

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

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## 1 Introduction

Inequality is a subject of intrinsic interest, in the sense that it is related to moral concepts such as justice and fairness.<sup>1</sup> Notwithstanding, it is also important for its effects, for example, on the growth and educational attainments of a society. Ironically, it is one of the most hotly debated subjects within growth and development economics literature and one which is far from reaching a consensus.

A first wave of development literature (as characterized by Easterly 2007, p. 756) presents the idea that high inequality could promote growth by concentrating income in the hands of high-saving capitalists (Kuznets 1955; Kaldor 1956). As presented in Aghion et al. (1999b), the view that wealth inequality could be growth enhancing is based on three arguments: (1) the marginal propensity to save of the rich is higher than that of the poor; (2) investment indivisibilities; and (3) the trade-off between productive efficiency and equality. However, later works indicate a possible negative effect of economic inequality on growth, both theoretically and empirically.<sup>2</sup> Several mechanisms were suggested as causes of this, such as political economy mechanisms (Alesina and Rodrik 1994; Persson and Tabellini 1994), imperfect capital markets (Banerjee and Newman 1991; Galor and Zeira 1993; Perotti 1992) and investment in human capital (Bourguignon and Verdier 2000; Galor et al. 2009; Galor and Zeira 1993; Perotti 1996), the composition of the aggregate demand (Murphy et al. 1989), and macroeconomic instability (Aghion et al. 1999a).<sup>3</sup>

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<sup>1</sup> These concepts and interrelations are investigated since the birth of philosophy in Ancient Greece. See the works of Plato (e.g., *The Republic*) and his disciple Aristotle (e.g., *Politics*).

<sup>2</sup> For comprehensive reviews, see Aghion (1999b) and Bénabou (1996).

<sup>3</sup> For the effects of redistribution on growth, see Easterly and Rebelo (1993), Perotti (1996), and Aghion (1999b).

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Three important studies followed, casting doubt on the robustness of what were then considered consistent results, and finding no negative relationship between economic inequality and growth. Using new data and panel techniques, Forbes (2000) finds a positive relationship between economic inequality and growth. Barro (2000) and Banerjee and Duflo (2003) also present evidence against such a clear-cut negative relationship. However, Easterly (2007), using an insightful instrument, finds again a negative relationship between inequality and economic performance.

There are also important studies correlating political inequality and development. Acemoglu (2008) shows how political inequality may retard development due to the unwillingness of incumbent elites to allow the entry of new agents. Elites might also block the introduction of new technologies (Acemoglu and Robinson 2000). Bates (1981) shows how, in a politically concentrated environment, there might be little interest in the provision of public goods, including schooling. As noted by Acemoglu et al. (2008), 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.

Even more important for the present work are Engerman and Sokoloff's comprehensive series of studies on development of the Americas. Engerman and Sokoloff (1997, 2002) argued that factor endowments had a major influence on the colonization strategies throughout the American continent that, in turn, established different initial levels of inequality that account for the divergent institutional paths of American societies that resulted in the differential development standards of these regions today. Therefore, in Engerman and Sokoloff's view, inequality had prejudicial effects on development in a cross-country framework.<sup>4</sup>

It is to this context of apparently contradictory evidence that Acemoglu et al.'s (2008) study belongs. Their study distinguishes empirically between economic and political inequality in their exploration of the effects of inequality. As the authors correctly note, economic inequality is probably endogenous in regressions without a political inequality variable, since we expect them to be linked, and this might bias the econometric evidence on the effects of economic inequality. The authors not only construct different variables for economic inequality (the land Gini) and political inequality (a political concentration index) but also deal with a constant *de jure* institutional environment, the region of Cundinamarca in Colombia, which, according to Pande and Udry (2005), might provide deeper insights into the specific channels through which inequality affects development.

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<sup>4</sup>Two brief comments on Engerman and Sokoloff's thesis: (i) Theories presented by North et al. (2000), which emphasize the importance of metropolitan objectives in contrast to local conditions, and Frankema (2010), which supports the role of precolonial institutions, are likely complementary to the one by Engerman and Sokoloff (for a review of these theories, see Frankema 2009, Chap. 3); and (ii) we believe that the validity of Engerman and Sokoloff's theory is in a cross-country framework, and, therefore, studies such as those by Nunn (2008), Acemoglu et al. (2008), and Dell (2010) do not necessarily oppose their views. Moreover, as shown by Nugent and Robinson (2010), there can be heterogeneities with Latin America.

