On the economic effects of Indigenous institutions: evidence from Mexico*

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Abstract

While Indigenous institutions affect policy outcomes and, consequently, economic development, our understanding of this association is as yet unclear. This paper examines this relationship using land reform in Mexico as a case study. Between 1917 and 1992, the rights to 16 million hectares of ancestral land were transferred to the Indigenous population in the form of land plots known as *Comunidades Agrarias*. By exploiting novel panel data for 13,600+ municipality-census observations, I find that ancestral land redistribution was more successful in municipalities with more complex Indigenous institutions. I hypothesise that centralised societies would have been more politically cohesive and therefore better able to coordinate collective actions against the state. The economic gains of the restoration policy were mainly found in the area of education.

Keywords: Institutions; Economic development; Ancestral land; Mexico

JEL classification: N20, N26, O10

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1 Introduction

Indigenous institutions can persist in many societies for centuries and therefore have significant effects on modern-day outcomes.[1] And yet, even if these institutions do not survive, they remain important for enhancing our knowledge of how modern societies have reached their current level of development. While an underlying assumption in this growing literature is that Indigenous institutions affect policy outcomes and, consequently, economic development, our understanding of this important relationship is as yet unclear.

This paper contributes to this line of research by evaluating a land restoration policy from the early 20th century. The case in point is a land reform in Mexico between 1917 and 1992, where 16 million hectares of ancestral land were transferred to the Indigenous population in the form of land plots known as *Comunidades Agrarias* (Agrarian Communities). Land transfers were used as a political tool to strengthen the political power of the elite, thus creating a bargaining process in which both the state and beneficiaries impacted the implementation of the reform (Walsh Sanderson, 1984).

In this study, novel panel data on Indigenous institutions and ancestral land for 13,600+ municipality-census observations was created, spanning most of the 20th century. To do so, detailed information on Indigenous languages in Mexico was digitised and collected, drawn from seven decennial censuses (1930–1990). By linking each language to Murdock's data (Murdock, 1967), a measure of Indigenous institutions was computed, which, specifically, is the population-weighted average of Murdock's *Jurisdictional Hierarchy Beyond the Local Community* index for all Indigenous groups within each municipality between 1930 and 1990. The main policy outcome was measured as the share of ancestral land area distributed to the Indigenous population within each municipality, drawn from the *Padron e Historial de Nucleos Agrarios (PHINA)* of Mexico. The construction of the dataset itself is a valuable contribution to our understanding of the economic history of Indigenous people in the Americas and to the impacts of returning ancestral land to Indigenous people, this being a major area of enquiry for policy reforms in Canada, the United States and elsewhere in Latin America.[2]

By conducting an extensive set of empirical analyses, this study demonstrates that in municipalities where the Indigenous population relates to more complex Indigenous institutions, a higher proportion of ancestral land was accumulated. This study interprets

[1] See: Michalopoulos and Papaioannou 2013; Bentzen, Hariri, and Robinson 2017; Angeles and Elizalde 2017; Gennaioli and Rainer 2007; Giuliano and Nunn 2013; Michalopoulos and Papaioannou 2014.

[2] See: Leonard et al., 2018; Dippel and Frye 2019; Dippel et al., 2019; and Feir et al., 2019.

these findings as the result of better political cohesion among more centralised societies and thus the coordination of better collective actions at the local level.

Ancestral land endured during the colonial period due to the establishment of Indigenous settlements, known as *Pueblos de Indios* (de Estrada, 2005; Assies, 2008). Collectively, these *Pueblos* formed the *Republic of Indians*, a term used to refer to the Indigenous communities officially recognised by the Crown (de Estrada, 2005). While these political and land tenure arrangements ended after the colonial period, the Indigenous communities that encompassed these *Pueblos* remain in existence (Garcia Martinez and Martinez Mendoza, 2012; Arteaga, 2018). Using unique data from the early 19th century, pinpointing the location of the *Pueblos*, this study finds that in municipalities with a higher presence of *Pueblos*, arguably the basis of ancestral land, land transfers were significantly larger.

Having established the association between Indigenous institutions and the redistribution of ancestral land, the economic consequences were then considered. This study explores whether the redistribution of ancestral land impacts on public goods provision, particularly in the area of education. This study finds that ancestral land was positively associated with literacy rates. Interestingly, this appears to be important for both Indigenous and non-Indigenous populations residing only in rural areas, where collective actions were generally more salient. These results are consistent with theories suggesting that the culmination of land concentration may increase the private demand for education (Galor et al., 2009; Cinnirella and Hornung, 2016).

This paper contributes to the emerging body of work highlighting the effects of pre-colonial institutions on present-day outcomes. Gennaioli and Rainer (2007) argue that pre-colonial centralised societies improved public goods by means of better accountability mechanisms for local leaders in Africa. Dell et al. (2018) posit that Vietnamese societies linked to pre-colonial centralised states were able to develop more effective mechanisms of local cooperation, enabling them to address the lack of provision of public goods by central governments. Angeles and Elizalde (2017) argue that the most far-reaching land reforms in Latin America were implemented in countries geographically correlated to the former Aztec and Inca empires, such as Mexico, Peru and Bolivia — home to the largest pre-colonial centralised societies. I contribute to this literature by demonstrating that more advanced Indigenous groups had greater success in effecting the redistribution of ancestral land, resulting in better outcomes for their own communities. This is an important finding because it shows that Indigenous institutions can impact economic development through their effects on policy outcomes designed to redistribute collective goods at the local level.

This paper also contributes to an evolving and important line of studies exploring the

long-term consequences of the allocation of land to Native Americans. Dippel and Frye (2019) examine the effects of the allocation policy in America during the early 20th century and find significant adjustments in land allocations, labour market and educational outcomes. Leonard et al. (2018) show that American Native Reservations with a higher land quality were more likely to be allocated than Reservations with poor land endowments. Dippel et al. (2019) examine the reassignment of property rights of allocated land on Native Americans and find large economic losses in allotments under a limited property rights regime. My main findings add to this literature by showing that land restoration appears to be more successful in regions with more politically centralised Indigenous groups.

More generally, this paper also contributes to the growing line of studies exploring the economic and political consequences of land reform in developing countries.[3] Albertus et al. (2016) found that land redistribution appears to be greater during periods of significant political threats to the incumbent party's hegemony, resulting in lower development outcomes. Fergusson et al. (2018) empirically tested a model on the comparative advantage of clientelism using land reform in Mexico. They argue that clientelist political parties opt for a weaker bureaucratic state capacity in areas where their political position is placed at risk by the opposition. My work adds to this literature by examining the political and economic effects of an underexplored facet of land redistribution: ancestral land. The main results provide evidence in relation to the institutional capacity of Indigenous groups affecting the redistribution of ancestral land. To the best of my knowledge, my results provide the first empirical evidence that connects the legacy of Indigenous political structures with land reforms in Latin America.

The next section provides the historical account followed by the description of the data and the main empirical strategy in section 3. Section 4 presents the main results. Section 5 provides evidence of the effects of ancestral land on economic outcomes, and section 6 concludes.

2 Historical overview

2.1 The origins of ancestral land: colonial period

The origins of ancestral land in Mexico date to the colonial period. Soon after the abolition of the encomienda system in the 1540s, the Spanish Crown granted large amounts of

[3]See: Dell, 2012; De Janvry et al., 2015; Albertus et al., 2016; Fergusson et al., 2018; Lillo Bustos, 2018; and Montero, 2018

land through different land tenure institutions (Assies, 2008). This colonial reform led to the recognition of ancestral land through the creation of Indigenous settlements, known as *Pueblos de Indios*. These *Pueblos* were then allowed to establish well-defined political structures known as *consejos gubernativos*, thus enabling self-government at the local level (de Estrada, 2005). Collectively, these *Pueblos* formed the so-called *Republic of Indians*; a term used to refer to the group of Indigenous localities officially recognised to uphold Indigenous rulers in Spanish America.[4]

By the 1800s, there were 4460+ *Pueblos* in Mexico, home to 3.4 million Indigenous people, representing 90% of the total Indigenous population at that time (de Estrada, 2005). While the formal recognition of the *Pueblos*' political structures and ancestral land faded soon after independence in the 1820s, their existence has continued throughout the post-colonial period.[5] Their very existence laid the foundations of present-day localities in Mexico, thus keeping alive the notion of ancestral land.[6]

2.2 The struggle of ancestral land: post-colonial period

Throughout the 19th century, the *Pueblos* faced an excruciating struggle for land preservation. Post-independent governments, especially during Porfirio Diaz's regime in the late 19th century, extensively dispossessed Indigenous (and non-Indigenous) people from their land in favour of large hacendados (landlords) and foreign corporations. Not even the possession of clear titles inhibited these policies. In the words of Phipps (1925, p. 117), *'Some villages had preserved land titles which went back to the time of the first viceroy, in perfect form; yet these documents did not protect them against the concessionaries or favourites of Diaz'*.

Ancestral land usurpation was significant as it is estimated that, by the end of Diaz's regime in 1910, 90% of the Indigenous communities in Central Mexico had lost their land (Phipps, 1925). As a result, by the 1910s, 840 hacendados owned 97% of the fertile and more productive land in Mexico (Patiño and Espinoza, 2015). Perhaps the famous quote from Luis Terraza, one of the largest hacendados in the state of Chihuahua,[7] encapsulates

[4]The *Republic of Indians* was constituted by a consejo gubernativo whose main structure was formed by a *gobernador*, *alcalde* and *regidor*. These *consejos* administered the collection of tributes, land arraignments, justice and commerce.

[5]See: Aguirre Beltran, 1967; Warman, 2003; Terraciano and Sousa, 2011; Mallon, 2011; Garcia Martinez and Martinez Mendoza, 2012; and Arteaga, 2018.

[6]On 1st December 2018, during the inauguration of the President of Mexico, Andrés Manuel López Obrador, these *Pueblos* passed '*The Bastón de Mando*' (*The Baton*) to Obrador. *The Baton* is the *Pueblos*' highest symbol of authority. During the colonial period, *The Baton* was carried by the "Republic" or consejo gubernativo during important events to symbolise the formal recognition by the King of Spain as a truly constituted Indigenous community (de Estrada, 2005).

[7]The total land area of Chihuahua is 247,460 sq. km., about the same size as the United Kingdom.

the magnitude of land inequality in the turn of 20th century in Mexico: *'Yo no soy de Chihuahua, Chihuahua es mío'* or 'I'm not from Chihuahua, Chihuahua belongs to me'.

It is therefore not surprising that land redistribution was the main hallmark of the Mexican Revolution in the early 20th century (1910–1920), as best summarised by the slogan *'Tierra y Libertad'* or 'Land and Freedom', which was attributed to Emiliano Zapata, arguably the most famous character of the Revolution. In fact, *Zapatism* was the most effective revolutionary movement in supporting Indigenous land rights. But even more notably, *Zapatism* grew out of Indigenous communities from the state of Morelos, where descendants of the Aztec group represented a clear majority.[8]

The very triumph of the Mexican Revolution gave rise to policies that aimed to benefit the Indigenous population, especially in terms of ancestral land. One of the most important outcomes of this historical upheaval was the approval of the Mexican Constitution of 1917. Among the major political and economic changes, Article 27 of the Constitution advocated the reformation of land tenure in Mexico. This essentially allowed the state to expropriate land resources and, in turn, redistribute to people at large.

Land reform nonetheless turned out be a rather effective political tool. Not only did the reform reduce discontent among the population; it also strengthened the political power of the elite. This is evidenced by the fact that land transfers can be linked to political influence in rural areas, which may have contributed to the entrenchment of the ruling political party's hegemony (Albertus, 2015; Albertus et al., 2016). This, however, had unintended consequences. It created a bargaining process in which the state and beneficiaries influenced the implementation of the reform (Walsh Sanderson, 1984). The central hypothesis of this paper is that the legacy of political complexity of Indigenous groups had a relevant role in the redistribution of ancestral land. Specifically, I hypothesise that groups who historically belonged to more complex political structures may have been more politically integrated in organising for collective actions, and therefore were more successful in gaining a higher allocation of ancestral land.

In what follows, I discuss how Indigenous institutions affected the restoration policy more generally, thus providing clear qualitative evidence about the role played by these institutions in the redistribution of ancestral land in Mexico.

2.3 The restoration of ancestral land: 1917–1992

There were two strands to the land distribution policy: *Ejidos* and *Comunidades Agrarias*. While the *Ejidos* targeted mainly landless people, the *Comunidad Agrarias* were directed

[8] According to Murdock's data (Murdock, 1967), the Aztec group was one of the societies with more complex political structures in pre-colonial Mexico.

to those who may have suffered the dispossession of their ancestral land, in this case the Indigenous population (Venezian and Gamble, 1969; Assies, 2008).

To establish a *Comunidad Agraria*, petitions were put forward collectively rather than from individuals, hence, petitions were submitted from a community. However, only communities that had a minimum of 20 inhabitants and a maximum of 10 thousand people were allowed to submit petitions. Petitions were handled by a two-tier bureaucratic process. All petitions were initially submitted to agrarian commissions administered by local governments, whereby land had to be identified, demarcated and measured (Alcázar Godoy, 2015). All approved petitions were then sent to the federal authorities for a formal certification of the requested ancestral land, which was approved by the President of Mexico. This decision was then ratified via its publication in the *Diario Oficial de la Federacion*, Mexico's official record of government business. Once a *Comunidad* had been formally granted, this was inalienable, non-transferable and could not be expropriated.

Indigenous people were therefore required to organise collectively in order to follow up petitions throughout the process, including demarcation matters — often the foremost challenge due to the opposition of powerful hacendados (Harvey, 1998; Bailon Corres, 2002; Warman, 2003). Unlike *Ejidos*, Indigenous people had to certify their links with ancestral land since 'time immemorial', usually via colonial titles (Appendini, 2002; Ruiz Medrano, 2010). Of course, this may have prevented many Indigenous communities from accessing ancestral land.[9] And yet, even if Indigenous people satisfied this requirement, this did not mean a rapid restoration of ancestral land nor the reinstating of all original ancestral land. Years of land usurpation and urban expansion limited the success of restoring ancestral land. For instance, as all petitions had to be accompanied by reports on clear demarcations of land conducted by agrarian surveyors, hacendados routinely bribed them or obstructed their work (Harvey, 1998). Assassinations by hacendados of Indigenous leaders who pressed for the restitution of land were also common (Friedrich, 1970; Craig, 1983; Bobrow-Strain, 2007). This essentially created confusion regarding petitions, often leading to delays in land restoration or petitions being reversed.

