Institutions, Inequality and Long-Term Development: A Perspective from Brazilian Regions

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Abstract

In this study we provide new evidences on the relationship between inequality and long-term development. We provide a new method of analysis by providing an empirical approach in a constant de jure institutional environment and therefore accounting for the different de facto institutional environments rooted in the colonial era of Brazil. We construct new inequality indicators, both economic and political, for early twentieth-century Brazil and econometrically study the relationship of the respective indicators with long-term indicators of income, education, and health. Surprisingly, economic inequality measured by the land Gini among landowners has a positive robust correlation with long-term development indicators in some de facto institutional environments. Political inequality measured by enfranchisement does not have a robust significant relation with those indicators in any institutional environment in our study. This provides further evidence for the importance of the study of historical and social elements, in their respective context, in both economic and political analysis, since this result is perfectly coherent with a rural Brazil dominated by agrarian elites.

Keywords: Institutions, economic inequality, political inequality, development.

1 Introduction

Institutions, the rules of the game in a society or, more formally, the humanly devised constraints that shape human interaction (North, 1990), have recently received a considerable share of attention from the growth and development literature. Institutions are largely viewed as the fundamental cause of growth (Acemoglu, Johnson, and Robinson, 2005).

In this context, several empirical works using a cross-country strategy found an expressive role of institutions. Acemoglu, Johnson, and Robinson (2001, 2002).

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"(...) I wish to assert a much more fundamental role for institutions in societies; they are the underlying determinant of the long-run performance of economies” (North, 1990, p.107).
exploring the considered exogenous variation in population density, urbanization patterns and European mortality rates across regions in the Americas, found an expressive and robust role for the institutions (even when controlling for geographical factors) in the development process (mostly measured by GDP per capita). Other cross-country studies, such as Easterly and Levine (2003), also find a central role for the institutions on the development process.

Reflecting on the new prospects of the institutions, development and growth’s literature, Rohini Pande and Cristopher Udry affirm that, to date, the macroeconomic literature on institutions and growth has largely relied on cross-country regression evidence, and that these works have provided compelling evidence for a causal link between a cluster of “good” institutions and more rapid long run growth (Pande and Udry, 2005) [the core papers here consist on Acemoglu, Johnson and Robinson, 2002, Hall and Jones, 1999, Knack and Keefer, 1995, La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1999, and Mauro, 1995]. But, according to the same authors, an inability to disentangle the effects of specific institutional channels on growth or to understand the impact of institutional change on growth will limit further progress using a cross-country empirical strategy (we can clearly see here the connection with North’s idea on institutional change discussed above and published 15 years before). The idea defended here is for a greater exploitation of synergies between research on specific institutions based on micro-data and the big questions posed by the institutions and growth literature. The emphasis here will therefore change from a research agenda that pays attention to de jure to one that focuses on de facto institutions.

Consistently, while Pande and Udry argue that a unit smaller than a country may provide a more homogeneous environment for the study of a given institution, and therefore reveal more about the causal role of that institution, Nunn (2009) surveys more recent studies, that exploit richer data sources, and that are able to employ much more satisfying identification strategies that typically rely on instrumental variables, falsification tests, regression discontinuities, differences-in-differences estimation, or propensity score matching techniques. Among those studies, we can quote Banerjee and Iyer (2005), Iyer (2007), Dell (2010), Huillery (2008), Nunn (2008), and Naritomi, Soares and Assunção (2012).

Although the literature has made considerable progress in showing that history matters, less understood are the exact channels of causality through which history matters (Nunn, 2009). This problem, more formally, the inability to identify the exact mechanism or channel of causality, has been slowly overcome by the recent studies that rely on microlevel data and analysis. But, according to same author, although this literature has grown greatly in recent years, many historic events and mechanisms need to be examined before we have a clear picture of the overall importance of historic events and the specific channels through which they continue to affect economic development today.

This is exactly the context that this study belongs. But before analysing more specific features, it is important to explore another work. Acemoglu, Bautista, Querubin, and Robinson (2008) decided to analyse empirically the consensus that it was economic inequality in Latin America during the nineteenth cen-
tury that was responsible for the divergent economic paths of North and South America. An important theoretical and empirical contribution of the study is to include a variable of political inequality, therefore controlling for a significant determinant factor of development and a possible source of endogeneity, because, as stated by the authors, collective choices reflect the wishes and interests of a small subsection of the society (its exclusion might cause the omitted variable bias in a regression that includes as independent variable the economic inequality). The authors find a surprisingly positive correlation of economic inequality and subsequent development indicators, while political inequality is consistently associated with worst development indicators.

With unique data from the beginning of twentieth-century Brazil, the Economic and Demographic Census of 1920, we were able to construct from scratch unique indicators of economic inequality (the land Gini coefficient among landowners) and of political inequality (the proportion of individuals that were eligible to vote) for each Brazilian municipality in 1920. We not only analyse how inequality, both economic and political, is related to long-term development, but we also go further into analysing how inequality is related to long-term development allowing for different de facto institutional environments controlling for a constant de jure context (in line with Pande and Udry’s reorientation argument).

We calculate the respective inequality indicators for all municipalities into three Brazilian states: Minas Gerais, Pernambuco and São Paulo. This choice was carefully made in order to capture how inequality is related to long-term development in different institutional environments greatly influenced by the distinct economic activities that strongly characterized these regions in earlier periods. We explore better this element in sections 2 and 3.

Complementing the theoretical framework in which this work belongs we need to make some observations on Stanley Engerman and Kenneth Sokoloff’s work. The authors highlight the relevance of stark contrasts in the degree of inequality in wealth, human capital, and political power in accounting for how fundamental economic institutions evolved over time. Engerman and Sokoloff (1997, 2002) document systematic patterns by which societies in the Americas that began with more extreme inequality or heterogeneity in the population were more likely to develop institutional structures that greatly advantage members of elite classes by providing them with more political influence and access to economic opportunities. The roots of these disparities in the extent of inequality would therefore lay in differences in the initial factor endowments. In other words, the factor endowments and attitudes toward it reflected in policy had enduring impacts on the structure of respective colonial economies and ultimately on their long-term paths of institutional and economic development.