The authors present intriguing evidence. Overall, they find a negative relationship between economic and political inequality for nineteenth-century Colombia and a positive association between economic inequality in the nineteenth century and development outcomes in the late twentieth century. These results are unexpected, as it is generally expected for Latin American countries to have high inequality, both economic and political, and that they are positively correlated (mutually reinforcing each other). The interpretation of the authors, based on Bates' (1981) insights on Africa, is that in "weakly institutionalized" societies, where few constraints were imposed on the actions politicians could take, large landowners had the power to keep in check the rapacious tendencies of these politicians.<sup>5</sup>

We provide a similar investigation for the complex case of Brazil. With unique data from the beginning of the twentieth century—the Brazilian 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) at the municipal level in selected Brazilian states. However, we not only analyze how inequality (both economic and political) is related to long-term development, but we also go further into analyzing how inequality is related to long-term development within different *de facto* institutional environments while controlling for a constant *de jure* context (in line with Pande and Udry's reorientation argument).

Therefore, we are able to integrate both the inequality literature and the recent institutional literature (see, e.g., Acemoglu et al. 2001, 2002; Pande and Udry 2005; Banerjee and Iyer 2005).<sup>6</sup> We calculate the respective inequality indicators for all the municipalities in four Brazilian states: Minas Gerais, São Paulo, Pernambuco, and Rio Grande do Sul. The states were carefully selected in order to capture how inequality is related to long-term development in different *de facto* institutional environments greatly influenced by the unique colonial experiences of these regions. Our analysis presents evidence of a heterogeneous relationship between inequality and long-term development indicators, broadly consistent with the colonial experiences of the states considered, likely a reflection of different *de facto* institutional environments.

Furthermore, our study intersects with an important recent literature on the Brazilian case. Naritomi et al. (2012) present evidence that colonial experiences indeed shaped different *de facto* institutional environments within the country. Summerhill (2010), exploring the state of São Paulo, does not find a negative effect of land inequality on long-term development.<sup>7</sup> Moreover, and in line with our results, the author does not find a significant relationship between political inequality measured by the extent of the franchise and long-term economic growth. In a state-level analysis, Wegenast (2010) argues that Brazil's different agrarian structures determined, in the long run, the educational outputs. His analysis suggests that in

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<sup>5</sup>The concept of "weakly institutionalized societies" is developed in Acemoglu et al. (2004).

<sup>6</sup>For a more systematic approach and review of the institutional literature, see Acemoglu et al. (2005).

<sup>7</sup>De Carvalho Filho and Colistete (2010), examining the same state of São Paulo at the beginning of the twentieth century, find a negative correlation between land concentration and supply of public education at that time.

states with higher land concentration, there were fewer incentives to invest in education. Moreover, for the Latin American context, Dell (2010), investigating the negative effects of the *mita*, suggests that land concentration would have been a beneficial factor, for it is hypothesized that the long-term presence of large-scale landowners in non-*mita* districts provided a stable land tenure system that encouraged public goods provision.

The chapter is organized as follows. In the next section, we explore the Brazilian development process from a historical perspective. We then proceed to the data analysis. Next, we present the econometric results. The last section concludes.

## 2 The Brazilian Context

### 2.1 Some History

Brazil was first claimed by modern Europeans in 1500. The interest of Crown and settlers would soon turn to the production of sugar, which became the colony's first major export. International prices were high and the supply, especially from Sicily, Atlantic islands such as Cape Verde and Madeira, and the East, was low and restricted. At the time, the main production centers were in Pernambuco and in Bahia. Brazil was the biggest sugar producer in the world until mid-seventeenth century—the heyday of the sugar enterprise in Brazil—when competition from Central American colonies and the Antilles became stronger (Prado Jr. 1956 [1945]).<sup>8</sup>

As expected, geographical characteristics were determinant for the success of this enterprise. Moreover, although there was no general overall plan for the sugar enterprise, potential problems were largely avoided thanks to favorable circumstances. Production techniques, the creation and expansion of a consumer market, and financing were largely dealt with by the Dutch, who practically controlled the so-called Portuguese enterprise. Due to economies of scale, production was based on large land properties with a single owner, called *latifúndios*, characterized mainly by monoculture and slave labor. Prado Jr. (1956 [1945]) notes the absence of complex methods of production in colonial Brazil, both in terms of space and time, or even significant improvement in methods. Production expansion was based on the extension of land under cultivation and on slave population growth rather than on changes in the production process and increased productivity.<sup>9</sup>

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<sup>8</sup>The competition from the Antilles was a direct consequence of the Dutch experience with the sugar industry in Brazilian lands before their expulsion in 1654. After learning the technical and organizational aspects, they were able to implement a similar structure in the Caribbean territories and generate higher profits (Furtado 2006 [1959]).