Political cohesion was therefore central in order to achieve successful petitions via an array of collective methods. One way was through local assemblies, whereby restoration petitions were overseen more effectively by agrarian committees (Harvey, 1998). When

[9] I estimated that 80% of *Pueblos de Indios* (or original ancestral land) are not within a *Comunidad Agraria* nor an *Ejido* On the other hand, 13% of the *Pueblos* were within a *Comunidad*, and only 6% within an *Ejido* (or non-ancestral land plot). This, however, does not seem to detract from the main argument of the paper. If anything, this may suggest not only how difficult it was for Indigenous people to acquire what they believed to be their ancestral domains, but it also shows that had this percentage been higher, even more land would have been transferred to the Indigenous population.

political dialogue did not progress, Indigenous people engaged in a series of demonstrations ranging from land invasions and barricades to the organisation of short-term guerrilla movements and the development of grassroots events to discuss and demand clear actions by the state (Harvey, 1998; Nash, 2001; Bobrow-Strain, 2007). For example, Harvey (1998, p. 99) provides a historical account for some of these collective actions developed in the municipality of Venustiano Carranza in the southern state of Chiapas in the 1970s.[10] In this municipality, petitioners organised clandestine meetings to arrange for the visits of agrarian surveyors in order to demarcate the requested land. These visits could, however, be blocked by hacendados who bribed surveyors. Petitioners responded by forming a guerrilla movement, which was rapidly dismantled by the army. Yet resistance resumed with road obstructions in the capital of Chiapas to try and force a direct discussion with their local authorities. An agreement was finally achieved, which resulted in the successful restoration of some land. By the end of land reform in the early 1990s, approximately 38% of the municipality of Venustiano Carranza's land area was finally restored.

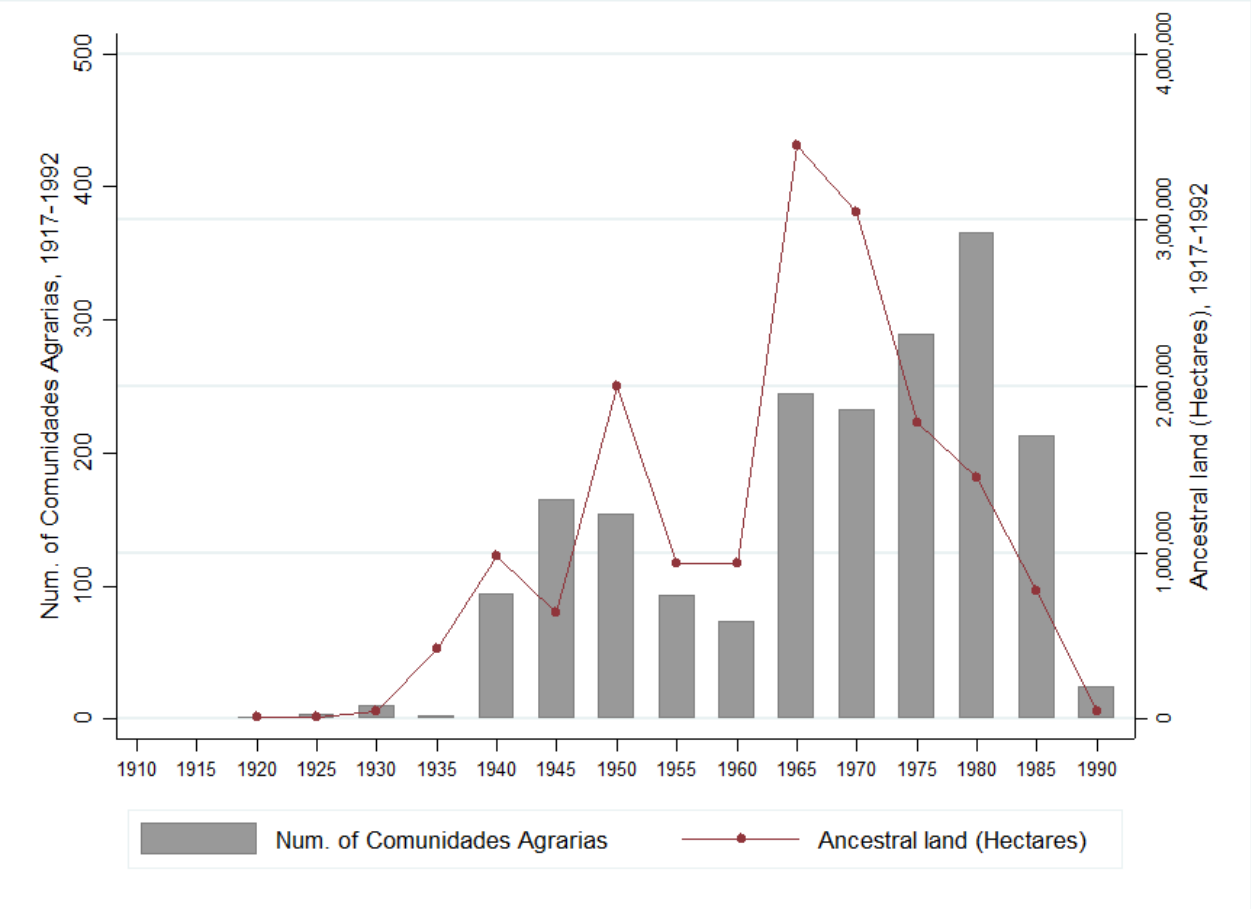
Political organisation among Indigenous people was not restricted to the actions outlined above. Indigenous communities joined presidential campaigns triggering many petitions for land (Bobrow-Strain, 2007). Indigenous leaders also joined key federal governments allowing them to emerge as central mediators between the state and Indigenous communities in the process of land restoration (Ibid.) Furthermore, regional events were organised to discuss common problems encountered in the land restoration process. For instance, in the mid-1970s at an Indigenous congress held in Chiapas, Indigenous people denounced the arbitrariness and corruption encountered in the process of land restoration (Harvey, 1998). Communities organised collectively to create a horizontal flow of information known as 'de las masas, a las masas' ('from the masses to the masses') via grassroots organisers that carried information to adjacent communities about restoration issues (Ibid.). All these methods had an important impact on the extent to which Indigenous groups influenced the implementation of the restoration policy.

By the early 1990s, the Indigenous population managed to repossess 16 million hectares of ancestral land by establishing 1900+ *Comunidades Agrarias*. This represents nearly 10% of the land area of Mexico and 20% of the total land redistributed during the reform. The remaining 80% of non-ancestral land was redistributed through the *Ejidos*' policy.

Figure 1 plots the number of *Comunidades Agrarias* created throughout the period of land reform, alongside the total ancestral land redistributed. There is a wide variation in the number of *Comunidades Agrarias* created during this period, as well as in terms

[10] Venustiano Carranza is a municipality where the majority of the Indigenous population belongs to the Tzotzil and Chol groups.

Figure 1: Number of *Comunidades Agrarias* and total ancestral land redistributed during land reform in Mexico, 1917–1992



Note: Number of *Comunidades Agrarias* denotes the number of *Comunidades* created by presidential approval. Ancestral land represents the total ancestral land redistributed via the *Comunidades Agrarias*' policy. Author's own computation based on data from PHINA

of the area of ancestral land restored. The figure also shows two prominent peaks, one during the 1930s and another one in the 1960s. At first sight, these peaks appear to be linked to the political and economic contexts at that time, such as the great acceleration of redistribution of land during the Cardenas presidency (1934–1940) and the massive social discontent that emerged in the 1960s, triggered in part by a deep economic crisis in the 1950s (Fergusson et al., 2018).

3 Data and empirical strategy

3.1 Data: construction of Index of Indigenous Institutions

In this study, novel panel data was constructed by digitising and collecting census data on ethnicity at municipal level. Hence, the main unit of analysis was municipalities; the second largest administrative division in Mexico below the national level.

In Mexico, censuses are, in the majority, conducted every ten years and since the first census in 1895, detailed information on the *'lengua indigena hablada'*, or Indigenous spoken language, has been collected for the Indigenous population. I relied on this information to track the ethnic origins of the Indigenous population for each municipality in Mexico from seven censuses, 1930–1990.[11] While this information was available for the last five censuses (1950–1990), the ethnicity data for the censuses 1930–1940 had to be digitised from the original publications (see sample of undigitised data in the Appendix Figure A1). Due to the format, as well as the low resolution of the publications, all the data had to be digitised manually.

To compute a measure of Indigenous institutions, I followed Angeles and Elizalde (2017) by combining this rich ethnic data with anthropological records drawn from George P. Murdock's *Ethnographic Atlas* (1967).[12] Having the most comprehensive ethnographic information of 1267 ethnic groups across the globe today, Murdock's Atlas has become the standard source for a wide range of comparative development studies in topics ranging from gender division (Alesina et al., 2013), health (Alsan, 2015), to institutions (Gennaioli and Rainer, 2007; Michalopoulos and Papaioannou, 2013; Angeles and Elizalde, 2017), the

[11] One concern about using Indigenous spoken language is that minority languages are often lost over time, which may potentially underestimate the ethnic identity of Indigenous people. I thank an anonymous referee for highlighting this issue.

[12] It is important to underline a key limitation in Murdock's data. Most of the sources used to code the Atlas's variables were drawn from ethnographic work constructed through direct observation during the 19th and 20th centuries. While this is perhaps better suited for studies addressing the economic history of African societies (a place where colonialism was a far more recent phenomenon (1880s)), for the Latin American societies this may be less credible considering that their first contact with Europeans dates to the 15th century. While this is a relevant shortcoming, there are reasons to believe that the use of the data is still suitable.

To code variables, Murdock also relied on a wide variety of historical sources, often written by Europeans at the time of first contact. Usually, this was the case for larger groups. For example, the texts with ethnographic information about the Aztecs and Mayas dates to the 1520s. This should make the use of the data more feasible for identifying pre-colonial characteristics for larger groups in Mexico, particularly in terms of political complexity. For smaller groups, however, the main concern is that their institutional features were more likely to have been modified, thus making the anthropological work less reliable, although these groups were organised in bands or tribes, which often had no jurisdictional hierarchy beyond their local communities. All these groups are classified within this lower category in Murdock 's Atlas.

origins of democracy (Bentzen et al., 2017; Ahmed and Stasavage, 2020), and many more.

Specifically, I combined the ethnic data with Murdock's ethnographic variable, called *Jurisdictional Hierarchy Beyond the Local Community*. This is an anthropological index widely used to examine ethnic institutions in different regions and time settings.[13] The variable classifies ethnic groups based on their different levels of political complexity, ranging from 0 to 4, where 0 denotes ethnic groups with a legacy of no political authority beyond the local community; 1 represents petty chiefdoms; 2 means larger chiefdoms; and, finally, 3 and 4 mean states and larger states.

According to this classification, the Atlas records only four Indigenous groups in Mexico within category 2, seven within category 1, and ten within category 0 (the lowest value). All these groups were matched to the census data, representing 50% of the total Indigenous population in the full sample (see Table 1).[14] Table A1 in the Appendix shows the full list of matched and non-matched ethnic groups. Assuming that more fragmented groups were less likely to be surveyed by anthropologists,[15] the non-matched population, classified as 'Others', was assigned the lowest value of Jurisdictional Hierarchy (value of 0). This allowed me to exploit all the ethnic data at my disposal. As robustness checks, I assigned the average value of Jurisdictional Hierarchy of all the matched population to the non-matched population, but I also excluded from the construction of my measure *all* the non-matched population. I then simply calculated a population-weighted average of Murdock's Jurisdictional Hierarchy variable for each municipality between 1930 and 1990. I will refer to this index as **IndigenousInst**. Specifically, my estimate takes the form:

$$\mathbf{IndigenousInst}_{ijt} = \sum \frac{IndigenousPop_{eijt}}{IndigenousPop_{ijt}} \cdot \mathbf{JH}_e \tag{1}$$

In equation 1, $\mathbf{IndigenousInst}_{ijt}$ is my measure of Indigenous institutions in municipality i of state j at census t. $IndigenousPop_{eijt}$ represents the total number of Indigenous people of ethnic group e from municipality i of state j at census t. $IndigenousPop_{ijt}$ denotes the total number of Indigenous people from municipality i of state j at census t. Finally, $\mathbf{JH}_e$ denotes the respective level of political complexity of ethnic group e based

[13] See: Gennaioli and Rainer, 2007 and Michalopoulos and Papaioannou, 2013, and for studies in the Americas see Dippel, 2014 and Angeles and Elizalde, 2017.

[14] The unmatched Indigenous groups are discussed in depth in the Appendix section ('Brief note on the unmatched Indigenous groups'). While I identified the states of Chiapas and Tabasco as two concerning cases, further checks support the main results. For some other states, especially for those with a percentage matching below 30%, all unmatched Indigenous population seems to be linked to Indigenous groups with the lowest political hierarchies.

[15] This assumption is confirmed if we consider that all the groups with a Jurisdictional Hierarchy value of 1 and 2 were matched.

Table 1: Matched Indigenous population in full sample

State	Total number of observations in full sample by state: 1930–1990	Indigenous population matched to the *Ethnographic Atlas* as % of total Indigenous population in full sample: 1930–1990
AGUASCALIENTES	75	59
BAJA CALIFORNIA	32	65
BAJA CALIFORNIA SUR	31	78
CAMPECHE	69	68
CHIAPAS	750	2
CHIHUAHUA	447	65
CIUDAD MEXICO	73	61
COAHUILA DE ZARAGOZA	250	55
COLIMA	60	33
DURANGO	273	10
GUANAJUATO	305	10
GUERRERO	488	58
HIDALGO	534	44
JALISCO	775	64
MEXICO	781	10
MICHOACAN DE OCAMPO	735	65
MORELOS	227	54
NAYARIT	130	29
NUEVO LEON	320	65
OAXACA	3140	66
PUEBLA	1317	71
QUERÉTARO	119	2
QUINTANA ROO	56	85
SAN LUIS POTOSI	373	50
SINALOA	126	28
SONORA	467	18
TABASCO	118	4
TAMAULIPAS	288	62
TLAXCALA	264	41
VERACRUZ	1288	63
YUCATAN	694	69
ZACATECAS	342	37
TOTAL	14,947	50

Note: Matched population refers to the population of Indigenous groups that were matched to the ethnic groups recorded in the *Ethnographic Atlas* (Murdock, 1967). Municipality ethnic data was drawn from the *Instituto Nacional de Estadística y Geografía (INEGI)* of Mexico.

on Murdock's Jurisdictional Hierarchy Index.