There is an extensive body of the academic literature that investigates the effects of economic inequality on economic development. These effects could be due to the interactions of inequality with imperfect capital markets (Galor and Zeira, 1993), through the composition of aggregate demand (Murphy, Shleifer, and Vishny, 1989), and also through political economy mechanisms (Alesina and Rodrik, 1994, Persson and Tabellini, 1994). In addition, as explored by Bourguignon and Verdier (2000) and Galor, Moav, and Vollrath (2006), there
is a possible link between inequality and the incentives to invest in education. Other works, however, provide evidence that the correlation between economic inequality and subsequent growth appears to be nonrobust (Forbes, 2000, Barro, 2000, Banerjee and Duflo, 2003). The idea that inequality is harmful to growth is also stated in Summerhill (2010), that argues that theoretical and empirical studies alike have shown how inequality can damage the prospects for growth, by facilitating demands for efficiency-undermining redistribution, reducing the provision of public goods, suppressing the formation of human capital, or fostering political institutions and policies that support rent-seeking by a narrow elite.

Several studies have been made recently exploring the connections between political inequality and development. Political inequality may be negatively related to development because the elites who control politics may create rents for themselves, impede entry (Acemoglu, 2008), and have little interest in the provision of public goods, including schooling (Bates, 1981). Political inequality will also tend to be associated with the absence of political competition and accountability, two factors that help to guarantee that political systems generate desirable outcomes (Acemoglu, Bautista, Querubín, and Robinson, 2008). Besides, Acemoglu and Robinson (2000, 2006) suggest that in societies with significant political inequalities, those with political power may block the introduction of new technologies or underinvest in public goods because of the fear that this will erode their political power.

A distinguishing aspect of this study is its unique strategy to explore the interaction between inequality in general with the institutional structure of a society in shaping its development path. As stated by Naritomi, Soares and Assunção (2012), the study of the Brazilian case allows - due to the homogeneity of its macro-institutions through its territory and the strongly centralized condition of its federation - to improve the comprehension of the different roles played by de facto and de jure institutions, i.e., between the effective functioning of the institutions and what is formally established. It is impressive how little attention this topic has received from recent literature.

The study proceeds as follows. Next section presents the Brazilian context, for the historical aspects of the social, political and economic formation of Brazil is of extreme relevance in the development and institutional analysis. Section 3 deals more explicitly with the empirical aspect of the study. It presents the data sources, the constructed variables, and the econometric results. A conclusion summarizes the main aspects of this research and presents insights for future studies.

2 The Brazilian Context

Between 1500 and 1822 Brazil was a colony of Portugal. Through most of the colonial period, Portuguese rule was characterized by the establishment of successive waves of extractive endeavors, varying in form and institutional characteristics according to the goods being demanded in Europe and the production possibilities offered by the colony (Naritomi, Soares, and Assunção, 2012). Sugar was the first agricultural product which Europe demanded of the Amer-
ican colonies. Salvador, capital of Bahia, and Recife, capital of Pernambuco, were the first sugar-producing centres (Denis, 1911).

In the first period of colonization, Portugal’s king, João III, decided to divide the country into capitâncias in order to ensure the occupation of the country without loss to the exchequer, and without withdrawing his maritime forces from the Indies. Pernambuco was, along with São Vicente, the only successful one. As noted by Denis (1911), Pernambuco have existed by the sugar trade. The planting of sugar in Brazil, as elsewhere, created, as early as the seventeenth century, not only a long-enduring industry, but also a long-enduring wealth (Denis, 1911). The Southern part of the colony remained largely free of direct intervention, settlers in those regions operated at the margin of the colonial enterprises supported by the metropolis.

The initial phase of colonization took place mainly along the Northeastern coast and led to a boom in the sugar production that caused Brazil to become the main world producer of sugar by 1700 (Prado Jr., 1945). Sugar cane was cultivated mainly along the stretch of land from the current state of Rio Grande do Norte down to the intermediary latitudes of the state of Bahia (Fausto, 2006). There were three main elements in the sugar complex: the “latifundio” (a large land property with a single owner), monoculture, and slave labor. Sugar cane brought the large rural estate and the patriarchal and slavery-based society to Brazil and the rest of colonial America (Higman, 2000). An aspect worth stating, is that sugar mills displayed economies of scale, therefore land was given to individuals who had enough funds to invest in the purchase of large numbers of African slaves (Schwarz, 1987).

In line with Engerman and Sokoloff’s view, and also noted by Naritomi, Soares, and Assunção (2012), the sugar cane society was built on extreme social inequality, and very small economic and political elites concentrated powers. The polarization between landlord and slave and the dominance of the plantation system targeted at exports to Europe constituted the foundations of the social, economic, and political structures associated with sugar production. The colony exacerbated the concentration of resources and the extractive nature of the sugar activity. Naritomi, Soares, and Assunção (2012) shows that the effects if these initial conditions are still present today. The authors also argument that the power of local elites can persist through the overruling of the state power and de jure institutions by economic power and de facto institutions ran by the elites themselves. Landed aristocracies through Latin America were often a symbol of the political scenery created by the sugar cane society.

In the eighteenth century, the discoveries of gold in the country side of the Portuguese colony, initially in Minas Gerais, followed by Goiás and Mato Grosso
reshaped the regional distribution of the population, production, and income of the colony. In the same century, new supply regions were opened, especially in the South of Minas Gerais, including São Paulo and the South region. The gold mining expansion in the central part of Brazil was extremely intense and concentrated in time. Hence, although mining also led to slavery and inequality, the social structure was less rigid and the distribution of endowments across the civil population was relatively more equal. In contrast, the availability of rents from gold coupled with the tremendous efforts of the Portuguese Crown to monitor every single step of production and trade of precious metals led to an overgrown, extremely focused and inefficient government apparatus. This apparatus was constructed entirely around the supervision and extraction of rent from one single activity: mining (Naritomi, Soares, and Assunção, 2012).