<sup>9</sup>According to Prado Jr., Brazil's development problems are a direct consequence of the dependence of the colony on exports of primary products produced in large properties with slave labor. However, Villela (2013) argues that none of these elements can explain for themselves Brazil's lack of growth at the time, the lack of efficiency gains being the fundamental problem.

Furtado (2006 [1959]) argues that the high profitability of an economy with a high import coefficient tends to hinder investments in secondary activities, such as food production. The intense specialization of the sugar economy would be then associated with its high profitability (Furtado 2006 [1959], p. 93). As a result, cattle raising shifted to the countryside of the Northeastern region. This activity was radically different from the sugar industry, occupying extensive areas of land, and the impact of the dry seasons was reflected in the absence of permanent occupation. Not only was there no need for large initial capital investments, but also the large amount of land available hindered productivity increases.

In the early seventeenth century, sugar exports began to decline, mainly due to increasing competition from British, Dutch, and French colonies. Prices continued to fall throughout the eighteenth century. With the decline of the sugar industry, income fell also in the cattle farming sector, which then became mostly a subsistence activity, allowing a continued growth of the population since the activity could be easily expanded due to the availability of land. The growth of the share of the cattle farming sector in relation to the sugar industry brought with it a decline in the region's average *per capita* productivity and income.

The problem was that the accelerated growth of the sugar enterprise had no structural counterpart. The economic system, under which almost all the net income generated stayed with the large landowners, often resorted to importing luxury goods, slaves, or machines for that same sugar industry, and underwent no significant change during this period. Therefore, the whole enterprise depended heavily on the external market. With the continued fall in prices and the increased opportunity costs due to the emergence of the mining regions, the sugar economy entered a "secular lethargy" (Furtado 2006 [1959], p. 91) that endured until the nineteenth century.

At the same time, economic enterprises in the Northeast did not completely stagnate with the decline of sugar production. The second half of the eighteenth century saw a rise in international demand for other agricultural products, particularly cotton, due mainly to the Industrial Revolution. The rural parts of the state of Pernambuco, being drier and, therefore, more suitable for the production of cotton rather than cattle raising, would also benefit.

During most of the sixteenth and seventeenth centuries, the southern part of the colony was relatively free of direct intervention from the Crown. With the main economic interest focused on sugar production, settlers in those other regions lived at the margin of the colonial enterprise. Soon after the fall of sugar prices after 1650, this geopolitical structure changed. In the last years of the seventeenth century, gold and other precious metals were discovered in the countryside of the Portuguese territory, especially in Minas Gerais. By the mid-eighteenth century, gold mining had reached its greatest land extent and highest levels of production. For almost a century (1675–1765) gold mining would be the focus of the attentions of the Crown (Prado Jr. 1956 [1945]). Migrants arrived from different parts of the country and new towns sprang up in the mining districts. Along with the shift of the colony's economic center from the Northeast to the Southeast, there was also shift in the political center. As a consequence, Rio de Janeiro replaced Salvador (Bahia) as the capital of the colony in 1763.

Although mining also made use of slave labor, the social structure was less rigid than in the sugar-producing areas. Slaves were never the majority among the population. Gold mining led to greater social inclusion, for it was not necessary to have important amounts of initial capital. Possibilities were greater even for slaves, who could often work for themselves and buy their freedom. Therefore, although the average income in the gold economy was inferior to the average income at the apogee of the sugar economy (Furtado 2006 [1959]), income was more broadly distributed and the percentage of free people was higher. This influx of wealth led the Portuguese Crown to rapidly establish a bureaucratic apparatus to avoid tax evasion.<sup>10</sup> The heyday of the Brazilian gold rush was in the 1750s, when exports reached 2.5 million British pounds (Furtado 2006 [1959]).<sup>11</sup>

However, the decline of the Brazilian gold rush came soon, due to its geographical characteristics (alluvial), inferior extraction techniques, and a bureaucracy incapable of providing sustainable incentives to the enterprise. Denis (1911, p. 61) notes: “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. (...) 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.” With the decline of the gold cycle and the persistent low international prices for sugar, the last years of the eighteenth century were characterized by economic difficulties in the colony. All in all, “the latifundium, slavery, and the export trade remained, as the historian Caio Prado Jr. has said, for more than 300 years the principal institutions of Brazilian society” (Dean 1971, p. 607).