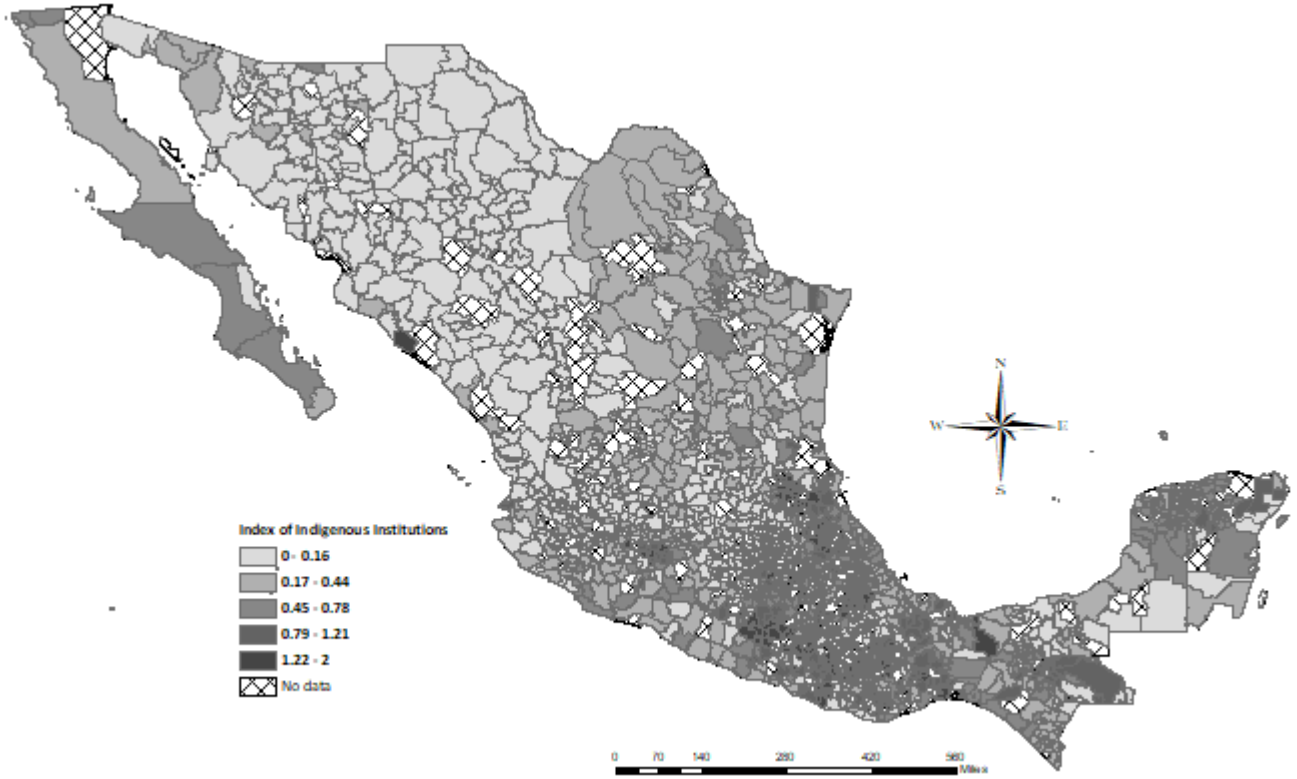
The resulting variable will capture the political complexity of the Indigenous population for each municipality in Mexico over much of the 20th century. As reported in Table 2, the mean of the **IndigenousInst** index is 0.52, bounded by continuous values between 0 and 2, where 0 denotes municipalities with a lower level of political complexity among the Indigenous population, and 2 the higher end. Figure 2 shows the variation of the **IndigenousInst** index across municipalities. The regions in Central, Southern and Yucatan Peninsula in Mexico tend to have the highest concentration of the largest values of the **IndigenousInst** index. Yet Indigenous institutions are also relatively prominent in other regions with no history of complex pre-colonial political institutions, such as the Baja California Peninsula in North-western Mexico, as well as in North-eastern Mexico. This is not surprising, as one important component of the **IndigenousInst** index comes from the different shares of population of Indigenous groups in Mexico. Due to internal migration, we then expect relatively larger values of this index even in places that do not necessarily coincide with the historical homelands of Indigenous people linked to more complex pre-colonial political structures.

Internal migration, indeed, raises important concerns over the interpretation of the **IndigenousInst** index. One would question whether Indigenous people who decided to leave their communities would have requested ancestral land at their new homeland. Moreover, how does migration more generally affect the political cohesion of the Indigenous population? While these questions are potential avenues for future research, Indigenous people would have still been prepared to claim ancestral land as long as these movements were not significant (e.g. Indigenous people moving to adjacent communities).[16]

Movements to adjacent communities would, however, represent a more significant challenge empirically, and consequently affect the interpretation for the **IndigenousInst** index. For example, if Indigenous people had observed a better political environment in their adjacent communities, we would expect more premeditated movements. The **IndigenousInst** index would therefore be contaminated as the success of acquiring ancestral land would not have been the outcome of how effective Indigenous people were in defending their collective interests, but rather due to these combined migration effects. To reduce biases, I used an **IndigenousInst** index that was constructed with the ethnic

[16] In the 1960s, for example, a significant number of Zapotec and Mixtec people (two of the largest Indigenous groups in Mexico in terms of politically centralised features) migrated from the southern state of Oaxaca to the north-western state of Baja California (the latter a region with no record of historical Indigenous settlements of larger groups). Yet there is no single ancestral land plot created in Baja California during the following 30 years of land reform.

Figure 2: Indigenous institutions in Mexico across municipalities



Note: The map shows the variation of **IndigenousInst** index across municipalities in Mexico. Municipality boundaries are in black. **IndigenousInst** index captures the political complexity of Indigenous groups as reported in Murdock's Ethnographic Atlas (Murdock, 1967). **IndigenousInst** ranges from 0 to 2, where higher values denote municipalities with more complex Indigenous institutions (darker shade), and lower values represent the opposite (lighter shade). **IndigenousInst** index was computed using detailed data on the different Indigenous languages of the total Indigenous population, drawn from censuses 1930-1990. The map illustrates the average of **IndigenousInst** between 1930-1990. Municipality ethnic data was drawn from the *Instituto Nacional de Estadística y Geografía (INEGI)* of Mexico.

data drawn from the first census (1930) and explored cross-sectional variation in the full sample. The simple idea is that if some predominant movements took place, by using an **IndigenousInst** index computed with the most historical ethnic information available, I would decrease contamination from potential movements of Indigenous people in subsequent periods. Results (provided in Appendix) still support the main conclusion of the paper.

3.2 Outcome: ancestral land

My dependent variable was the redistribution of ancestral land drawn from the *PHINA*. This *Padron* provides detailed information about the formation of the *Comunidades Agrarias*, such as the total ancestral land redistributed, location and date of formation. According to this *Padron*, a total of 1967 *Comunidades Agrarias* was created between 1917 and 1992. The average size of an ancestral land plot is approximately 84 sq. km, but the size of a plot can range from 0.05 to 6143.21 sq. km (statistics not reported).

Since my main unit of observation is the municipality, I calculated the dependent variable as the total ancestral land redistributed in municipality i at census t divided by the total land area in municipality i. I use the cumulative share of ancestral land at intervals of 10 years, hence corresponding to the structure of the census data. Table 2 shows that the average of accumulated ancestral land is 7% (std. dev: 0.20) in the full sample.[17]

3.3 Controls

Controls were included for some observable municipality characteristics, which might be potential confounders of both ancestral land redistribution and my **IndigenousInst** index. Detailed description and sources of these variables can be seen in the Appendix. These are:

Demographic factors. This is a set of time-variant controls that includes the logarithm of population density –as more densely populated regions would have had more constraints for land availability – and the share of Indigenous population. This latter variable is perhaps more relevant if we consider that in some municipalities the predominant ethnic group would have been Indigenous. We therefore expect a higher redistribution of ancestral land in areas where the share of the Indigenous population is larger, plausibly

[17]There were about 110 municipalities where the redistributed ancestral land exceeded the actual municipality land area. This issue seems to be related to the irregularities undertaken when documenting the formation of the communal lands (Walsh Sanderson, 1984). The main analysis excludes these observations, but I also show results with them included.

due to a higher political pressure to restore ancestral land. Alternatively, a larger share of Indigenous population may have led to less redistribution of resources, as granting more ancestral land would essentially have hindered urbanisation or modernisation policies at the local level.

Geographical and locational factors. Another potential concern is in relation to the possible geographical and locational effects on ancestral land redistribution. Hence, I include controls for elevation, latitude, land area and land suitability. Indeed, geographical factors may have affected ancestral land redistribution in many complex ways. For example, recent studies have found a strong association between land quality and allocation of land rights to Indigenous people. Leonard et al. (2018) demonstrate that, after the introduction of the Allotment Act of 1887 in the United States, American Indian Reservations with a higher land quality were more likely to be allocated than Reservations with poor land endowments. Furthermore, a wide range of studies assert that locational factors that made pre-modern societies institutionally more (or less) advanced tend to persist and thus help make present-day societies more (or less) successful (Acemoglu et al., 2001, 2002; Dell 2010; Acemoglu and Robinson, 2012; Fenske, 2014; Maloney and Valencia, 2016; Oto-Peralías and Romero-Avila, 2017).

Historical controls: colonial legacy. A further concern is whether the colonial arrangements controlling Indigenous settlements might be responsible for the redistribution of ancestral land. I therefore include controls for the degree of exposure to historical Indigenous settlements as measured by the number of *Pueblos de Indios*; the extent of land area for these Indigenous settlements; and the historical Indigenous population by the year 1800.

There are many ways by which these colonial factors may confound ancestral land redistribution. It would be possible that in municipalities with a higher exposure to *Pueblos de Indios*, the restoration policy may have been more successful, irrespective of the legacy of political complexity of Indigenous groups. To put it simply, present-day Indigenous communities that were directly or indirectly more exposed to these *Pueblos* may have been more likely to furnish the historical evidence that allowed them to be linked with ancestral land since 'time immemorial' — an essential prerequisite to submitting a formal restoration petition. Furthermore, it would be possible that municipalities, historically associated with these Indigenous settlements, may have been more politically integrated, but later followed by a process of political fragmentation caused by the colonial policies in place to control the Indigenous population (Arteaga, 2018). This means that if the effect of Indigenous institutions is to be cancelled out by the presence of the *Pueblos*, then the main driver affecting the redistribution of ancestral land should come from these colonial

arrangements, and not via Indigenous institutions.

Alternative channels: additional ethnic characteristics. The selection of unobservable characteristics may nonetheless be of concern due to the persistence of other relevant ethnic factors. For instance, proto-democratic practices had essentially been developed by both larger and smaller Indigenous groups (Bentzen et al., 2017). Hence, the ability to impact policy may not have been an outcome of how politically centralised groups challenge the state at the national level but rather attributable to the ability of Indigenous people to achieve local treaties more effectively.

I therefore made efforts to control for some important alternative ethnic channels of ancestral land redistribution. To do so, I selected relevant ethnic variables from Murdock's Atlas that might also potentially confound the restoration policy. These are: the fraction of Indigenous population that historically depended on agriculture; an index of settlement patterns ranging from 0 to 8, where 0 denotes fully nomadic and 8 permanent settlement; an index of local community complexity ranging from 0 to 4, where 0 represents highly fragmented communities and 4 more integrated; the fraction of the Indigenous population whose ancestors practised a more equal distribution of land; and, finally, the fraction of the Indigenous population whose ancestors relied on proto-democratic practices.

Ethnic heterogeneity. Finally, since the **IndigenousInst** index does not account for any forced-coexistence effect (Dippel, 2014), I also control for ethnic heterogeneity by including the most widely used index of ethnolinguistic fractionalisation in the literature (Alesina et al., 1999). Moreover, a well-established literature argues that ethnic diversity is a key driver of the redistribution of resources (Alesina et al., 1999). Hence, while the **IndigenousInst** index will capture the ability of ethnic groups to 'coordinate' and thus effectively influence policy outcomes, the ethnolinguistic fractionalisation index will capture the 'costs' of different ethnic groups in coordinating their political demands (Gennaioli and Rainer, 2007).

3.4 Descriptive results

Figure 3 is a graphical interpretation of the main finding of the paper. Figure 3 plots the evolution of ancestral land redistribution from 1930 to 1990 between two groups of municipalities: politically fragmented and politically centralised. To plot these groups, I followed the literature and constructed an indicator on political centralisation (Gennaioli and Rainer, 2007; Michalopoulos and Papaioannou, 2013; Dippel, 2014). I defined municipality i as politically centralised if the value of the **IndigenousInst** index is higher than 1, but if the value of this index is lower or equal to 1, municipality i is then classified as

politically fragmented.

The trends that we observe in Figure 3 speak for themselves. Ancestral land was redistributed significantly more in municipalities with a larger share of Indigenous people characterised by complex Indigenous institutions (politically centralised group). Indeed, municipalities with fragmented groups saw some ancestral land redistribution between 1930 and 1960. However, from 1960 onwards, there is a clear divergence in the redistribution of ancestral land between these two groups of municipalities. The restoration policy somewhat stalled in municipalities with fragmented groups during the remaining three decades of land reform. In sharp contrast, municipalities where the majority of the Indigenous population relates to centralised societies, ancestral land carried on accumulating throughout the period of the restoration policy.