Denis (1911) brings our attention not only the impossible task that was maintaining the law in Minas Gerais during the eighteenth century, but he also notes that, as the surface of the alluvial workings became exhausted by wasteful methods, a great part of the population was gradually absorbed by agriculture and stock-raising, and that during the nineteenth century the mining activities of Minas were not very notable; although, it was discovered that the alluvial deposits had been merely scratched on the surface.

In 1808, by order of the Prince Regent Dom João, and running from Napoleon’s troops, the Portuguese Royal family lands in Brazil. Almost immediately, Dom João issued a manifesto declaring that all Brazilian ports should thenceforth be open to trade with the entire world, and that goods might be exported under any flag. As noted by Denis (1911), he, at the same time, practically abolished Royal monopolies, and greatly reduced the import duties. This was a major turn in the development process of Brazil, laws prohibiting industries were once repealed, and printing-presses were established. In 1821, ceding to the pressures from Portugal claiming for the return of their king, Dom João returns to Portugal. His son, Dom Pedro, stayed in Brazilian lands as regent. Soon after, in the year of 1822, in the midst of pressures into opposite directions, from Portugal and from Brazil, Dom Pedro declares independence and is proclaimed Constitutional Emperor.

While tropical Brazil, Pernambuco, and Bahia remained in the first rank during the colonial era, their influence has been declining since the Declaration of Independence, to the profit of the southern part, the temperate zone of Brazil. São Paulo leads the way at the head of this younger Brazil (Denis, 1911).

At the close of the eighteenth century, São Paulo had a history of nearly three centuries: three centuries of constant agricultural and pastoral expansion, during which the Paulistas were practically an independent conquering race. During these three centuries, to sum up the factors bearing upon the creation of the nation, a large population of whites had concentrated around São Paulo, cultivating the land by means of slave labour, first Indian and then negro (Denis,

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4Dom João was cultivated, kindly, and enlightened, but not a firm ruler (Denis, 1911).
5With the death of Queen Maria, Dom João was acclaimed King in 1818.
1911). The year of 1885 marks the onset of the great coffee-planting fever.\footnote{During these years the planting of coffee occupied every mind. It absorbed everyone: farmers, large and small, colonists, rich and poor, city men and country folk - all were involved (Denis, 1911).} It was at this period that the state of São Paulo covered itself with railroads (Denis, 1911).

As coffee has taken the place of sugar, the south of Brazil has won from the north its former economic preponderance. The great coffee-growing centre is São Paulo. In average years its yield of coffee amounts to two-thirds of the total yield of Brazil, and to half of the whole world’s harvest (Denis, 1911). The accumulation of capital due the coffee boom had effects on other activities, as in the expansion of infrastructure and urbanization. The spread of railways and banks of national capita, as well as the European migration, were signs of these new times. At the same time, the state of Minas Gerais finds an abundant source of wealth in provisioning the city of Rio de Janeiro, the capital of Brazil at the time.\footnote{The feeding of the capital is a lucrative industry for the state of Minas, and since the coffee crisis it has given itself entirely to this task (Denis, 1911).}

Summerhill (2010) links the high levels of farm inequality and political exclusion to its legacy of colonialism, slave-based plantation agriculture, and oligarchic politics. The author also finds evidence that farm inequality was high at the start of the twentieth century, yet the pattern of farm inequality was not persistent at the county level over the next 90 years.

In southern Brazil the population has been renewed, all through the second half of the nineteenth century, by a stream of European immigration (Denis, 1911). Brazil was second only to the United States and Argentina in the number of immigrants it received in this period. Within Brazil, São Paulo was the single most important destination of immigrants (Summerhill, 2010). In São Paulo, the Italians have provided the long-established Paulista population with the labour necessary to the extensive production of coffee, and nothing tied them to the soil and they readily change their employers after each harvest. The north of Brazil has not been a center of European immigration (Denis, 1911).

In 1889 Republic was proclaimed while the emperor, Dom Pedro II, embarked upon a Brazilian warship to Lisbon. The Provisional Government immediately granted the suffrage to all literate adult males, and appointed a Constitutional Commission.

The 1889’s Brazilian Constitution was based on the United States’ Constitution. In contrast to the time of the Imperial Government, where Brazil was a powerfully centralized State, the states enjoyed a very large degree of independence (Denis, 1911). The budgetary resources of the states varied with their respective population and their wealth.\footnote{The Constitution has afforded them an important source of revenue in allowing them to establish export duties and to employ them for their own profit.} During the beginning of the twentieth century, it was not easy to distinguish political parties in Brazilian politics.
We now, based largely on Love (1970) and Leal (2012), explore with greater detail the social, economic, and political context of the period known as Old Republic (1891-1930), the key period in our analysis. Under the Empire (1822-1889) the extent and significance of suffrage constituted exceedingly modest advances over the absolutist structure of government during Brazil’s subordination to Portugal (1500-1822). With the establishment of the Republic, a democratization of the formal process occurred in three ways: (i) the number of elective positions at all levels of government was increased (municipality intendants - roughly equivalent to mayors - were now to be elected in the majority of states); (ii) suffrage was broadened (by the first republican Constitution of 1891 all literate males twenty-one and older could vote); and (iii) authority was decentralized (which granted relatively more authority to state and municipality governments, and also shifted a greater share of tax receipts to them).