Early in the nineteenth century, a major political event changed the development path followed by the colony. In 1808, by order of Prince Regent Dom João, fleeing from Napoleon’s troops, the Portuguese royal family is transferred to Brazilian lands.<sup>12</sup> In 1822, in a country with approximately 3.9 million inhabitants (of which 1.2 million approximately were slaves), Dom Pedro—son of Dom João (who was then in Portugal), the colony’s regent at the time—declared independence and was proclaimed Constitutional Emperor, remaining in power until 1831. After a regency period (1831–1840) characterized by great social instability, his son, Dom Pedro II,

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<sup>10</sup> Examples of important administrative controls by the Portuguese Crown are the payment of one-fifth of the production (and their careful supervision through all stages of the mining activity), prohibition on individual negotiations, establishment of special trading monopolies, and tight control on local manufacturing.

<sup>11</sup> In 1780 the value of gold exports was less than one million British pounds (Furtado 2006 [1959]).

<sup>12</sup> According to Prado Jr. (1956 [1945]) this was effectively the end of the colonial period for Brazil. New economic measures were soon adopted. The first and probably the most important measure was a manifesto declaring that all Brazilian ports should be considered open to trade with the entire world, and that goods might be exported under any flag. At the same time, royal monopolies were abolished and import duties reduced, laws prohibiting the establishment of industries were repealed, a national press was established (Denis 1911), and new educational and financial institutions (such as the first *Banco do Brasil*, in 1808) were established as well.

became the new emperor in 1840. Finally, in 1889 the Republic was proclaimed and 1891 saw the implementation of a new constitution.

Notwithstanding the government's intention of dealing with land concentration under the Empire, efforts would eventually fail, largely because the political system was dominated by a landed elite (Dean 1971). Furthermore, the positive effects on prices of the events at the end of the eighteenth century and beginning of the nineteenth century were due to a confluence of particular circumstances.<sup>13</sup> Once international markets returned to normal conditions, a new phase of difficulties began for the colony: conflicts with England, on which newly independent Brazil had become dependent, mainly due to the unilateral application of the liberal economy by the former (Furtado 2006 [1959]) and worries with the end of the slave trade, the scarcity of the government's financial resources, and the increasing dissatisfaction in practically every region led to a series of social rebellions. In the midst of these difficulties, a new source of wealth would emerge: coffee, which led to a new period of economic affluence in the country.<sup>14</sup>

Like Minas Gerais, the region that corresponds to what is today the state of São Paulo was only of marginal economic importance during the first centuries of colonization. Although São Paulo was not completely outside the great sugar enterprise, it was coffee that made the region especially important. Coffee was introduced into the country in 1727 and large-scale production started at the end of the eighteenth century.<sup>15</sup> However, it was at the beginning of the nineteenth century that Brazilian production became significant in international terms.<sup>16</sup>

It is around this time that the labor question became delicate. With the abolition of slavery it became clear that the country's best option was to import foreign workers. After initial problematic experiences and with government's generous intervention, it was possible, for the first time in the country's history, to attract a massive influx of European migrants.<sup>17</sup> The average numbers of non-slave immigration grew steadily from the 1860s to the end of the century.<sup>18</sup>

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<sup>13</sup> Important international events were beneficial for a colony whose main activity was the export of primary products: the Industrial Revolution, the American War (1775–1783), the French Revolution (1789–1799), the Napoleonic Wars (1803–1815), and the upheaval in many of the Spanish colonies had a significant impact on the supply and, therefore, prices of primary goods in which Brazil had an idle production capacity, such as sugar, cotton, and leather.

<sup>14</sup> According to Goldsmith (1986), we have the following figures for the average growth in GDP *per capita*: 1850–1860: 1.4%; 1860–1870: 1.0%; 1870–1880: –0.2%; 1880–1890: 0.4%; 1890–1900: –1.7%. For a different view, see Leff (1997).