One possible explanation of this apparent divergence is the deep economic crisis starting in the 1950s which caused discontent across rural Mexico. As documented by Fergusson et al. (2018), because this economic crisis significantly undermined the ruling political party's hegemony, the government started to accelerate its land distribution policy in order to reduce social unrest and political competition. Indeed, Indigenous communities also took over the demands throughout the 1960s, leading to the establishment of political organisations whereby land restoration issues were addressed (Altamirano-Jimenez, 2013).[18]

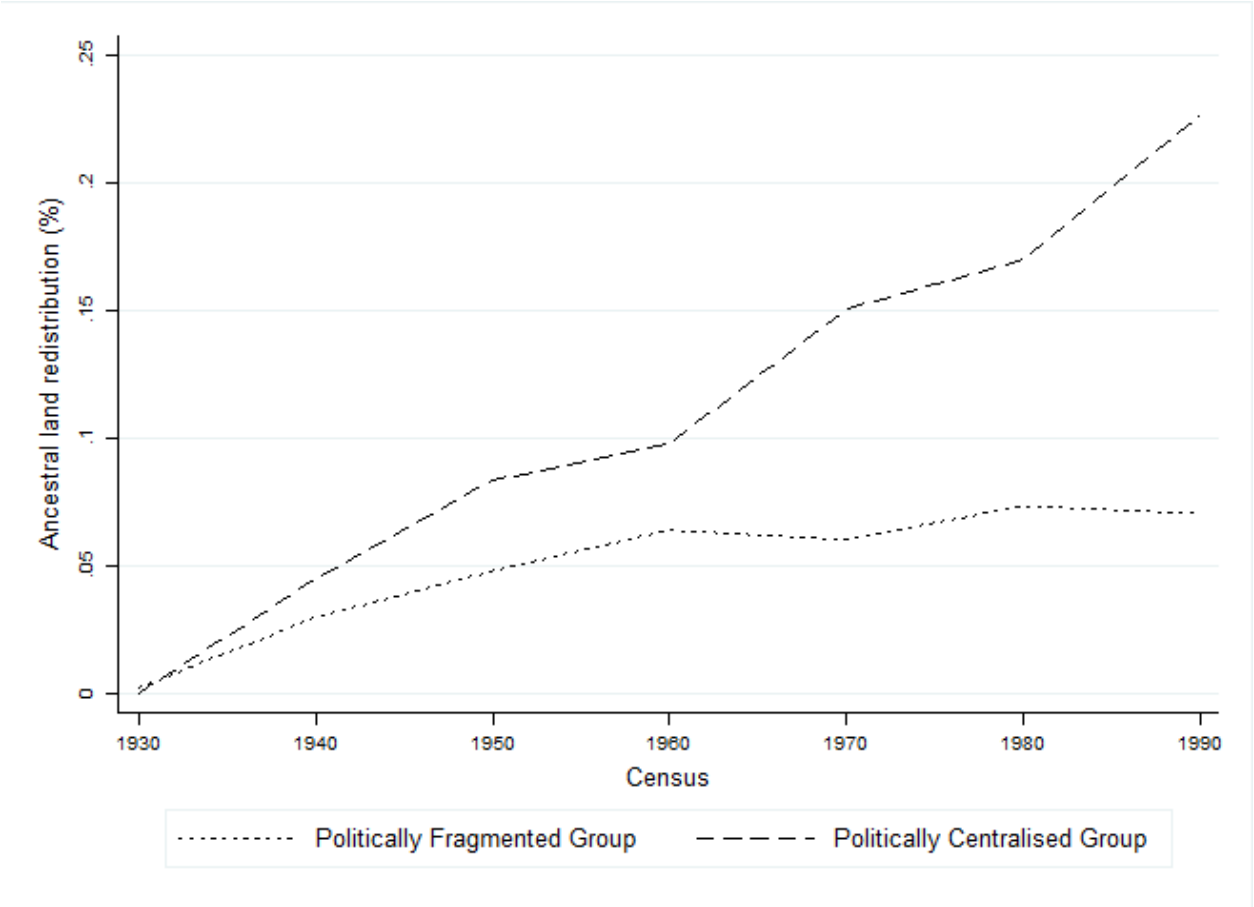
An important concern is whether the redistributed ancestral land relates to *original* land. This point is relevant considering that in approximately 450 years of colonial and post-colonial rule, some of the Indigenous communities may have lost their Indigenous identity, along with their links and impetus for ancestral land.[19] One way to explore this concern is to investigate if there is any reliable settlement pattern between the thousands of *Comunidades Agrarias* created during land reform and the *Pueblos de Indios* — the latter arguably the basis of ancestral land. While Figures 4a and 4c show the *Comunidades Agrarias* and *Ejidos* (non-ancestral land) that were established throughout the reform, Figure 4b illustrates the location of the *Pueblos de Indios*[20] that existed by 1800. By just looking at these maps, it is possible to observe that only the *Comunidades Agrarias* and *Pueblos* tend

[18]For example, in the early 1970s, the Zapotec COCEI's political organisation, one of the largest Indigenous political movements at that time, was created in the southern state of Oaxaca – a state where the majority of the Indigenous population relates to centralised Indigenous groups. The organisation was key in addressing not only land claims but also local issues such as greater local governance (Altamirano-Jimenez, 2013).

[19]A well-established literature has emphasised that ethnic identity tends to vary across individuals and across time (Chandra, 2006). The process of state building in Mexico may have affected ethnic identity via state-sponsored education, for instance.

[20]The data on *Pueblos de Indios* comes from the *"Atlas Ilustrado de los Pueblos de Indios"* compiled by Dorothy Tanck de Estrada (2005), which I will describe in more detail in the following sections.

Figure 3: Ancestral land redistribution in Mexico by politically centralised *versus* politically fragmented groups



Note: This figure shows the evolution of ancestral land redistribution in Mexico from 1930 to 1990, by two groups of municipalities: politically fragmented and politically centralised. Ancestral land redistribution is the share of ancestral land redistributed out of the total land area for each municipality. Municipalities within the politically centralised group are those where the **IndigenousInst** index is higher than 1. Whereas municipalities within the politically fragmented group are those where this index is lower or equal to 1. The classification captures the political centralisation of the Indigenous population in Mexico based on Murdock's *Ethnographic Atlas* (Murdock, 1967). Ethnic information was drawn from the Mexican National Statistics Office's censuses between 1930 and 1990.

to follow similar settlement patterns.[21]

In the next section, I provide a more sophisticated empirical approach by exploiting a panel strategy that controls for municipality-fixed effects, which otherwise confound the effect of my estimates.

3.5 Empirical specification

To investigate the effects of Indigenous institutions on the redistribution of ancestral land, I use the following specification:

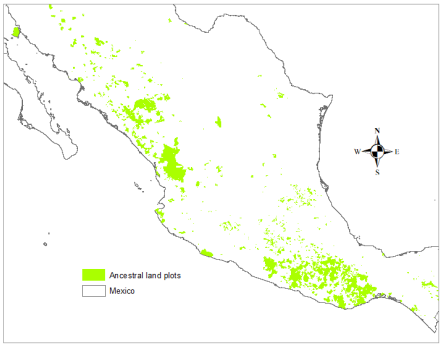
$$\mathbf{L}(\%)_{ijt} = \alpha_j + \tau_t + \beta \mathbf{IndigenousInst}_{ijt} + \theta \mathbf{X}_{ij} + \delta \mathbf{Z}_{ijt} + \eta \mathbf{S}_{ijt} + \varepsilon_{ijt} \tag{2}$$

In equation 2, $\mathbf{L}(\%)_{ijt}$ is the share of ancestral land area distributed in municipality i of state j at census t. α_j captures a municipality-fixed effect that controls for time-invariant municipality characteristics. τ_t is census-fixed effects, which controls for time shocks that affect all municipalities at census t. β captures the effect of Indigenous institutions on ancestral land redistribution in municipality i of state j at census t. $\mathbf{X}_{ij}$ is a set of time-invariant geographical and historical controls, which will be factored out with the fixed effects specifications. $\mathbf{Z}_{ijt}$ is a vector of time-variant demographic factors, such as the logarithm of population density and the share of the Indigenous population. Finally, $\mathbf{S}_{ijt}$ is a rich set of time-variant variables controlling for other ethnic factors. ε_{ijt} is the error term. Robust standard errors are clustered at the municipal level. As a robustness check, I also include Driscoll–Kraay standard errors that are robust to spatial dependence (Driscoll and Kraay, 1998).

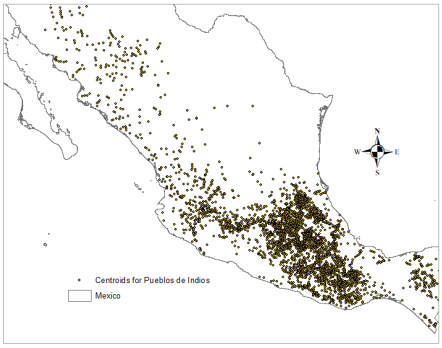
[21] To quantify these settlement patterns across municipalities (our main unit of observation), I matched the *Comunidades Agrarias*, *Ejidos* and *Pueblos de Indios* to municipalities by using the centroids of the *Comunidad Agraria*, *Ejido* and *Pueblo*. I considered a *Comunidad Agraria*, *Ejido* and *Pueblo* to match a municipality if its centroid falls within the boundaries of one of the municipalities. This allowed me to construct three different variables measuring the total number of *Comunidades Agrarias*, *Ejidos* and *Pueblos* that fall within each municipality. By exploring simple correlations between these variables, I found that while the correlation (not reported) between the number of *Comunidades Agrarias* and the number of *Pueblos* is 0.37, the one for *Ejidos* and *Pueblos* is just 0.05. While these are simple correlations, they suggest, at first sight, that municipalities that were more exposed to the *Comunidad Agraria*'s scheme accord largely with the notion of ancestral land in Mexico as these tend to show a higher presence of *Pueblos*. In the empirical section, I provide a more sophisticated analysis to shed light on these associations.

Figure 4: Settlement patterns of *Comunidades Agrarias*, *Ejidos*, and *Pueblos de Indios*

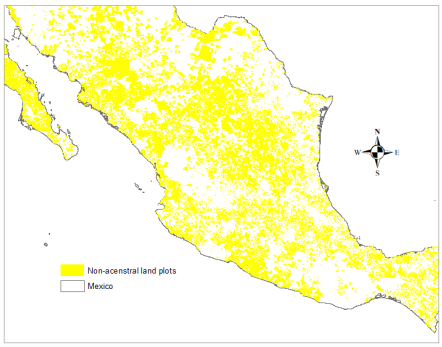
(a) *Comunidades Agrarias*, 1910s-1990s



(b) *Pueblos de Indios*, 1800s



(c) *Ejidos*, 1910s-1990s



Note: Figure 4a shows the land area under the *Comunidades Agrarias*' policy, whereas Figure 4c illustrates the land area under the *Ejidos*' policy. Geospatial data on *Comunidades Agrarias* and *Ejidos* were drawn from the 'Datos Abiertos de Mexico'. Figure 4b shows locations of the *Pueblos de Indios* that existed by the 1800s. Data on *Pueblos* is from the *'Atlas Ilustrado de los Pueblos de Indios'*, compiled by Dorothy Tanck de Estrada (2005).

Table 2: Descriptive Statistics

	Observations	Mean	Std Dev	Min	Max
Outcomes:					
Ancestral land (%)	13,759	0.07	0.20	0	0.99
Literacy rates (*logs*)	13,683	0.40	0.18	0	0.68
Literacy rates (*logs*) for Indigenous pop, in rural areas	1929	-0.29	0.17	-1.5	-0.01
Literacy rates (*logs*) for non-Indigenous pop in rural areas	2070	-0.18	0.10	-1.56	-0.01
Literacy rates (*logs*) for Indigenous pop in urban areas	1385	-0.2	0.13	-0.84	-0.01
Literacy rates (*logs*) for non-Indigenous pop in urban areas	1434	-0.12	0.08	-1.34	-0.00
Main variable of interest:					
IndigenousInst index	13,682	0.52	0.69	0	2
Baseline controls:					
Share of Indigenous population	13,682	0.20	0.29	0	0.98
Population density (*logs*)	13,694	3.3	1.28	0.03	9.8
Latitude	14,200	20.16	3.4	14.64	32.44
Altitude (*km*)	14,200	1.36	0.84	0.0	3.3
Land suitability index	14,200	75.01	28.75	0	99
Land area (*logs*)	14,200	5.62	1.5	0.83	10.88
Historical controls:					
Num. of *Pueblos de Indios*	14,200	1.93	2.54	0	26
Pueblos de Indios' land area	14,947	5.92	17.29	0	270
Historical Indigenous pop (*logs*)	14,200	1.42	5.66	-4.61	9.77
Ethnic-specific controls:					
Agriculture dependence	13,682	0.59	0.23	0	0.93
Settlement patterns	13,682	5.3	2.15	0	8
Jurisdictional Hierarchy at local level	13,682	2.71	1.06	0	4
Election	13,682	0.44	0.28	0	1
Land rights	13,682	0.78	0.31	0	1
Ethnic Fractionalisation Index	13,682	0.17	0.22	0	0.75

4 Main Results

4.1 Baseline results

Table 3 presents the results of the estimating equation 2. The dependent variable is the share of ancestral land area redistributed throughout the restoration policy. I began the analysis with the pooled panel regressions in column (1), which conditioned with regards to important observable municipality characteristics such as geographical and historical factors. Columns (2)–(6) show the fixed-effect models, which allow me to exploit the cross-sectional relationship between ancestral land redistribution and Indigenous institutions and the changes in this association during the restoration policy. All fixed-effects estimates include a set of municipality-fixed effects and a set of census-fixed effects, alongside relevant time-variant controls, which I added incrementally.

The main observation from Table 3 is that the coefficient on **IndigenousInst**, β, is statistically significant at 1% level in virtually every specification. After cancelling out all time-invariant unobservable municipality characteristics in column (2), my coefficient of interest by itself takes the value of 0.021. This value implies that passing from a hunter-gathering group to one of large chiefdom (an increase of 2 units in the **IndigenousInst** index) leads to an increase of ancestral land redistribution to 0.042. This effect is sizeable if we consider that the mean of ancestral land is 0.07 in Table 2.

Turning to the effects of geographical and historical factors in the pooled panel regressions in column (1), geographical and locational characteristics appear to be important for latitude, elevation and land suitability. Regarding colonial controls, virtually all seem to be important. While exposure to the historical Indigenous settlements and the historical Indigenous population have a significant and positive effect, the effect of land area of the historical Indigenous settlements is negative. These results, however, underline important points, particularly for the historical controls. Firstly, they support the observation that the restoration policy was largely associated with the notion of ancestral land in Mexico: the higher the exposure to *Pueblos de Indios*, the more ancestral land plots were established.[22] Secondly, ancestral land plots were in fact generally established in regions where the Indigenous population was largely settled during colonisation, as measured by the historical Indigenous population. Thirdly, and more generally, these results support the idea that Indigenous institutions and the redistribution of ancestral land were not two isolated phenomena: Indigenous people did impact on policies underpinning important

[22] I also tested the extent to which the historical Indigenous settlements depended on Indigenous institutions by interacting this index with *Pueblos de Indios*. The interaction term was positive but insignificant, yet the coefficient on Indigenous Institutions was once again unchanged. Results not reported.

collective interests: ancestral land.

Returning to the fixed-effects models, in column (3), I include relevant time-variant demographic factors that may also confound my estimates. Population density appears important and shows the expected sign: densely populated regions lower the redistribution of ancestral land. The fact that the share of Indigenous populations is negative and significant reassures that the **IndigenousInst** index is not capturing the effects of population sizes of more advanced Indigenous groups, which are often more populous. Remarkably, the effect of Indigenous institutions remains positive and statistically significant, and changed only marginally from column (2) to column (3).

In column (4), I explore alternative channels of ancestral land redistribution by including additional ethnic characteristics created from Murdock's Atlas. Interestingly, only proto-democratic practices and local community complexity impact positively on the restoration policy, whereas settlement patterns and land rights impact negatively. Indeed, these other ethnic features appear to have played an important role in ancestral land redistribution. For example, the effect of proto-democratic practices implies that municipalities with a higher fraction of Indigenous people whose ancestors practised early forms of democracy may have seen the 'deliberation' of more effective collective actions.[23] Importantly, although these other ethnic factors seem to be important, together they did not challenge the effect of my main variable of interest: the estimated coefficient on **IndigenousInst** even increases in magnitude and remains statistically significant.