The introduction of “liberal” constitutional mechanics of government, a wider suffrage, and decentralization did not result in the type of regime the members of the 1890-1891 constituent assembly envisaged (Love, 1970). Strong political organizations with a measure of independence from kinship and patron-client structures emerged in a few states (notably São Paulo, Minas Gerais and Rio Grande do Sul). The Old Republic coincided with the style of rule known as the “politics of governors”\(^9\). Below the governors and their state executive committees stood local bosses called coroneis (colonels)\(^{10}\).

Following the precedent of the colonial and imperial eras, the large landowner in the republican period tended to monopolize political as well as social and economic preeminence. He instructed his dependents how to vote, and the term voto do cabresto (the “hailer vote”) was coined to characterize this abuse of expanded suffrage\(^11\). Brazil’s liberalized suffrage requirements thus strengthened the position of the coroel and the landed oligarchy, as the nation remained 90% rural in the early years of the Republic.

Without the requisite social and economic structures, universal suffrage could either produce long-term political instability or strengthen traditional conservative elements against liberal reformers. The official liberal ideology, on which the Constitution of 1891 was based, had outpaced the social and economic evolution of the country. Brazil retained its patriarchal structures intact. As Leal (2012) stresses, this phenomenon (coronelismo) was simply the means by which liberal democratic forms were made to conform to the social and economic infrastructure of the nation - a declining yet still resilient patriarchal regime.

Coronelismo was a violent form of rural ward politics, in which rival coroneis (if there was more than one powerful figure in a given municipality or district)

\(^9\)A system in which the president assured the governors of the states that their parties would always win elections in their respective jurisdictions in exchange for support of presidential policies in congress and electoral support of the president’s successor (Love, 1970).

\(^{10}\)Leal (2012).

\(^{11}\)The coroel also made extensive and imaginative use of more direct forms of electoral fraud, of which the most common were “voting” illiterates, non-existent and deceased persons, and non-citizens.
fought it out to be the sole boss of the local contingent of the incumbent party at the state level\textsuperscript{12}. Rural Brazil was extremely "political" in the sense that everyone was aware that this well-being depended on aligning with the coronel\textsuperscript{13}.

By 1900 Brazil was a caricature of an oligarchic Latin American policy based on political exclusion, patronage, and clientelism. In the political front, the 1881 electoral reform eliminated the striking broad electoral franchise that Brazil had for most of the nineteenth century, along with the system of two-stage elections. The overthrow of the constitutional monarchy in 1889 reduced the franchise even further.

In 1920's Brazil, essentially an agricultural country\textsuperscript{14}, the land belonged largely to the ruling class throughout its territory (Denis, 1911). According to the same author, this Brazilian aristocracy enjoys political power as well. Life in the city is recent concept; the habits of a methodical and economical urban existence have not yet been formed; there has not yet been time. In the country rich and poor lead much the same life.

As recognized by Denis (1911): "Brazil's political organization is perfectly democratic (...), but only some 20 percent of the population is literate, and many voters have no convictions, but vote from local prejudice or persuasion. The large landed proprietors choose the candidates, and their instructions are usually obeyed". Denis goes further by stating that they (the large land proprietors) form the structure, the framework, of all party politics; they are its strength, its very life; it is they who govern and administer Brazil.

\section{Inequality and Long Run Development in Brazil}

\subsection{The Data}

\subsubsection{The 1920 Census}

Our main source of data for the beginning of the twentieth century is the Economic and Demographic Census of 1920, the first economic census of Brazil. Providing a rich set of information, this Census allows us to construct measures of economic and political inequality for the different regions in which we have interest: Minas Gerais, Pernambuco and São Paulo.

Our measure of economic inequality is a standard measure of the land Gini coefficient, which measures land inequality among landowners. As noted by Summerhill (2010), while a variety of inequality measures are available, Gini enjoys ease of interpretation, and are directly comparable with late twentieth-century measures of farm inequality. The farm land Gini and farm wealth

\footnote{\textsuperscript{12}Here it becomes important the existence of the capanga (henchmen). Once a contest was settled, the capangas of the victorious coronel became a quasi-official army in this feudal-like dispersion of governmental authority (Love, 1970).}

\footnote{\textsuperscript{13}As Love (1970) notes: Tax-collectors, teachers, law-enforcement officers, and most importantly the local judge had to support the boss. Even the priest (...).}

\footnote{\textsuperscript{14}The only portion of the population which is really urban consists of the foreigners, business man of all kinds, whom one meets in Rio, São Paulo, and certain other large cities. The greater part of the business affairs of the country is in their hands (Denis, 1911).}
Gini are the most common measures of agricultural inequality. They do not, although, take into account those without property. They will mask high inequality for a society as a whole if many people do not own land. The overall measures are a step towards remedying this problem, taking into account that farms were distributed across not just farm owners, but the entire population (Summerhill, 2010).

The 1920 Census provides abundant data, as well as specific information, for each municipality, of the number of rural properties and their respective size by size intervals. The number of properties in the Census for each region analysed in this study is: 115,655 for Minas Gerais, 23,336 for Pernambuco, and 80,921 for São Paulo; a total of 219,912 rural properties. The territorial extension of the rural properties is divided into ranges: less than 41 hectares; 41 to 100 hectares; 101 to 200 hectares; 201 to 400 hectares; 401 to 1,000 hectares; 1,001 to 2,000 hectares; 2,001 to 5,000 hectares; 5,001 to 10,000 hectares; 10,001 to 25,000 hectares; and 25,001 hectares or more.

Our index of political inequality comprehends a measure of franchise for each municipality. We calculate the proportion of the population that is eligible for voting in each municipality. According to the Constitution of 1891 (the one valid until 1934) only alphabetized Brazilian men older than 21 were able to vote. The Census provides detailed data on demographic variables (number of individuals subdivided into sex, age, nationality, etc.) and the number of alphabetized individuals (also subdivided by sex and age). As an extension of these variable, for robustness checks, we also calculate the percentage of eligible voters between men, and the percentage of eligible voters between men older than 21 years.