<sup>15</sup> The USA was the main market for the Brazilian product (Prado Jr. 1956 [1945]).

<sup>16</sup> Figures provided by Furtado (2006 [1959]) show that the production was of 3.7 and 5.5 million sacks in the periods 1880–1881 and 1890–1891, respectively, rising to 16.3 million between 1901 and 1902 (one sack was equivalent to 60 kg).

<sup>17</sup> For example, after several charges of abuse, Germany prohibited emigration to Brazil in 1859.

<sup>18</sup> The figures for the annual average numbers of immigrants, by decade, are 1860–1869: 9850; 1870–1879: 20,780; 1880–1889: 47,890; 1890–1899: 118,170; and 1900–1909: 66,651 (Leff 1972).



As we have seen, the last years of the nineteenth century were extremely favorable for the production of coffee in the Brazilian lands, especially in Rio de Janeiro, São Paulo, and Minas Gerais regions. Not only were internal conditions conducive towards increasing production, but there was also the auspicious external circumstances of supply shortages.<sup>19</sup> However, considering the inelasticity of international demand and the large availability of lands and relative production advantages, it was inevitable that the coffee supply would continue to increase, with a consequent decline in prices. The response of the coffee planters and the government (tightly connected) to these adverse prospects was to implement valorization programs that consisted in buying and storing the excess coffee so as to control international prices.<sup>20</sup> However, this mechanism for protecting the coffee economy was only “a process that transferred, to the future, the solution of a problem that would only become more and more serious” (Furtado 2006 [1959], p. 256). The policy was relatively successful until the 1920s, when the Great Depression brought Brazil into a new era of difficulties and political disruption.

Rio Grande do Sul would only become economically relevant in the second half of the eighteenth century. The region’s economy would be based on cattle farming. According to Prado Jr. (1956 [1945]), the cattle would reproduce rapidly due to the favorable natural environment, providing the region with the greatest concentration of cattle in the colony. Production of derivatives such as dairy products and leather was also of considerable importance. Agriculture would be developed only in a small sector near the coast (Prado Jr. 1956 [1945]). Initially, similar to the country side of the Northeast region, cattle farming developed as an extensive activity. Leather exports helped to maintain what was then a low-profitability activity afloat. It was only with the already mentioned discovery of gold that the activity faced a “true revolution,” being finally integrated with the rest of the colony (Furtado 2006 [1959], p. 121).

Following Prado Jr. (1956 [1945]) and Engerman and Sokoloff (1997, 2002), we can say that a different colonization method was structured. Variations in geographic characteristics such as climate and soil meant that the lands that today form the state of Rio Grande do Sul were not suited for the production of tropical products such as sugar. In order to protect the region from possible competitors such as Spain, the solution was to establish a settlement strategy similar to the one in the USA and Canada. Recruitment was made among poor and middle-class Portuguese families and peasants and considerable advantages were offered to those willing to emigrate (Prado Jr. 1956 [1945]).

Thus, the settlement of the South region of the country, especially Rio Grande do Sul, was unlike any others in Brazilian colonization. Land was more equally divided, slave labor was used in much smaller scale, and the population was rather homogeneous (Prado Jr. 1956 [1945]).

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<sup>19</sup> Supply constraints in the main production centers, such as the Portuguese Ceylon—present-day Sri Lanka—encouraged the Brazilian production.

<sup>20</sup> Brazil had practically a monopoly on coffee production, being responsible, at its height, for producing more than three-quarters of the international supply (Furtado 2006 [1959]).



## 2.2 *Political Aspects*

In terms of political participation, Love (1970) states that the end of the Empire and the establishment of the Republic (1889) saw a democratization of the formal political process at three levels. The first is that the number of elective positions at all levels of government was increased (governors and the president and vice president of the Republic were now to be elected). Second, suffrage was expanded compared to the Empire. Under the first republican Constitution on 1891, all literate males 21 and older could vote. Finally, authority was decentralized.

There is some divergence between Love's (1970) and Leal's (2012 [1948]) views. Probably the reality was closer to Leal's explicit exposition, which notes the great fragility and dependence of the municipal administration, despite some increase in revenues noted by Love (1970). As we will see in greater detail later, the introduction of these liberal constitutional mechanisms of government, broader suffrage, and decentralization did not result in the type of *de facto* political structure that the members of the 1890–1891 constituent assembly had envisaged (Love 1970).