To account for forced-coexistence and ethnic diversity effects, I include in column (5) the ethnolinguistic fractionalisation index, which displays a negative effect on my dependent variable. This suggests that a larger ethnic diversity meant a lower redistribution of ancestral land, which aligns with the well-established literature addressing the underlying effects of ethnic heterogeneity on public goods (Alesina et al., 1999). Finally, in column (6), I deal with outliers by removing all observations where the redistributed ancestral land exceeded the total land area in municipalities.

All in all, the results in Table 3 are strongly supportive of the main argument of the paper: namely more politically cohesive Indigenous groups were better able to challenge the restoration policy in Mexico as opposed to politically fragmented groups. Figure 5 shows the scatterplot of the partial correlation between Indigenous institutions and ancestral land redistribution of my preferred fixed-effect specification (col. 6).

[23] While this result suggests that early democracy is also an important factor for collective actions among the Indigenous population, at this point, I simply regard this ethnic feature as a meaningful control. Hence, exploring how proto-democratic institutions persisted and, more importantly, how these institutions have allowed Indigenous groups to better coordinate collective actions is a promising area for future research.

Table 3: Baseline results

Dependent variable: Ancestral Land (%)						
	(1)	(2)	(3)	(4)	(5)	(6)
	Pooled OLS estimates	Fixed-effects estimates				
IndigenousInst	0.032***	0.021***	0.023***	0.047***	0.049***	0.020***
	[0.009]	[0.008]	[0.008]	[0.009]	[0.010]	[0.005]
Population density (*logs*)			-0.068***	-0.060***	-0.060***	-0.028***
			[0.011]	[0.010]	[0.010]	[0.004]
Share of Indigenous population			-0.15***	-0.12**	-0.015	-0.049
			[0.053]	[0.05]	[0.08]	[0.03]
Latitude	0.01**					
	[0.004]					
Altitude (*km)*	0.059***					
	[0.008]					
Land suitability index (%)	0.001***					
	[0.000]					
Land area (*logs*)	0.000					
	[0.007]					
Num. of *Pueblos de Indios*	0.003*					-
	[0.002]					
Historical Indigenous pop (*logs*)	0.004***					
	[0.001]					
Pueblos de Indios' land area	-0.001***					
	[0.000]					
Agriculture dependence				-0.12	-0.13	-0.05
				[0.09]	[0.08]	[0.05]
Settlement patterns				-0.033***	-0.034***	-0.024***
				[0.007]	[0.007]	[0.003]
Jurisdictional Hierarchy at local level				0.068***	0.071***	0.043***
				[0.021]	[0.021]	[0.011]
Election				0.34***	0.35***	0.19***
				[0.032]	[0.034]	[0.017]
Land rights				-0.19***	-0.18***	-0.09***
				[0.046]	[0.046]	[0.024]
Ethnic Fractionalisation Index					-0.24**	-0.097***
					[0.11]	[0.036]
State-fixed effects	Y	N	N	N	N	N
Municipality-fixed effects	N	Y	Y	Y	Y	Y
Census-fixed effects	Y	Y	Y	Y	Y	Y
Observations	13,668	13,668	13,668	13,668	13,668	13,238
Adjusted R-squared	0.25	0.10	0.11	0.14	0.14	0.17

Note: This table presents the effects of Indigenous institutions on ancestral land redistribution. **IndigenousInst** refers to the legacy of political complexity of the Indigenous population in Mexico measured at the municipal level. Ancestral land (%) is the total ancestral land area accumulated during land reform in Mexico via the *Comunidades Agrarias*' policy. Col. 1 shows the pooled panel estimates. These regressions include state-fixed effects and census-fixed effects, as well as a set of geographic and historical controls. Cols 2–6 present the fixed effects (FE) estimates. FE estimations include a full set of municipality and census-fixed effects, alongside an array of time-variant controls. Robust standard errors in parenthesis are clustered at municipality level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

4.2 Evidence from timing: differential trends

Figure 1 shows important structural breaks in the restoration policy. This makes the panel variation in the data useful, specifically to observe the timing of the differences in ancestral land redistribution across municipalities with different levels of Indigenous institutions.

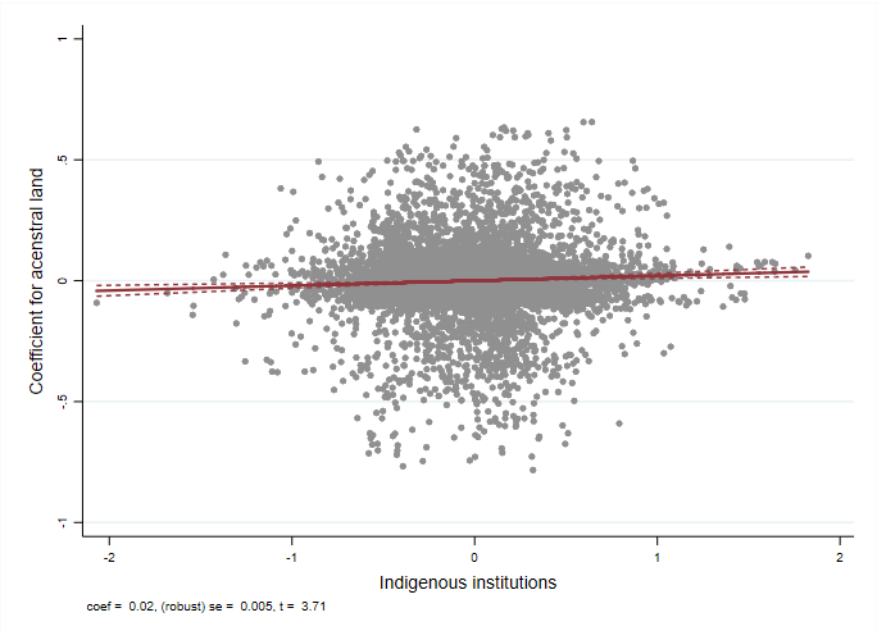
One important break emerged during the great acceleration of land redistribution from the mid-1930s to 1940. Before this period, the state focussed mainly on the redistribution of non-ancestral land (*Ejidos'* plots), arguably to pacify the country after the end of the Mexican Revolution. During this post-revolutionary period, the restoration policy had little significance for the state. As Figure 1 shows, the distribution of ancestral land was irrelevant during the 1920s and increased considerably only after the mid-1930s, when land reform was revived by Lazaro Cardenas, who served as President of Mexico between 1934 and 1940. Cardenas was famously known for his harsh expropriating policies, particularly in the oil industry, but also for his firm commitment to land redistribution. But more notably, in 1934, the agrarian legislation was improved with the introduction of an Agrarian Code, which made the restoration policy easier to deliver (Alcázar Godoy 2014). Hence, by the end of Cardenas' term, 1 million hectares of ancestral land had been redistributed – a sharp increase from the mere seven thousand hectares allocated during the late 1920s.

I therefore test the prediction that ancestral land redistribution became significantly more important from 1934 when the restoration policy was invigorated by the Cardenas administration and as a result of important changes in the agrarian law in Mexico. To implement this exercise, I extrapolated the **IndigenousInst** index in 1920. This is because the ethnic data for the 1920 census was not available. I then investigate this with following specification:

$$\mathbf{L}(\%)_{ijt} = \alpha_j + \tau_t + \beta \mathbf{IndigenousInst}_{ijt} + \sum_{t=1920}^{1990} \delta_t(\mathbf{IndigenousInst}_{ijt} * census_t) + \eta \mathbf{X}_{ijt} + \varepsilon_{ijt} \tag{3}$$

Equation 3 is similar to equation 2, the difference is that in equation 3 an interaction term between $\mathbf{IndigenousInst}_{ijt}$ and the set of census dummies, $census_t$, was included. Hence, δ_t is my estimate that compares differences in ancestral land distribution before (1920) and after the regime break across municipalities with different levels of Indigenous institutions. Our coefficient of interest, δ_t, therefore allows us to observe the variation of ancestral land on the basis of Indigenous institutions at each census and compares it with

Figure 5: Partial correlation between Indigenous institutions and ancestral land redistribution in Mexico



Note: This figure shows the scatterplot of Indigenous institutions and ancestral land redistribution in Mexico, controlling for municipality-fixed effects and time-fixed effects, alongside other important covariates such as population density, the share of Indigenous population, and some other ethnic variables.

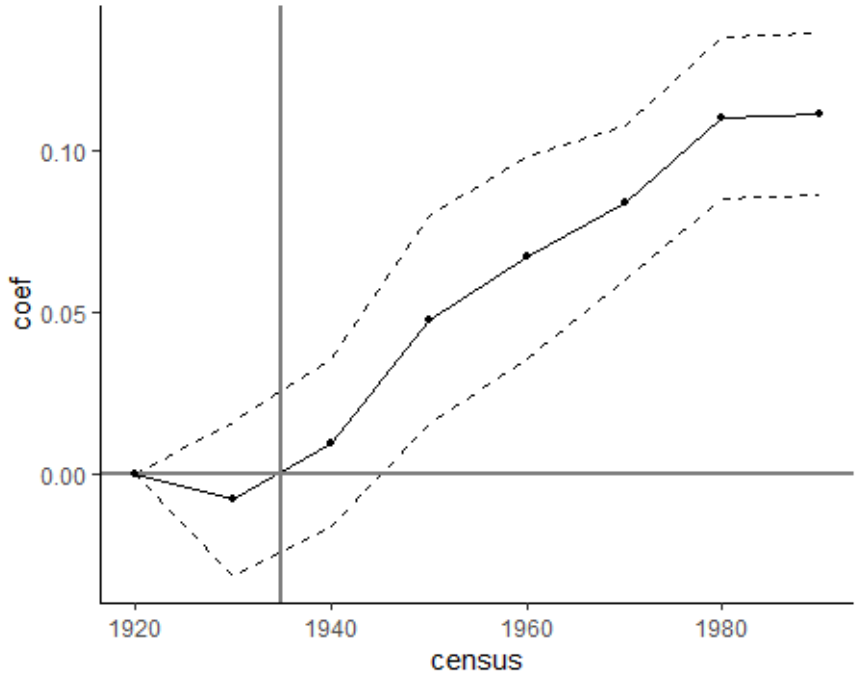
the 1920 census (our baseline period).

Figure 6 shows the main estimates, δ, obtained from equation 3. The pattern demonstrates that there was no differential effect of Indigenous institutions in 1930 and 1940, but this began to show from 1950 onwards. These results are consistent with the qualitative evidence emphasising the revival of land reform during the Cardenas' regime in the mid-1930s. Importantly, the results reveal the timing of the effects of Indigenous institutions on the restoration policy, which become more important only after the 1940s. These differential estimates are summarised in column (1) of Table 4.

4.3 Evidence from linguistic similarities

The previous results relied on a rich data source on ethnicity collected over the 20th century, allowing me to exploit novel variations of early institutions through the Indigenous population. However, an important limitation in the construction of the **IndigenousInst** index is that, on average, half of the full sample was not matched to the anthropological data (see Table 1). This means that, on average, 50% of the Indigenous population did not have information on its corresponding levels of pre-colonial political institutions, as

Figure 6: Differential estimates of the effects of Indigenous institutions on ancestral land redistribution



Note: This figure shows the coefficients on the interaction between the **IndigenousInst** index and the set of indicators for censuses, as calculated in equation 3. The dependent variable is ancestral land redistribution as specified in Section 3.2. The coefficients capture the differences in ancestral land before (1920 census) and after the regime break in 1934 in municipalities with different levels of Indigenous institutions. The vertical line indicates the break of regime in 1934 and the year when the agrarian law in Mexico was modified. 95% confidence intervals are displayed in dotted lines.

reported in Murdock's Atlas. I nonetheless included the unmatched population by assigning it the lowest value of Murdock's Jurisdictional Hierarchy variable, with the crude assumption that smaller groups are generally unresearched by anthropologists. Yet, in this section, I made headway on increasing the matching in the data by constructing an alternative **IndigenousInst** index based upon a linguistic similarity approach.

As previously pointed out, the ethnic origins of the Indigenous population were tracked via detailed census data on Indigenous languages. As a result, 21 Indigenous groups were matched from the census data to Murdock's Atlas. However, based on the linguistic classification for the 2010 census, there are approximately 64 Indigenous languages in Mexico (see classification in Table A1). This means that about 40 Indigenous groups were not assigned their respective value from Murdock's Jurisdictional Hierarchy variable. To further increase the matching across my two datasets, I therefore took advantage of the linguistic similarity among Indigenous groups as follows.

I first used the *Ethnologue* data to construct a linguistic similarity tree. *Ethnologue* provides the world's most comprehensive record of 7711 living languages, including detailed language families. From each language family, one can access a series of language subgroups, each containing a list of closely related languages. I identified 7 language families and 20 language subgroups in Mexico. Table A2 in Appendix presents the linguistic similarity tree. I deemed n number of Indigenous groups to be linguistically similar if they belong to language subgroup i. I then assigned a value of Murdock's Jurisdictional Hierarchy variable to all the Indigenous groups in language subgroup i based on the anthropological information from the Indigenous group that was previously matched to Murdock's data. For example, in Table A2, the Oto-Pamean subgroup from the Otomanguean family has five closely related Indigenous languages: Chichimeca, Matlazinca, Mazahua, Otomi, and Pame. In this subgroup, the Chichimeca group had been matched to Murdock's data by taking level zero of Jurisdictional Hierarchy (the lowest category). Consequently, all closely related groups of the Chichimeca group received its Jurisdictional Hierarchy value, which is 'zero'. This strategy allowed me to increase the number of Indigenous groups matched to 45 from 21.

I then calculated a population-weighted average of Murdock's Jurisdictional Hierarchy variable as in equation 1, but based on this linguistic similarity approach. I used, nonetheless, only the ethnic data from the 1990 census to construct this alternative **IndigenousInst** index. This was because the first censuses did not have a comprehensive and systematic linguistic classification.[24] Yet the strategy allowed me to obtain a stronger matching in the

[24]For example, while I found 36 Indigenous languages in the 1930 census, there were only 30 in the 1970 census. It was not until the 1990 census that a comprehensive linguistic classification was developed.

data. As Table A3 in Appendix shows, virtually 90% of the Indigenous population was matched to Murdock's data.

In column (2) of Table 4, I estimate the effects of Indigenous institutions on the restoration policy using the above alternative index. The dependent variable is the share of the *total* ancestral land area redistributed by 1990 in municipality i. The cross-sectional OLS regressions include a set of state-fixed effects, alongside the array of controls included in our baseline models (see equation 2). The results support the main conclusion of the paper. The coefficient on the alternative **IndigenousInst** index is once again positive and highly statistically significant.