3.1.2 Contemporary Outcomes and Control Variables

We analyse a variety of contemporary outcomes. We aim to improve the understanding of the relation between inequality and development as a broader concept than GDP per capita. In this sense, our first reference is the more systematic analysis made by the United Nations, with important contributions from Amartya Sen and Mahbub ul Haq, that led to the construction of the Human Development Index (HDI).

For income per capita we collect data from the Instituto Brasileiro de Geografia e Estatística (IBGE - Brazilian Bureau of Geography and Statistics), that provides this information for each municipality for the year 2000. The Instituto de Pesquisa Econômica Aplicada (IPEA - Institute for Applied Economic Research) provides our data for health and educational attainments. For educational attainments we analyse the average years of study for individuals older than 25 years. As a health indicator we explore infant mortality\textsuperscript{15}.

We also use a variety of geographical and demographic control variables. The primary source is the IBGE. We explore altitude, the geographical area, latitude,
average rainfall for each season (therefore we have four variables of rainfall), average temperature for each season (therefore four more variables) total, urban, and rural population for the year 2000, and total population for 1920.

As additional educational controls for the year 1920 (for reasons that will be clearer on section 3.4) we use the percentage of the population that have as their official profession teaching. Another used variable is the percentage of alphabetized women. We also have the number of schools.

3.2 Comparable Territorial Units

Since the mid-nineteenth century, the Brazilian territory had significant changes both in the number as in the geographical limits of its political-administrative units. These changes imply transfers of municipalities between states or territories that difficult intercensal comparisons, even at the state level.

Due to such issues, even if we focus on municipal data, we can only imperfectly reconstruct the territorial limits of these units from 1872. The creation of Comparable Territorial Units becomes therefore a necessary and useful measure for the comparable study of different years in the Brazilian context. At the municipal level, comparisons are even more difficult due to the rapid rise of the number of the municipalities and the changes in their geographical limits.

In 1920, 1304 municipalities were surveyed. This number changed to 1890 in 1950, 3952 in 1970, and reaching 5507 in 2000. Today, there are officially 5570 municipalities in Brazil.

Based on the work of Reis, Pimentel, and Alvarenga (2010) we were able to divide the territory of Minas Gerais, Pernambuco, and São Paulo into 157, 52, and 172 comparable territorial units respectively. These will be our unit of analysis. All data are consistently unified for representing their respective information for each one of the comparable territorial units.

3.3 Empirical Strategy

In order to explore the consequences of land inequality and political inequality for long-term development we exploit the cross-section variation in the CTU’s for each of the following estates: Minas Gerais, Pernambuco, and São Paulo.

We first estimate cross-sectional ordinary least squares (OLS) regressions of the following form

\[ y_i^{2000} = \alpha g_i^{1920} + \beta p_i^{1920} + \delta' x_i + \varepsilon_i \]  

where \( y_i^{2000} \) is a measure of development in the comparable territorial unit \( i \) for the year 2000, \( x_i \) is a vector of control covariates, and \( \varepsilon_i \) is an error term. We assume that \( E(\varepsilon_i) = 0 \) for all \( i \). The key variables in this equation are \( g_i^{1920} \) and \( p_i^{1920} \), the land Gini coefficient for the comparable territorial units in 1920, and the constructed variable for political inequality in 1920, respectively. Our main
interest is therefore the consistent estimation of $\alpha$ and $\beta$.

We will estimate this regression, with distinct dependent variables (accounting for different development indicators, such as income, education, and health), for each of the three regions previously stated (Minas Gerais, Pernambuco, and São Paulo) in order to examine the relation between both economic and political inequality and development across different de facto institutional contexts.

As discussed previously (Section 2), the inclusion of these specific regions has a clear purpose. Each one of these regions is representative of a different de facto institutional setting that allows us to capture possible different relations between inequality and long-term development indicators. Pernambuco is representative of an old agrarian structure, with great importance during the colonial era due to the sugar production that, as stated before, had severe implications for the political, economic and social structure of the region. Minas Gerais was the center of the gold cycle that also had profound political, economic, and social impact. It was lately an important center of coffee production and for the supply of goods for the domestic market. São Paulo was the main coffee producer, becoming the most important economic center of Brazil, position that it still occupies today.

The main econometric concern in this specification is the possible endogeneity bias generated by omitted variables. In other words, if omitted factors in $\varepsilon$, are correlated with our explanatory variables the estimation by OLS will generate inconsistent estimators. Easterly (2007), building on historical insights from Engerman and Sokoloff, has stressed that growing conditions (topography, climate, and soil) favorable to the production of cash crops contribute to higher inequality (Summerhill, 2010). As Acemoglu, Bautista, Querubín, and Robinson (2008), the vector $x_i$ will control for a rich set of covariates.

3.4 Results

We start by providing results of simple regressions (correlations), using as independent variables the land Gini (among landowners) and the franchise indicator, and as dependent variables the GDP per capita, average years of schooling and infant mortality, for each Brazilian region. Results are summarized in Table 3.4.1.
Panel A (Table 3.4.1) presents the results for Minas Gerais. Columns 1 to 3 show the results for the logarithm of GDP per capita, columns 4 to 6 give the results for the logarithm of average years of schooling, and columns 7 to 9 give us the results for infant mortality. Panels B and C show the respective results for Pernambuco and São Paulo.

