth concentration. Given the common nature of encroachments through history, from the English enclosure movement to the wars led by colonizers against indigenous population all over the Americas, this analysis contributes with an important case that might be an example to study other violent land distribution processes.

In *Why Nations Fail*, Acemoglu and Robinson (2012 p.37) argue that the policies of encroachment and subsequent forced move of indigenous population in late 19th century Sonora provide an excellent example of institutional change detrimental to a positive economic climate. In this paper we have shown that the encroachment policies and war against the indigenous population increased inequality but also raised the overall level of wealth. Acemoglu and Robinson were both right and wrong, the extractive encroachment policies of late 19th century Sonora did increase inequality. The effects on the larger population are ambiguous and we cannot draw any well-grounded conclusions about how the encroachment impacted the rest of the population. What we can say with certainty however is that they benefitted less than the upper-class. For this reason, we can comfortably say that encroachment increased inequality.

Conclusion

In this article we have analysed the effects encroachment had on wealth in Sonora at the end of the 19th century. We argue that encroachment significantly raised wealth for individuals in the upper classes, while middle- and lower-class individuals were affected to a lesser extent. Moreover, the effects for the lower and middle classes are less robust. Using a fixed-effects strategy we show that despite parallel trends prior to the encroachment, the upper-class pulled away after encroachment. We also show that women had significantly lower levels of wealth throughout the period, in all our regression specifications.

Our argument is robust to both a sensitivity analysis, where we check if the findings are sensitive to the end of the encroachment policy, and a placebo test where we randomly assign class-status (and thereby treatment and control status), showing that the findings are not random, but systematically linked to class. Our argument is similarly strengthened by showing that geography, captured by living in an urban centre or in proximity to a river, does not explain the rise in wealth. Nor is our model sensitive to removing non-agricultural assets. Rather, our argument that the encroachment positively shocked wealth for the upper-class is strengthened by only analysing agricultural assets.

We conclude that the economics of encroachment in Sonora drove up wealth for a small portion of the population, significantly increasing inequality. Through ownership, and control of agricultural assets the loss of the indigenous population became the gain of the colonizers.

Further research is needed to understand the full impact of the encroachment policies – how did it affect productivity and incomes and what were the very long-term effects of these policies? The Colonization Law was in place for the whole country, given the regional heterogeneity of Mexico and the diverse response to the policy changes at regional level, more research is needed to understand the impact of encroachment throughout the country. The role

of encroachment in understanding inequality in the Americas is clearly underdeveloped and must be placed at the forefront of pre-industrial inequality research within the region.

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Appendix A

Table A.1. Sensitivity analysis using only wills with agricultural assets

	1900	**1892**	**1888**	**1880**
	(1)	**(2)**	**(3)**	**(4)**
	ln (1 + Value of assets)	**ln (1 + Value of assets)**	**ln (1 + Value of assets)**	**ln (1 + Value of assets)**
Social status				
Upper class	0.08	-0.06	0.40	2.0***
	(1.07)	(1.09)	(1.09)	(0.577)
Encroachment				
Gender	-0.51*	-0.52*	-0.54**	-0.48*
	(0.267)	(0.258)	(0.251)	(0.256)
Social status * Encroachment				
Upper class * Encroachment	4.6***	3.8***	-0.81	-3.4**
	(1.20)	(1.22)	(1.36)	(1.22)
No. obs.	458	458	458	458
R^2	0. 312	0. 317	0. 306	0. 338
Unit FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
No. clusters	20	20	20	20

Notes: Sensitivity analysis using only agricultural assets as outcome variable.
Robust standard errors clustered at locality in parentheses *** p<0.01, ** p<0.05, * p<0.1