4.4 Evidence from 'plurality' units

Another important concern relates to the main theoretical argument *vis-à-vis* the empirical strategy. The theoretical argument focuses principally on ethnic groups by arguing that politically centralised groups are usually more capable of organising collective actions against the state, as opposed to politically fragmented groups. However, one could question whether the empirical analysis necessarily measures Indigenous 'groups' *per se*, as opposed to weighing individuals by their degree of pre-colonial political hierarchy of their corresponding ethnic group. This starkly raises the question as to why individuals from different ethnic groups, but with similar (or different) degrees of politically hierarchical characteristics, would be willing to form a cohesive political community capable of acting as collective?[25]

While the above question would lead us to a future inquiry, I made progress on this important point by estimating the effects of Indigenous institutions based on municipalities where a single Indigenous group has been a clear plurality, which I call 'plurality' units. The basic idea is that if the effects of Indigenous institutions hold across municipalities where Indigenous group e is a clear majority, we could then be reasonably confident that the politically centralised characteristics of Indigenous group e is what matters in the organisation of collective actions to better affect policy outcomes, albeit with a degree of ethnic diversity in municipalities.

I selected a sample of 'plurality' units as follows. I first identified the ethnic groups that had the largest share of population with respect to the total Indigenous population in each subnational state. To avoid erroneous identifications due to the migration of Indigenous people in more recent times, I used the first censuses to establish this initial identification (e.g. 1930). This resulted in 7 different Indigenous groups with a strong presence in 14

[25] I thank an anonymous referee for raising this important question.

subnational states.[26] Of these 7 Indigenous groups, 4 correspond to category 2 of Murdock's Jurisdictional Hierarchy variable (that is, politically centralised groups); 2 groups correspond to category 1; and 2 more groups to category 0 (or politically fragmented groups).[27] I then selected my set of 'plurality' units as those municipalities in subnational state s where the share of ethnic group e was >50% between 1930 and 1990.[28] The 'plurality' sample then comprised 280+ units in each census (n=2038). This sample would represent the most accurate approximation of municipalities in Mexico where a single Indigenous group has been a clear plurality.

In column (3) of Table 4, I explore whether the pre-colonial political hierarchy of Indigenous 'groups' matters for the redistribution of ancestral land based on my 'plurality' units. Remarkably, my estimated coefficient on **IndigenousInst** appears once again statistically significant at 1% level. These results support the main theoretical argument of the study: Indigenous groups with more politically centralised characteristics are better capable of making their collective interests heard than politically fragmented groups. Specifically, politically centralised groups in Mexico were therefore better able to affect the restoration policy, thus allowing them to accumulate a higher proportion of ancestral land. These results are particularly important in the context of mixed ethnicity reservations and efforts to ensure successful land claims across the Americas.[29]

4.5 Evidence from non-ancestral land (*Ejidos*)

Important to consider is the role of Indigenous institutions in the redistribution of non-ancestral land via the *Ejidos* programme. While the Indigenous people primarily contested ancestral land, many decided, or were forced, to gain non-ancestral land (Appendini 2002). However, the non-ancestral land was usually disputed by groups with larger interests, and not only by the Indigenous population. We then expect Indigenous institutions to have an opposite effect as, generally, central governments prioritise the non-Indigenous population over the Indigenous one in the redistribution of resources.

To explore this issue, I constructed a similar dependent variable as before but in this in-

[26] Of course, there were some Indigenous groups with a stronger presence in more than one subnational state, particularly for more politically centralised groups. For instance, the Aztec group has a strong presence in 6 different subnational states, whereas the Mayas in 3.

[27] The Indigenous groups with their corresponding Murdock's Jurisdictional Hierarchy value are as follows. Level two: Aztec, Zapotec, Mixtec, Purepecha; Level one: Maya; and Level zero: Huichol and Tarahumara.

[28] Results were also subject to more restricted thresholds, but not beyond a 70% limit. This is because virtually all municipalities in Mexico are ethnically diverse. Hence, by adopting a higher threshold I ended up with no observations at all.

[29] See: Leonard et al., 2018; Dippel and Frye 2019; Dippel et al., 2019; and Feir et al., 2019.

stance used data on the total non-ancestral land area redistributed through *Ejidos*. Results are presented in column (4) of Table 4. I found a negative and strong effect of Indigenous institutions on non-ancestral land. This should be interpreted as evidence indicating that Indigenous people do contest policies even in contexts that are less favourable for the success of their collective actions as these tend to be more open to challenge by the state. In this case, the results show that in municipalities with a larger presence of Indigenous population linked to more complex Indigenous institutions, the gains in non-ancestral land through the *Ejidos* programme were less successful.

4.6 Robustness

A series of robustness checks were conducted, some of which had already been tested in previous subsections. Firstly, I excluded all observations where ancestral land area exceeded the total land area of municipalities. Secondly, I increased the matching across the two main datasets (census data and Murdock's Atlas) by creating an **IndigenousInst** index based on a linguistic similarity approach. Thirdly, I identified all the municipalities where a single Indigenous group had been a clear majority with respect to the rest of the groups. My results carried through all these specifications.

In Table A4 in the Appendix section, I further tested the accuracy of the **IndigenousInst** index in several ways. Following the strategy to include the unmatched Indigenous population by assigning the lowest category of Murdock's Jurisdictional Hierarchy variable, I assigned to the unmatched population a value of Murdock's variable equal to the average of all ethnic groups that were matched (col. 1). Another check was to exclude virtually *all* the unmatched population in the construction of the **IndigenousInst** index (col. 2). A further check was to tackle the issue relating to the migration of Indigenous people, which may have contaminated the **IndigenousInst** index (Col. 3). This was addressed by constructing an index based on ethnic data from the first census (1930). My variable of interest appears to be important in all these checks.

In column (4) of Table A4, I adjust the standard errors for spatial dependence in the data by using Driscoll–Kraay standard errors (Driscoll and Kraay, 1998). The accuracy of the estimated coefficient on **IndigenousInst** remains important, albeit at the 10% level.

Another concern was measurement errors, especially in relation to the construction of the different variables recorded in Murdock's Atlas. As noted above, the construction of this set of variables was based mainly on two methods: direct anthropological documentation and historical sources. Murdock then tried to record the most appropriate factors to describe societies prior to external shocks. In this description, our biggest concern is par-

Table 4: Evidence from timing, linguistic similarity, plurality units and non-ancestral land

Dependent variable: Ancestral Land (%)				
	(1)	(2)	(3)	(4)
IndigenousInst		0.053***	0.038***	-0.013***
		[0.014]	[0.015]	[0.004]
IndigenousInst X 1930 census	-0.008			
	[0.012]			
IndigenousInst X 1940 census	0.010			
	[0.013]			
IndigenousInst X 1950 census	0.048***			
	[0.016]			
IndigenousInst X 1960 census	0.067***			
	[0.016]			
IndigenousInst X 1970 census	0.084***			
	[0.012]			
IndigenousInst X 1980 census	0.110***			
	[0.013]			
IndigenousInst X 1990 census	0.111***			
	[0.013]			
State-fixed effects	N	Y	N	N
Municipality-fixed effects	Y	N	Y	Y
Census-fixed effects	Y	Y	Y	Y
Geographic controls	N	Y	N	N
Historical controls	N	Y	N	N
Demographic controls	Y	Y	Y	Y
Ethnic controls	Y	Y	Y	Y
Observations	14,795	1648	1965	13,238
Adjusted R-squared	0.21	0.45	0.28	0.2

Note: This table presents the effects of Indigenous institutions on ancestral land redistribution based on different empirical strategies. **IndigenousInst** refers to the legacy of political complexity of the Indigenous population in Mexico, measured at the municipal level. Ancestral land (%) is the total ancestral land area accumulated during land reform in Mexico via the *Comunidades Agrarias*' policy. While cols. 1-3 use as dependent variable ancestral land redistribution, col. 4 uses non-ancestral land. Col. 1 shows the differential effect of Indigenous institutions. The reference category is the 1920 census as specified in subsection 4.2. Col. 2 presents the OLS estimates using the alternative index of Indigenous institutions based on a linguistic similarity approach, as reported in subsection 4.3. Col. 3 presents the FE estimates based on the 'plurality' municipalities, as selected in section 4.4. Col 4 displays FE estimates using as dependent variable the non-ancestral land redistribution. Robust standard errors in parenthesis are clustered at municipality level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

ticularly for largest groups. The Atlas records only four groups with the largest value of Jurisdictional Hierarchy variable (value of 2) in Mexico. These groups are: Aztecs, Tarascos, Mixtecs, and Zapotecs. Of these groups, the description of the Aztecs and Tarascos relied on historical documents from the 16th and 17th centuries, whereas the ones for the Mixtecs and Zapotecs are from the 20th century. While I cannot rule out the possibility of measurement errors, in column (5) of Table A4, I assign to all the Zapotec and Mixtec population the average value of Jurisdictional Hierarchy variable from the matched Indigenous groups. While the panel estimate was not statistically significant (yet at 15% level), in column (5), the differential estimates remain positive and statistically significant in almost all the censuses in column (6).

5 The economic consequences of ancestral land redistribution

The evidence so far has documented a large and significant effect of Indigenous institutions on the equalisation of ancestral land in Mexico. This shows that Indigenous groups linked to more complex pre-colonial political hierarchies were better able to influence the restoration policy. But a natural question is whether ancestral land can plausibly be associated with higher (or lower) economic outcomes? This section provides empirical evidence on the effects of ancestral land redistribution on economic outcomes.

This examination was somewhat restricted by limited data availability. I was only able to exploit space and time variations in the provision of public goods, particularly in the area of education. This association was also explored using separate measures of educational outcomes for Indigenous and non-Indigenous populations by rural and urban areas for each municipality. However, these splits in the data were only available from a single census.

The association between land equalisation and educational outcomes is, however, especially important. Recent studies have found that land concentration is an underlying factor of growth stagnation (Galor et al., 2009). However, as peonage is relieved from forced labour, this allows people to achieve better educational attainment and incentivise greater occupational choice (Sokoloff and Engerman, 2000; Cinnirella and Hornung, 2015). I thus conjecture that the rate of success of Indigenous people in the redistribution of ancestral may have led to an increase in educational achievement as a whole.

5.1 Panel strategy

I start by adopting a panel strategy by using as my main outcome literacy rates. My variable of interest is ancestral land redistribution. The specification takes the following form:

$$\mathbf{Y}_{ijt} = \alpha_i + \zeta_t + \tau_{t,s} + \beta \mathbf{L}(\%)_{ijt} + \rho \mathbf{Z}_{ijt} + \Gamma \mathbf{X}_{ij} + \varepsilon_{ijt} \tag{4}$$

In equation 4, i denotes municipalities, j states and t census period. $\mathbf{Y}_{ijt}$ is the logarithm of literacy rates. While the vector α_i is municipality-fixed effects, ζ_t is census-fixed effects. $\mathbf{L}(\%)_{ijt}$ is our variable of interest measuring the share of ancestral land redistribution. I also control for shocks that affect all municipalities within a state in a specific census with state-by-census-fixed effects, $\tau_{t,s}$. $\mathbf{Z}_{ijt}$ is an array of all time-variant municipality characteristics (e.g. share of Indigenous population, population density, and other ethnic factors). $\mathbf{X}_{ij}$ is a battery of geographical and historical controls, which I interact with the set of indicators for census; ζ_t. ε_{ijt} is the error term. Robust standard errors are clustered at the municipal level.

Table 5 presents the main results. In column (1), I include the variable of interest, ancestral land redistribution, alongside municipality-fixed effects, census-fixed effects and state-by-census-fixed effects. The estimated coefficient on ancestral land redistribution is already statistically significant at 1% level. I then gradually added the set of controls in the following columns. The coefficient of interest remains very stable, positive and statistically significant. Since the literacy rate is measured in logarithm form, the coefficient in column (4) shows that an increase in ancestral land area by 1 unit is associated with an increase in literacy rates of approximately 2%.

While these associations do not imply a causal relationship, the results suggest that in municipalities where the redistribution of ancestral land was more successful, a higher rate of educational attainment took place.

5.2 The splits: Indigenous and non-Indigenous population

While the above illustrates that Indigenous institutions impact economic development through their effects on policy outcomes, it does not show whether the effect is higher or lower for those who took on the political demands, in this case the Indigenous population. In this subsection, I explore the effect of ancestral land on educational outcomes among the Indigenous and non-Indigenous people who reside in rural and urban areas within each municipality. As noted above, this examination was only possible based on cross-

Table 5: Economic consequences: Education (Panel sample, 1930–1990)

Dependent variable: Log literacy rates				
	(1)	(2)	(3)	(4)
Ancestral Land (%)	0.018***	0.017***	0.018***	0.018***
	[0.006]	[0.006]	[0.006]	[0.006]
Municipality-fixed effects	Y	Y	Y	Y
Census-fixed effects	Y	Y	Y	Y
State-by-census-fixed effects	Y	Y	Y	Y
Demographic controls	N	Y	Y	Y
Ethnic controls	N	N	Y	Y
Demographic & historical controls	N	N	N	Y
Observations	13,239	13,239	13,239	13,239
Adjusted R-squared	0.93	0.93	0.93	0.93

Note: This table shows the panel estimates of the effects of ancestral land redistribution on education outcomes. Education is measured using log literacy rates calculated as $\frac{\text{Population who can write and read}}{\text{Total population}}$. Ancestral land (%) is the total percentage of municipal ancestral land area redistributed to the Indigenous population via *Comunidades Agrarias'* policy. Fixed-effects models include municipality-fixed effects, census-fixed effects, state-by-census-fixed effects, as well as time-variant controls. Robust standard errors in parenthesis are clustered at municipality level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

sectional evidence. Table 6 reports the main OLS results. All regressions included the set of geographical, historical and demographic controls, as well as state-fixed effects. My main variable of interest was the total share of ancestral land redistributed by the end of land reform in 1992.

Table 6 shows that the redistribution of ancestral land appears to have benefited both the Indigenous and non-Indigenous people. Moreover, the effect is important solely in rural areas, where not only the majority of Indigenous population tends to reside, but also where ancestral land plots were generally disputed. Interestingly, while the effect of ancestral land is slightly larger on the educational outcomes for the Indigenous population residing in rural areas (col. 1), the coefficient seems to be better estimated when predicting the outcomes for the non-Indigenous population (col. 2). Indeed, these effects raise further research questions, but at this point it is important to highlight that ancestral land redistribution impacted positively on education outcomes for both Indigenous and non-Indigenous people who reside in rural areas, where Indigenous groups were arguably better able to organise collectively in order to claim a more favourable distribution of ancestral land.