We start our analysis with Panel A. Column 1 shows that the land Gini coefficient estimate, of 1.47, is positive and highly significant. Column 2 presents the coefficient estimate for our political variable. The estimate is 0.04, a relatively small magnitude, but also highly significant, indicating a possible positive correlation between these two variables (log GDP per capita and franchise). Column 3 regress the logarithm of GDP per capita against both variables. The magnitudes and significances are similar. Columns 4 and 7 present the results for the simple regression of the logarithm of average years of schooling and infant mortality against the land Gini variable, respectively. The estimates, 0.87 and -29.13, are also statistically significant. In columns 5 and 8 we can see the results for the franchise variable. It presents similar behaviors in relation to column 2. In other words, although significant the magnitude of the estimated coefficient in a simple regression of GDP per capita, average years of schooling, or infant mortality against the percentage of eligible voters is very small. When we include both variables (the land Gini and the franchise indicator) as independent variables in regressions for average years of schooling and infant mortality (columns 6 and 9), the results are consistent with the discussion above. The general conclusion of Panel A is that both indicators of economic and political

| Panel A |                            | Minas Gerais |                            |                            |                            |                            |                            |                            |
|---------|-----------------------------|--------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|         | [1]                         | [2]          | [3]                         | [4]                         | [5]                         | [6]                         | [7]                         | [8]                         | [9]                         |
|         | Log GDP per capita          | Log Average  | Land Gini                   | Franchise                   |                             |                             |                             |                             |
| Land Gini| 1.47***                    | 1.53***      | 0.04***                     | 0.04***                     |                             |                             |                             |                             |
| Franchise|                            |              |                             |                             |                             |                             |                             |                             |
| Observations | 157                        | 157          | 157                         | 157                         | 157                         | 157                         | 157                         | 157                         |
| R² adj. | 0.12                        | 0.07         | 0.20                        | 0.12                        | 0.25                        | 0.39                        | 0.11                        | 0.02                        | 0.13                        |
| Panel B |                            |              |                            |                            |                            |                            |                            |                            |
| [1] Log GDP per capita |                            |              |                            |                            |                            |                            |                            |
| Land Gini | 0.23                        | 0.09***      |                             |                             |                             |                             |                             |
| Franchise|                            |              |                             |                             |                             |                             |                             |
| Observations | 52                         | 52           | 52                          | 52                          | 52                          | 52                          | 52                          | 52                          |
| R² adj. | -0.01                       | 0.35         | 0.37                        | -0.02                       | 0.38                        | 0.38                        | -0.02                       | 0.12                        | 0.11                        |
| Panel C |                            |              |                            |                            |                            |                            |                            |                            |
| [1] Log GDP per capita |                            |              |                            |                            |                            |                            |                            |
| Land Gini | 0.65***                    |              |                             |                             |                             |                             |                             |
| Franchise|                            |              |                             |                             |                             |                             |                             |
| Observations | 172                        | 172          | 172                         | 172                         | 172                         | 172                         | 172                         | 172                         |
| R² adj. | 0.07                        | -0.00        | 0.06                        | 0.08                        | 0.08                        | 0.16                        | 0.04                        | 0.05                        | 0.09                        |

Legend: * p-value<0.1; ** p-value<0.05; *** p-value<0.01
inequality are positively correlated with development indicators in the long run for Minas Gerais.

Panel B presents the same structure of Panel A but now for the state of Pernambuco. An interesting result is that, opposing the results for Minas Gerais, the land Gini coefficient is statistically insignificant in all specifications for all development indicators. Columns 1, 4, and 7 (simple regression for GDP per capita, average years of schooling, and infant mortality), and columns 3, 6, and 9 (regressions for the same three development indicators respectively against both the land Gini and franchise) show it clearly. Nevertheless, the franchise indicator has the expected sign (positive for GDP per capita and average years of schooling, and negative for infant mortality) and it is highly significant in all specifications.

We now analyse on Panel C our last region, São Paulo. Similarly to the results for Minas Gerais on Panel A, and therefore opposing as well the results for Pernambuco, the land Gini variable is positively correlated to the development indicators. Columns 1 and 3 show a positive and highly significant relationship for the land Gini and GDP per capita. Columns 4 and 7 present the positive and statistically significant results for the simple regression for average years of schooling and infant mortality respectively. This result is maintained on the regressions including the political variable (Columns 6 and 9). As for the franchise variable, the coefficient estimate is insignificant in the simple regression with GDP per capita as independent variable (column 2). The analogous estimate is significant for the regressions with average years of schooling (column 5) and for infant mortality (column 8) as dependent variables, but they also present a small magnitude. Columns 3, 6 and 9, that present the results for the regressions with each of the three development indicators as dependent variable and both the land Gini and the franchise indicators as independent variables, confirm the results of the simple regressions.

Although interesting, the results presented on Table 3.4.1 reveal only historical correlations. The econometric concern that naturally arises is the possible bias generated by the inconsistency of the OLS results in the regressions, due to the fact that the covariance of the covariates and the error term is not zero. The most important source of inconsistency in our case is the omitted variable bias. As Acemoglu, Bautista, Querubín and Robinson (2008), we attempt to correct for this bias controlling for a rich set of control variables. Another concern is that the positive correlation between the franchise variable is being driven by the association of this variable with an educational indicator. By definition we have to consider the number of alphabetized males (for the construction of the franchise variable), and per se, more alphabetized people would indicate a more educated environment that, by other ways than franchise, would lead to more development. In order to check if that is the case we also control for a number of educational variables.

Tables 3.4.2, 3.4.3, and 3.4.4 provide these extended results for Minas Gerais, Pernambuco and São Paulo respectively.
Table 3.4.2 OLS regressions with controls: Minas Gerais

| Minas Gerais | (1) | (2) | (3) | (4) | (5) | (6) |
|--------------|-----|-----|-----|-----|-----|-----|
| **Log GDP per capita** |     |     |     |     |     |     |
| Land Gini    | 1.06*** | 0.83** | 0.84** | 0.85** |     |     |
| Franchise    | 0.03** | -0.02 | -0.01 | 0.00 |     |     |
| FranchiseM   |     |     |     | -0.00 | -0.00 |     |
| Geographic controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Educational controls | No | No | Yes | Yes | Yes | Yes |
| Observations | 157 | 157 | 157 | 157 | 157 | 157 |
| R² adj.      | 0.35 | 0.33 | 0.57 | 0.59 | 0.59 | 0.59 |