While these results show a positive outcome as a result of more ancestral land redistribution, these associations should be considered with caution due to potential endogene-

Table 6: Education outcomes: Indigenous vs non-Indigenous people

Dependent variable:	Literacy rates for Indigenous pop.	Literacy rates for non-Indigenous pop.	Literacy rates for Indigenous pop.	Literacy rates for non-Indigenous pop.
	RURAL		URBAN	
	(1)	(2)	(3)	(4)
Ancestral Land (%)	0.037*	0.033***	0.021	0.030
	[0.022]	[0.012]	[0.022]	[0.021]
State-fixed effects	Y	Y	Y	Y
Population controls	Y	Y	Y	Y
Geographic controls	Y	Y	Y	Y
Historical controls	Y	Y	Y	Y
Observations	1786	1880	1286	1337
Adjusted R-squared	0.23	0.39	0.37	0.33

Note: This table shows the OLS estimates of the effects of ancestral land (%) on education outcomes for Indigenous and non-Indigenous populations by type of area. All dependent variables are measured at municipal level. Regressions include state-fixed effects, as well as demographic, geographical, historical, and ethnic controls. Robust standard errors in parenthesis are clustered at municipal level.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

ity issues. A further exploration of the possibly effects of allocation of ancestral land on economic outcomes, incorporating, for example, an analysis at the allotment level, may shed further light on this important matter. But at this point, these results suggest that in municipalities where ancestral land redistribution was more successful, better economic outcomes were achieved, especially in the area of education.

6 Conclusions

The positive association between Indigenous institutions and economic development is understood to be as a result of how these institutions impact on the redistribution of resources at the local level. The main findings outlined in this paper are novel in establishing this link. I have documented that Indigenous institutions (or, more precisely, the political complexity of Indigenous groups) impact on economic development through their effects on policy outcomes. I establish this by evaluating the effects of a policy programme designed to redistribute ancestral land. I show that areas with a higher presence of Indigenous population linked to more complex Indigenous institutions evidence a higher redistribution of ancestral land. This suggests that politically centralised groups were better able to coordinate themselves and undertake successful collective actions, which led to the acquisition of more ancestral land resources and therefore the possibility of improving development outcomes.

The main findings of the paper underline important implications for our understanding of the economic history of Indigenous people in the Americas. Recent empirical evidence has established a link between land allocation and Indigenous people, and how this may have significant economic and political consequences. [30] Understanding how Indigenous people could influence land restoration policies is therefore a valuable contribution to this nascent literature.

In the case of Mexico, history shows how dispersed nomadic groups became powerful via the settlement of rich, arable land. In doing so, they created large, complex societies; which were governed by strong institutions. In turn, this facilitated economic and political dominance over smaller, less organised societies in the way of tributary systems and commerce. Upon the arrival of Europeans, these structures were replaced by the encomiendas and, later, the *Republic of Indians*, notably as a way to decentralise the power of pre-existing systems of governance. The early 20th century saw collective organisation against a bureaucratic, corrupt state in the form of the Mexican Revolution. This translated into the enacting of specific policies that would lead to the restoration of land. In regaining this ancestral land, those communities that had a greater degree of institutional complexity in pre-colonial times have reaped the benefits of this policy. This adds to the findings in the existing literature on the persistence of early institutions and long-term development.[31]

While this paper outlines an important explanation as to how Indigenous institutions affect economic development, this does not imply historical determinism. Indeed, other forces besides Indigenous norms are at play in shaping policy outcomes, such as geography, beliefs, markets, etc. The aim of this paper, however, is to advocate for vigorous analysis to enhance our understanding of the political and economic history of Indigenous people, whose existence has contributed so much to the making of present-day societies, but which is still somewhat undervalued.

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[30] See: Leonard et al., 2018; Dippel and Frye 2019; Dippel et al., 2019; and Feir et al., 2019.

[31] See: Gennaioli and Rainer, 2007; Giuliano and Nunn, 2013; Michalopoulos and Papaioannou, 2013; Michalopoulos and Papaioannou, 2014; Bentzen et al., 2017; Angeles and Elizalde, 2017; Dell et al., 2018.

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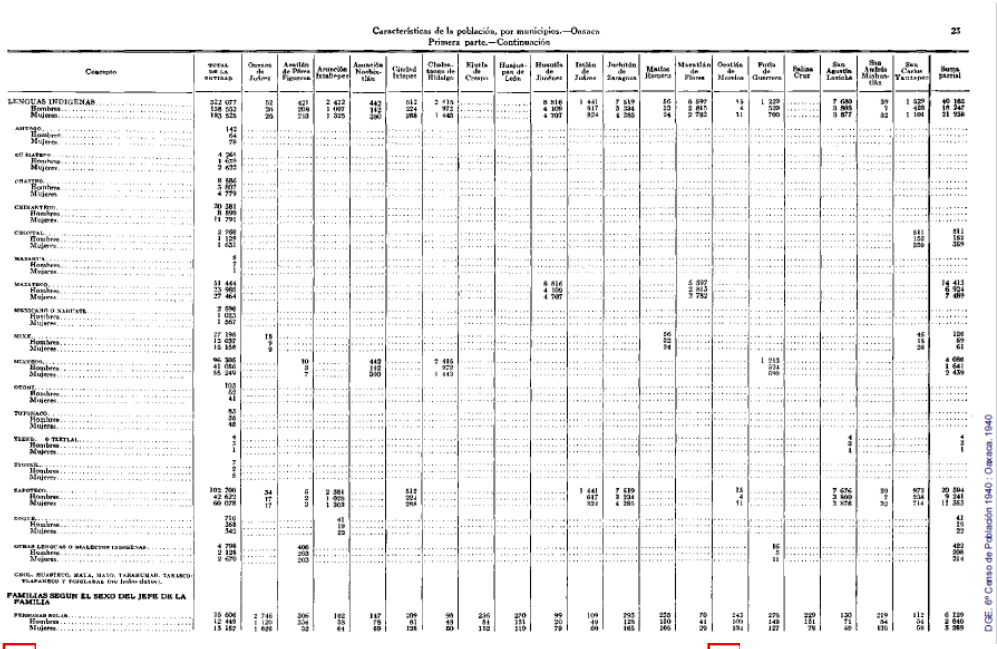
Appendix

Figure A1: Sample of undigitised ethnic data for the state of Oaxaca



Características de la población, por municipios.—Oaxaca 23
Primera parte.—Continuación

Concepto	TOTAL DE LA ENTIDAD	Cuenca de Juárez	Asunción Ixtaltepec	Asunción Nochixtlán	Ciudad Ixtepec	Chahuites, Tapanatepec de Hidalgo	Ejutla de Crespo	Huajuapan de León	Huautla de Jiménez	Juchitán de Zaragoza	Matías Romero	Mazatlán de Flores	Ocotlán de Morelos	Putla de Guerrero	Salina Cruz	San Agustín Loxicha	San Andrés Mixtepec	San Carlos Yautepec	Suma parcial
LENGUAS INDÍGENAS	352 677	52	421	2 422	442	512	2 475			8 816	1 441	7 339	56	6 597	15	1 329		7 680	39	1 529	40 182
Hombres	158 552	26	208	1 097	142	224	972			4 109	617	3 334	32	2 815	4	539		3 595	7	428	18 347
Mujeres	193 525	26	213	1 325	300	288	1 503			4 707	824	4 005	24	3 782	11	790		3 877	32	1 101	21 835
AMUZGO	142																				
Hombres	64																				
Mujeres	78																				
AT MATEO	4 261																				
Hombres	1 637																				
Mujeres	2 624																				
CHATINO	8 686																				
Hombres	3 907																				
Mujeres	4 779																				
CHICAHUTEC	20 281																				
Hombres	8 890																				
Mujeres	11 391																				
CHONTAL	2 988																	441		441	
Hombres	1 127																	152		152	
Mujeres	1 631																	289		289	
MAZAHUA	4																				
Hombres	3																				
Mujeres	1																				
MAZATECO	31 444									8 816				5 597							14 413
Hombres	13 988									4 109				2 815							6 924
Mujeres	17 456									4 707				2 782							7 489
MEXICANO O NAHUATL	2 896																				
Hombres	1 039																				
Mujeres	1 857																				
MIXE	27 186	18										56						46			120
Hombres	12 032	9										32						18			59
Mujeres	15 154	9										24						28			61
MIXTECO	96 395		10		442		2 475								1 215						4 096
Hombres	41 056		3		142		972								374						1 541
Mujeres	55 249		7		300		1 503								840						2 439
OTOMI	103																				
Hombres	57																				
Mujeres	41																				
TUPINAMBA	53																				
Hombres	32																				
Mujeres	48																				
TEPEHUA O TEPEHUAN	4															4				4	
Hombres	3															3				3	
Mujeres	1															1				1	
TRIQUI	7																				
Hombres	3																				
Mujeres	3																				
ZAPOTECO	102 700	34	6	2 391		512					1 441	7 339		15		7 676	39	672	20 204		
Hombres	42 622	17	3	1 093		224					617	3 334		4		3 669	7	334	9 241		
Mujeres	60 078	17	3	1 303		288					824	4 005		11		4 007	32	714	11 363		
ZOQUE	710			41															41		
Hombres	368			19															19		
Mujeres	342			22															22		
OTRAS LENGUAS O DIALECTOS INDÍGENAS	4 796		406											85					491		
Hombres	2 128		203											5					208		
Mujeres	2 668		203											11					214		
CHOL, HUASTECO, MAYA, MAYO, TARAHUMAR, TARASCO, TLAPANECO Y TOTONACA (no hubo datos).																					
FAMILIAS SEGÚN EL SEXO DEL JEFE DE LA FAMILIA																					
PERSONAS SOLAS	35 606	2 746	306	182	147	309	98	236	270	95	109	295	258	70	245	275	229	130	219	112	6 129
Hombres	12 446	1 126	234	98	78	81	61	104	151	70	49	126	110	61	109	148	121	71	84	54	2 840
Mujeres	15 187	1 620	72	84	69	228	37	132	119	25	60	169	148	9	136	127	76	59	135	58	3 289

DGE. 6º Censo de Población 1940 : Oaxaca, 1940

Notes: **Figure A1 shows the undigitised ethnic data sample. The first column in Figure A1 shows the list of Indigenous languages in a small set of municipalities from the state of Oaxaca; whereas subsequent columns present the aggregate counts on Indigenous people speaking one of the listed Indigenous languages within each municipality. This page summarises aggregate information on Indigenous languages for only 19 municipalities out of the existing 500+ in the state of Oaxaca for the 1940 census. Publications can be accessed at the INEGI's website.**

Table A1: Ethnic groups matched and non-matched from census data to *Ethnographic Atlas* by level of political complexity

Political complexity value	Ethnic Groups
	PANEL A: Matched groups
Level 2	Aztec, Tarasco, Mixtec, Zapotec (4)
Level 1	Kaqchikel, Mam, Maya, Mixe, Totonac, Q'eqchi, K'iche (7)
Level 0	Chichimec, Chinantec, Huichol, Mazatec, Papago, Pima, Popoluca, Seri, Tarahumara, Yaqui (10)
	PANEL B: Non-Matched groups
Level 0	Akateko, Amuzgo, Awakateko, Ayapaneco, Chatino, Chocho, Cho'l, Chontal, Chuj, Cora, Cucapa, Cuicateco, Guarijio, Huasteco, Huave, Ixcateco, Ixil, Jakalteco, Ki'che, Kaqchikel, Kickapoo, Kiliwa, Kumaia, Lacandon, Matlatzinca, Mayo, Mazahua, Oluteco, Otomi, Paipai, Pame, Q'anjob'al, Q'eqchi', Qato'k, Sayulteco, Teko, Tepehua, Tepehuano, Texistepequeno, Tlahuica, Tlapaneco, Tojolabal, Triqui, Tzeltal, Tzotzil. (45)

Note: This table shows all the Indigenous groups that were matched and non-matched between the census data and Murdock's Atlas. Column 1 shows the value of political complexity based on Murdock's Jurisdictional Hierarchy Beyond Local Community (Murdock, 1967). Columns 2 shows the list of ethnic groups based on matched (Panel A) and non-matched ethnic groups (Panel B) from census data to Murdock's Ethnographic Atlas. The list of ethnic groups is based on the 2010's census linguistic classification drawn from the Mexican National Statistics Office.

Table A2: Matching based on linguistic similarity

Family language	Main linguistic similarity group	Indigenous group	Murdock's Jurisdictional Hierarchy Index
Mayan	Yucatecan	Maya	Level one
	Mamean	Awakateco, Ixil, Mam, Teko	Level one
	Cholan-Tzeltalan	Chontal, Chol, Chorti, Tzeltal, Tzotzi	Level one
	Kichean	Q'eqchi	Level one
	Core-K'ichean	K'iche	Level one
	Kaqchikel-Tz'utujil	Kaqchikel	Level one
Tarascan	Tarascan	Purepecha	Level two
Otomanguean	Zapotecan	Chatino, Zapotec	Level two
	Oto-Pamean	Chichimeca, Matlatzinca, Mazahua, Otomi, Pame	Level zero
	Oto-Pame-Chinantecan	Chinanteco	Level zero
	Popolacan	Chocho, Ixcatec, Mazatec, Popoloca	Level zero
	Mixtecan	Cuicatec, Mixtec, Triqui	Level zero
Uto-Aztecan	Core-Nahuatl	Nahuatl(Aztec)	Level two
	Cora-Huichol	Cora, Huichol	Level zero
	Cahitan	Cahita, Mayo, Yaqui	Level zero
	Pimic	Pima, Tepehuan	Level zero
	Tarahumaran	Guarijio, Tarahumara	Level zero
Mixe-Zoquean	Mixe-Zoquean	Popoluca, Mixe, Zoque	Level one
Totonacan	Totonacan	Tepehua, Totonac	Level one
Language Isolate	Seri	Seri	Level zero

Note: This table presents the linguistic similarity tree. Column 1 shows the family language. Column 2 shows the linguistic similarity group. Column 3 shows the list of ethnic groups based on matched (Panel A) and non-matched ethnic groups (Panel B) from census data to Murdock's *Ethnographic Atlas*. Column 4 shows the value of political complexity based on Murdock's Jurisdictional Hierarchy Beyond Local Community (Murdock, 1967). The list of ethnic groups is based on the 2010's census linguistic classification drawn from the Mexican National Statistics Office. The linguistic tree was classified using data from *"Ethnologue:Languages of the World"*.

Table A3: Matched Indigenous population based on linguistic similarity

State	Number of municipalities per state in 1990	Indigenous population matched to the *Ethnographic Atlas* as % of total indigenous population in 1990
AGUASCALIENTES	9	72
BAJA CALIFORNIA	4	76
BAJA CALIFORNIA SUR	4	92
CAMPECHE	9	93
CHIAPAS	109	70
CHIHUAHUA	65	90
CIUDAD MEXICO	11	85
COAHUILA DE ZARAGOZA	36	29
COLIMA	10	81
DURANGO	39	90
GUANAJUATO	45	37
GUERRERO	72	63
HIDALGO	82	97
JALISCO	114	65
MEXICO	118	92
MICHOACAN DE OCAMPO	113	88
MORELOS	33	86
NAYARIT	20	93
NUEVO LEON	44	65
OAXACA	452	96
PUEBLA	190	97
QUERÉTARO	18	90
QUINTANA ROO	7	95
SAN LUIS POTOSI	56	63
SINALOA	18	80
SONORA	70	87
TABASCO	17	90
TAMAULIPAS	41	66
TLAXCALA	37	87
VERACRUZ	182	88
YUCATAN	106	98
ZACATECAS	51	79
TOTAL	2182	90

Note: This table presents the proportion of the Indigenous population that was matched to Murdock's Atlas as % of the total Indigenous population. This matching was based on the linguistic similarity approach using data from the 1990 census. Municipality ethnic data were drawn from the *Instituto Nacional de Estadística y Geografía (INEGI)* of Mexico.

Table A4: Robustness specifications

Dependent variable: Ancestral Land (%)						
	(1)	(2)	(3)	(4)	(5)	(6)
IndigenousInst	0.045***	0.02***	0.025*	0.02*	0.016	
	[0.009]	[0.005]	[0.013]	[0.010]	[0.013]	
IndigenousInst X 1930 census						0.002**
						[0.001]
IndigenousInst X 1940 census						0.011
						[0.007]
IndigenousInst X 1950 census						0.027***
						[0.009]
IndigenousInst X 1960 census						0.042***
						[0.014]
IndigenousInst X 1970 census						0.037**
						[0.017]
IndigenousInst X 1980 census						0.026
						[0.018]
IndigenousInst X 1990 census						0.032*
						[0.018]
State-fixed effects	N	N	Y	N	N	N
Municipality-fixed effects	Y	Y	N	Y	Y	Y
Census-fixed effects	Y	Y	Y	Y	Y	Y
Geographic controls	N	N	Y	N	N	N
Historical controls	N	N	Y	N	N	N
Demographic controls	Y	Y	Y	Y	Y	Y
Ethnic controls	Y	Y	Y	Y	Y	Y
Observations	13,238	13,238	12,291	13,238	13,238	15,070
Adjusted R-squared	0.17	0.17	0.27	0.17	0.17	0.18

Note: This table presents a series of robustness checks of the effects of Indigenous institutions on ancestral land redistribution. **IndigenousInst** refers to the legacy of political complexity of the Indigenous population in Mexico measured at the municipal level. Ancestral land (%) is the total ancestral land area accumulated during land reform in Mexico via the *Comunidades Agrarias'* policy. Column (1) assigns to the unmatched population a value of Murdock's Jurisdictional Hierarchy variable equal to the average of all the ethnic groups that were matched. Column (2) excludes all the unmatched population in the calculation of **IndigenousInst** index. Column (3) uses an **IndigenousInst** index computed with ethnic data from 1930 census. Column (4) adjusts standard errors for spatial dependence by using Driscoll–Kraay standard errors (Driscoll and Kraay, 1998). Columns (5)-(6) assigns to all Zapotec and Mixtec population the average value of Murdock's Jurisdictional Hierarchy variable from the matched Indigenous groups to deal with measurement errors from Murdock's *Ethnographic Atlas*. While column (5) uses the fixed-effects model, column (6) applies a flexible diff-in-diff approach, where baseline period is 1920. All specifications but that in column (3) rely on fixed-effects estimates. Robust standard errors in parenthesis are clustered at municipality level in all but one specification in column (4).

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A5: Further checks on unmatched Indigenous groups

Dependent variable: Ancestral Land (%)		
	(1)	(2)
IndigenousInst	0.023***	0.020***
	[0.006]	[0.005]
Municipality-fixed effects	Y	Y
Census-fixed effects	Y	Y
Demographic controls	Y	Y
Ethnic controls	Y	Y
Observations	13,238	13,126
Adjusted R-squared	0.17	0.17

Note: This table presents the effects of Indigenous institutions on ancestral land redistribution using further adjustments in the **IndigenousInst** index. **IndigenousInst** refers to the legacy of political complexity of the Indigenous population in Mexico measured at the municipal level. Ancestral land (%) is the total ancestral land area accumulated during land reform in Mexico via the *Comunidades Agrarias*' policy. While col. 1 shows the FE estimates using the adjusted $Index$, col. 2 presents the FE estimates excluding observations linked to the state of Tabasco. Robust standard errors in parenthesis are clustered at municipality level.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Brief note on the unmatched Indigenous groups

According to Table 1, 50% of the Indigenous population was not matched to the *Ethnographic Atlas* in the full sample (1930–1990). This section discusses some important points about the unmatched Indigenous groups, paying attention to the states with a percentage matching <30%.

A total of nine states have a percentage matching <30% in Table 1: Chiapas, Durango, Guanajuato, Mexico, Nayarit, Querétaro, Sinaloa, Sonora, and Tabasco. Of these states, three are from Central Mexico (Chiapas, Mexico and Tabasco) and the rest from Northern Mexico.

Central Mexico:

Chiapas. Two Maya groups were not matched in this state: Tzeltal and Tzotzil. Quite notably, together they encompass most of the Indigenous population in this state. For example, according to the 1960 census, Tzeltal and Tzotzil people represent approximately 70% of the Indigenous population in Chiapas. This is indeed concerning, especially if we consider that these two groups were given a Jurisdictional Hierarchy value of '1', via the linguistic similarity strategy (see Table A2). While the robustness section dealt with this issue (e.g. by excluding them from the computation of the **IndigenousInst** index, I was also able to gather systematic census data on Tzeltal and Tzotzil groups across units and over time. This allowed me to i) increase the matching for this state to 56% from 2%; and ii) to adjust the **IndigenousInst** index in accordance with this new matching. Column (1) of Table A5 presents the fixed-effects estimates using the adjusted **IndigenousInst** index. The estimate reassures the main results of the paper: the coefficient on **IndigenousInst** is not only positive and statistically significant once again, but it is also larger in magnitude.

Tabasco. Usually, 50% of the Indigenous population is classified as 'Others', thus making it impossible to comment on the share of the unmatched population. Yet an important unmatched group was Chol. Chol people tend to represent 50% of the Indigenous population in Tabasco. Importantly, Chol was also linked to a language subfamily group with a Jurisdictional Hierarchy value of '1'. While I was unable to gather the required data for this group, in column (2) of Table A5, I excluded all observations associated with the state of Tabasco. This, however, did not challenge my results in any significant way.

Mexico. There are two important unmatched Indigenous groups: Mazahua and Otomi. Together they encompass approximately 70% of the Indigenous population in this state. However, this should not be a concern as these groups belong to the Oto-Pamean lan-

guage subfamily group (Table A2), whose groups were assigned the lowest category of Murdock's Jurisdictional Hierarchy variable (that is, level zero). Hence, by assigning a value of zero to the whole of the unmatched Indigenous population, this strategy implicitly gives to these groups a suitable Jurisdictional Hierarchy value.

Northern Mexico:

Durango. In this state, 90% of the Indigenous population was unmatched. However, most of the unmatched population relates to a single group: Tepehuan. Approximately 80% of the Indigenous population in Durango belong to the Tepehuan group. However, this should not be a concern either, as this group was linked to the Pimic language subfamily group, which took a Jurisdictional Hierarchy value of zero.

Guanajuato. While a high proportion (55%) of Indigenous population tends to be classified as 'Others', a single unmatched group encompasses about 40% of the Indigenous population: Otomi. Yet this group was also linked to a subfamily language group with the lowest political hierarchies (Oto-Pamean).

Nayarit. Cora is an unmatched group with a strong predominance in this state. Based on the 1990 census, approximately 50% of the Indigenous population is classified as Cora. However, this group was linked to the Cora-Huichol language subfamily group, which received a Jurisdictional Hierarchy value of zero.

Queretaro. After Tabasco, this state has also one of the highest percentages of unmatched population in the data (98%). However, this is a region where the predominant group is Otomi. In 1990, 90% of the Indigenous population was classified as Otomi. As noted above, the Otomi group was linked to the Oto-Pamean language subfamily group. I am therefore confident that by assigning a value of zero to all the unmatched Indigenous population, virtually all the unmatched population in this state received a suitable value of political complexity.

Sinaloa & Sonora. A single unmatched group seems to be driving the low percentage in the data in these two states. The Indigenous group is Mayo, which represents 70% of the Indigenous population. Yet again, this group was assigned to a subfamily language group with the lowest Jurisdictional Hierarchy value.

Summary

Based on the above inspection, only the regions within the states of Chiapas and Tabasco appear to be an important concern: their unmatched groups do show some levels of hi-

erarchical organisation. However, the additional analysis presented in Table A5 reassures the validity of the results. As with the unmatched groups from Northern Mexico, essentially all are linked to subfamily language groups with the lowest political hierarchies. Hence, following the strategy to include them as groups with the lowest level of political complexity (level zero), this implicitly allocated them a suitable Jurisdictional Hierarchy value.

Variable definitions

Table A6: Variable definitions

Variables	Definitions and sources
Outcomes:	
Ancestral land (%)	Ancestral land is the total ancestral land redistributed in municipalities divided by the total land area of municipalities, measured in intervals of 10 years from 1930 to 1990. Source: *Padron e Historial de Nucleos Agrarios* (PHINA), *Registro Agrario Nacional* (RAN)
Non-ancestral land (%)	Non-ancestral land is the total land redistributed in municipalities divided by the total land area of municipalities, measured in intervals of 10 years from 1930 to 1990. Source: *Padron e Historial de Nucleos Agrarios* (PHINA), *Registro Agrario Nacional* (RAN)
Literacy rate	*Log* percent of population of those who can write and read between 1930-1990. Source: *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico
Literacy rate for Indigenous pop., in rural areas	*Log* percent of Indigenous population in rural areas of those who can write and read. The data use information drawn from the 1995 census. Source: *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)
Literacy rate for non-Indigenous pop. in rural areas	*Log* percent of non-Indigenous population in rural areas of those who can write and read. The data use information drawn from the 1995 census. Source: *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)

Continued on next page

Table A6 – continued from previous page

Variables	Definitions and sources
Literacy rate for Indigenous pop. in urban areas	*Log* percent of Indigenous population in urban areas of those who can write and read. The data use information drawn from the 1995 census. Source: *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)
Literacy rate for non-Indigenous pop. in urban areas	*Log* percent of non-Indigenous population in urban areas of those who can write and read. The data use information drawn from the 1995 census. Source: *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)
Variable of interest:	
IndigenousInst	The **IndigenousInst** index captures the political complexity of Indigenous groups for each municipality, as reported in Murdock's *Ethnographic Atlas* (Murdock, 1967). The index ranges from 0 to 2, where higher values denote municipalities with more complex political hierarchies and lower values represent the opposite. The index was computed using detailed data on the ethnic origins of the total Indigenous population from seven censuses, 1930–1990. Source: Murdock's Ethnographic Atlas (variable code in Atlas v33), and *Instituto Nacional de Estadística y Geografía*(INEGI) of Mexico
Controls:	
Share of Indigenous population	Indigenous population as percentage of total population for each municipality. The data use information drawn from seven censuses, 1930–1990. Source: *Instituto Nacional de Estadística y Geografía (INEGI) of Mexico*

Continued on next page

Table A6 – continued from previous page

Variables	Definitions and sources
Population density (*logs*)	*Log* population per sq. km of municipality land area. The data use information drawn from seven censuses, 1930–1990. Source: *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico
Latitude	Absolute latitude for each municipality. Author's own computation using GIS software
Altitude *km*	Average altitude in kilometres for each municipality. Author's own computation using GIS software
Land suitability index	Average land quality for each municipality. The variable takes values between 0 and 1, measuring the probability of the land area being cultivated. The variable was constructed using Ramankutty et al. (2002)'s index of land quality for agriculture. The index comprises three main land and geographic components for agriculture: croplands, climate conditions and soil characteristics. Source: Ramankutty et al. (2002). Variable computed using GIS software
Land area (*logs*)	*Log* total surface land area for each municipality. Author's own computation using GIS software
Historical controls:	
Number of *Pueblos de Indios*	Total number of *Pueblos de Indios* within each municipality. I computed this variable by using the centroids of each Pueblo, as reported in *Atlas Ilustrado de los Pueblos de Indios*, compiled by Dorothy Tanck de Estrada (2005). I considered a *Pueblo* to match a municipality if its centroid falls within the boundaries of one of the municipalities. Source: *Atlas Ilustrado de los Pueblos de Indios* (de Estrada, 2005). Variable computed using GIS software

Continued on next page

Table A6 – continued from previous page

Variables	Definitions and sources
Historical Indigenous pop. (*logs*)	*Log* Indigenous population by 1800 within each municipality. Source: *Atlas Ilustrado de los Pueblos de Indios* (de Estrada, 2005). Author's own computation using GIS software.
Pueblos de Indios' land area	Total land area of the historical Indigenous settlements. To calculate this variable, the 4400+ *Pueblo de Indios* had to be georeferenced to the geospatial location of localities in Mexico. Then, the sum of all the areas corresponding to each *Pueblo* within each municipality was calculated. Source: *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico, and *Atlas Ilustrado de los Pueblos de Indios* (de Estrada, 2005). Author's own computation using GIS software
Ethnic-specific controls:	
Agriculture dependence	The fraction of Indigenous population that historically depended on agriculture. Sources: Murdock's *Ethnographic Atlas* (variable code in Atlas v5), *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)
Settlement patterns	An index of settlement patterns ranging from 0 to 8, where 0 denotes fully nomadic and 8 permanent settlement. Sources: Murdock's *Ethnographic Atlas* (variable code in Atlas v30), *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)

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Table A6 – continued from previous page

Variables	Definitions and sources
Jurisdictional hierarchy at local level	An index of local community complexity ranging from 0 to 4, where 0 represents highly fragmented communities and 4 the opposite. Sources: Murdock's *Ethnographic Atlas* (variable code in Atlas v32), *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)
Election	The fraction of the Indigenous population whose ancestors practised a more equal distribution of land. Sources: Murdock's *Ethnographic Atlas* (variable code in Atlas v72), *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)
Land rights	The fraction of the Indigenous population whose ancestors relied on proto-democratic practices. Sources: Murdock's *Ethnographic Atlas* (variable code in Atlas v74), *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico and *Redatam*-Commission for Latin America and the Caribbean (ECLAC)
Index of ethnolinguistic fractionalisation	This index measures the probability that two randomly people from a given municipality will not belong to the same ethnolinguistic group, as followed by Alesina et al. (1999). Source: *Instituto Nacional de Estadística y Geografía* (INEGI) of Mexico