| **Log Average Years of Schooling** |     |     |     |     |     |     |
| Land Gini    | 0.71*** | 0.57*** | 0.58*** | 0.59*** |     |     |
| Franchise    | 0.03*** | 0.00 | 0.01 | 0.00 |     |     |
| FranchiseM   |     |     |     | 0.00 | -0.00 |     |
| Geographic controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Educational controls | No | No | Yes | Yes | Yes | Yes |
| Observations | 157 | 157 | 157 | 157 | 157 | 157 |
| R² adj.      | 0.49 | 0.58 | 0.57 | 0.60 | 0.60 | 0.60 |

| **Infant Mortality** |     |     |     |     |     |     |
| Land Gini    | -3.23 | -5.38 | -5.25 | -5.88 |     |     |
| Franchise    | -0.12 | 0.13 | 0.08 | 0.07 |     |     |
| FranchiseM   |     |     |     | 0.07 | -0.02 |     |
| Geographic controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Educational controls | No | No | Yes | Yes | Yes | Yes |
| Observations | 157 | 157 | 157 | 157 | 157 | 157 |
| R² adj.      | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 | 0.52 |

Legend: * p-value < 0.1; ** p-value < 0.05; *** p-value < 0.01

Table 3.4.2 shows that, controlling for a long set of covariates, the finding that the land Gini is positively correlated with GDP per capita and average years of studying is robust for Minas Gerais (Panels A and B, columns 1, 4, 5 and 6). The same is not true for the franchise variable. Although significant when we control for the geographic controls (Panel A, column 2 for GDP, and Panel B, column 2 for average years of schooling) it is not significant when we control for other educational indicators (Panel A, column 3 for GDP per capita, and Panel B, column 2 for average years of education). These results are maintained when
we use both variables (that account in some level for economic and political inequality) and all the controls (both geographical and educational ones), we can see those results in column 4 both in Panel A as in Panel B. These are striking results that show that the economic inequality among land owners has a positive relation with long term indicators of income and education. We go further into analysing our other striking result, the one that shows no evidence of an effect of franchise in long term income and education. We include the other two indicators of franchise in columns 5 and 6. The result remains. Interestingly in none of the specifications we find a statistically significant relation between economic and political inequality with our long term indicator of health, infant mortality.
Table 3.4.3 presents the analogous results of Table 3.4.2 for the state of Pernambuco. We see that the patterns observed in Table 3.4.1 for the relationship between the land Gini and long term development indicators is maintained for Pernambuco even controlling for a rich set of other indicators. Column 1 shows these results for GDP per capita (Panel A), average years of schooling (Panel B), and infant mortality (Panel C). The result obtained in Table 3.4.1, that shows a statistically significant relation for Pernambuco between the franchise
variable and long term development indicators is not robust. As we can see in column 3 (each Panel presents the result for one development indicator), once we control for other educational covariates the significance disappears (although the variable is still significant once we control for geographic variables - column 2). These results are maintained even when including all elements (land Gini, franchise, geographic controls, and educational controls) in the regression - see column 4. Columns 5 and 6 present the robustness of the results even using other franchise variables.
Table 3.4.4 OLS regressions with controls: São Paulo

|                  | Panel A | Panel B | Panel C |
|------------------|---------|---------|---------|
|                  | (1)     | (2)     | (3)     | (4)     | (5)     | (6)     | (1)     | (2)     | (3)     | (4)     | (5)     | (6)     | (1)     | (2)     | (3)     | (4)     | (5)     | (6)     |
|                  | Log GDP per capita | Log Average Years of Schooling | Infant Mortality |
| Land Gini        | 0.52*** | 0.37*** | -4.02   |
| Franchise        | 0.63**  | 0.16*   | 0.04    |
| FranchiseM       | -0.03** | 0.16*   | 0.36    |
| FranchiseAM      | -0.03** | -0.00   | 0.34    |
| Geographic       | Yes     | Yes     | Yes     |
| controls         |         |         |         |
| Educational      | No      | No      | Yes     |
| controls         |         |         |         |
| Observations     | 172     | 172     | 172     |
| R² adj.          | 0.26    | 0.28    | 0.28    |
| Franchise        | -0.01** | -0.00   | 0.19    |
| FranchiseM       |         | 0.07    | 0.07    |
| FranchiseAM      |         |         |         |
| Geographic       | Yes     | Yes     | Yes     |
| controls         |         |         |         |
| Educational      | No      | No      | Yes     |
| controls         |         |         |         |
| Observations     | 172     | 172     | 172     |
| R² adj.          | 0.26    | 0.28    | 0.28    |
| Franchise        | -3.21   | -3.20   | -3.20   |
| FranchiseM       | 0.36    | 0.34    | 0.34    |
| FranchiseAM      |         |         |         |
| Geographic       | Yes     | Yes     | Yes     |
| controls         |         |         |         |
| Educational      | No      | No      | Yes     |
| controls         |         |         |         |
| Observations     | 172     | 172     | 172     |
| R² adj.          | 0.28    | 0.28    | 0.28    |

Legend: * p-value<0.1; ** p-value<0.05; *** p-value<0.01

Last, but not least, we present the robustness results for São Paulo. Economic inequality between landowners in 1920 is highly significant for explaining long term indicators of development for income (Panel A - column 1) and education (Panel B - column 1) even when controlling for geographic variables. However, we do not obtain this significance for the health indicator - infant mortality (Panel C - column 1). Nevertheless, the political inequality indicator, although significant in some specifications (e.g., Panel A and B, columns...
2 and 6), is rarely relevant, because it presents very small magnitudes. The result of significance of the economic inequality variable is also non robust, for the significance disappears when we include the franchise and other educational covariates (columns 4, 5 and 6).

Table 3.4.5 OLS regressions: poverty and public goods

| Panel A | Minas Gerais | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Poverty | Public Goods | | | | | | | |
| Land Gini | -60.26*** | -34.45*** | | | | | | | |
| Franchise | -30.02** | 28.90** | 20.72*** | 22.69*** | | | | | |
| Geographic controls | No | Yes | No | Yes | Yes | No | Yes | Yes | Yes |
| Educational controls | No | No | No | Yes | Yes | No | No | Yes | Yes |
| Observations | 157 | 157 | 157 | 157 | 157 | 157 | 157 | 157 | 157 |
| R² adj. | 0.11 | 0.67 | 0.06 | 0.66 | 0.68 | 0.08 | 0.81 | 0.20 | 0.82 |

| Panel B | Pernambuco | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Poverty | Public Goods | | | | | | | |
| Land Gini | -4.14 | 7.15 | | | | | | | |
| Franchise | -2.91*** | -1.39 | -0.96 | 4.59*** | 4.73** | 4.10 |
| Geographic controls | No | Yes | No | Yes | Yes | No | Yes | Yes | Yes |
| Educational controls | No | No | No | Yes | Yes | No | No | Yes | Yes |
| Observations | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| R² adj. | -0.02 | 0.17 | 0.24 | 0.48 | 0.47 | -0.01 | 0.09 | 0.22 | 0.35 |

| Panel C | São Paulo | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Poverty | Public Goods | | | | | | | |
| Land Gini | -22.92*** | -5.43 | | | | | | | |
| Franchise | -1.59 | 12.97*** | 6.47** | 3.81 | | | | | |
| Geographic controls | No | Yes | No | Yes | Yes | No | Yes | Yes | Yes |
| Educational controls | No | No | No | Yes | Yes | No | No | Yes | Yes |
| Observations | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 |
| R² adj. | 0.06 | 0.39 | 0.02 | 0.48 | 0.48 | 0.11 | 0.45 | 0.01 | 0.50 |

Legend: * p-value<0.1; ** p-value<0.05; *** p-value<0.01

We also analyse some additional variables. In order to study the relationship between our interest variables - the economic and political inequality variables - and poverty and public goods provision we do some additional regressions. Table 3.4.5 presents, for each state, the regression results using as dependent variable a measure of poverty (percentage of the population below the poverty line) and a measure of public goods provision (percentage of houses with canalized water). The results are, as expected, consistent with our previous analysis. For Minas Gerais (Panel A) the land Gini is highly significant and has the expected sign in all specifications (with and without controls): negative for the
poverty indicator and positive for the public goods provision indicator. The inter-
esting results is shown in columns 9 and 10 of Panel A: even when controlling
for geographical and educational variables and for the land Gini, the political
variable is highly significant for the provision of water.

For Pernambuco (Panel B) none of the specifications with controls show a sig-
nificant relation between any of the variables of interest and the poverty and
public goods provision variables. For São Paulo (Panel C) we have a similar re-
sult: when controlling for geographical and educational controls, and including
the land Gini and the franchise variables, none of them is significant for either
the poverty or for the public goods provision indicators (Panel C - columns 5
and 10).

4 Conclusion

In this study, we attempted to contribute to the debate about the effects of ine-
quity on long-term development. As noted by Acemoglu, Bautista, Querubín,
and Robinson (2008), most existing investigations of this question look at cross-
country data (or cross-state and cross-village data) and do not distinguish be-
tween economic or political inequality. Therefore including the political inequal-
ity is an important and exciting, both theoretical as empirical, improvement on
the literature relating inequality and development.

We first proposed a new method of analysis of the effects of inequality within the
institutional framework. Supported by the unique and fruitful Brazilian context
we were able to construct a method of analysis that maintained constant the de
jure institutional structure while examining the relationship between inequality
and different de facto environments. This shall present more light on the institu-
tional change process, greatly emphasized by Douglass North.

We also extended the literature explored by Acemoglu, Bautista, Querubín,
and Robinson (2008) that include not only economic, but also political inequal-
ity. Our analysis reinforces the importance of the study of micro environments
to better comprehend the effects of inequality. Differently than late nineteenth-
century Colombia, in Brazil both political and economic inequality were tightly
linked.

We also found evidence that support a careful historical investigation. The
eligibility for voting did not give the population more political access. The
political process on early twentieth-century Brazil was still controlled by the
landed elites (Leal, 2012). Our empirical results support this idea, showing
mostly no significant effect of enfranchisement on development indicators.

Another striking result of this study is the consistent evidence of a positive
relation of the land Gini coefficient (among landowners) and development indi-
cators for some regions but not for others. Especially during the coffee boom
phase, landowners were the main authority throughout most of the territory of
a rural Brazil. They were responsible for the majority of aspects of the life of
the municipality. Therefore equality among landowners might enforce economic
and political disputes while in a more unequal environment the provision of public goods and access to justice might be easier. These results are consistently weaker for our health indicator (infant mortality). But we find no such evidence for Pernambuco, with its old agrarian aristocracy derived from the sugar cycle.

These evidence make more interesting the “weakly institutionalized societies” hypothesis presented by Acemoglu, Bautista, Querubín, and Robinson (2008), and Acemoglu, Robinson, and Verdier (2004), based on Bates (1981). Although fitting into the weakly institutionalized definition, early twentieth-century Brazil presented the positive correlation of economic inequality and long-term development but not for the same reasons exposed by Acemoglu, Bautista, Querubín, and Robinson (2008) for Colombia. It was not a check against politicians, since they were the base of the political power, but it left more room for their own politics that might have benefited the population more than if there were more equality. It is important to stress that this does not imply that these kind of inequalities are good per se, but comparing the effect of these two scenarios in this specific context provide such insights.

All in all, we have also only presented here historical correlations. We can not, based solely on these empirical findings, provide any solid argument of a causal relation, even controlling for the variety of both geographical and educational controls. We therefore have attempted to make a small contribution in a field that promises important answers for the ways we comprehend inequality and development. An undoubtedly important, exciting and open field of research.

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