A central aspect of the Brazilian history for our study is the *coronelismo*, one of the most important characteristics of the First Republic (1889–1930). Leal (2012 [1948]) defines it as the result of a combination of the representative system of the time and an inadequate social and economic structure. In other words, *coronelismo* is a peculiar manifestation of the private sector, an adaptation through which residual elements of old and excessive private power have managed to coexist in a political regime of (theoretically) broad representation. It is a commitment between the public sector, progressively strengthened, and the decadent influence of the local chiefs, mainly the landowners (Leal 2012 [1948]). “Without the requisite social and economic structures, universal suffrage could either produce long-term political stability or strengthen traditional conservative elements against liberal reforms” (Love 1970, p. 4), and in the Brazilian case during the First Republic, “the official liberal ideology, on which the Constitution of 1891 was based, had outpaced the social and economic evolution of the country” (Love 1970, p. 10).

According to Leal (2012 [1948]), these manifestations of private sector power, especially in rural areas, are due to the agrarian structure of the country, characterized mainly by strongly concentrated land ownership.<sup>21</sup> The vast distances and empty areas within the territory, as well as the scarcity of people, greatly influenced the situation (Carvalho 1946). Therefore, the public sector commitment is explained by the sufficiently broad franchise that makes the government dependent on the rural electorate. The essence of this commitment is that local chiefs provide unconditional

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<sup>21</sup> According to Love (1970), the nation remained 90% rural in the early years of the Republic. Furthermore, Love (1970) argues that the critical role played by urbanization is based on three main points: (i) Brazilian rural society, owing to its historical roots, has a much stronger patriarchal tradition than its urban counterpart, and for this reason the rural vote was easier to control; (ii) the rural sector offered more opportunity for manipulation of the vote through fraud and violence, because the state and its mechanisms for guaranteeing free suffrage were less effective in the countryside; and (iii) the access of the urban population to greater opportunities for education meant that a large percentage of urban dwellers would vote than their rural counterpart.

support to the “official” candidates in state and federal elections, and in return, the states give the local chiefs a free hand in almost all issues that concern the municipality, including the appointment of state positions at local level (Leal 2012 [1948]).

In an agrarian society with high land concentration, where the public sphere was largely absent in rural areas, the *coronel* was often responsible for improving local conditions, especially in terms of the provision of public goods and services: schools, roads, railroads, churches, and hospitals among others. It was, therefore, mostly with such improvements (some of which depend only on his political prestige while others might demand personal contributions or contributions from friends) that the municipal chief built and maintained his leadership position (Leal 2012 [1948]).

Leal’s (2012 [1948]) analysis stressed the importance of the reciprocity in the system. On the one side, the municipal chiefs and the *coronéis* who decided the choices of many voters and, on the other, the politically dominant situation in the state controlled the budget, the jobs, the favors, and the police force. The weakness of the municipalities was therefore a deciding factor in maintaining the *coronelismo*.

Just as *coronelismo* ruled relations between municipalities and states, the *política dos governadores* (“governors’ policy”) ruled relations between the states and the federal government.<sup>22</sup> Leal (2012 [1948]) shows clearly the contradiction in the system: by arguing that there should be constraints placed on the powers of the municipalities to avoid rule by local oligarchies, legislation gave the governors of the states every means for encouraging the very same local oligarchies, albeit to their benefit, creating state oligarchies and the consequent *política dos governadores*.<sup>23</sup> Both the commitment between the governors and the *coronéis* and the one between the president and the governors were based on the inconsistency of the rural electorate, a direct consequence of the type of agrarian structure dominant in the country.

### 3 The Data<sup>24</sup>

#### 3.1 The Census of 1920

The Census of 1920 is the fourth population census and the first agricultural and industrial census to have been conducted in Brazil. In accordance with the International Statistical Congress, which took place in Belgium in 1853, the purpose

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<sup>22</sup> It was 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 (which favored export agriculture) and electoral support of the president’s successor” (Love 1970, p. 9).

<sup>23</sup> The politics of the *coronéis* led to the strengthening of the state power in a much more effective way than the *política dos governadores* guaranteed the reinforcement of the federal power, especially in terms of the different possibilities of the use of violence (Leal 2012 [1948]).

<sup>24</sup> As we can see from Table 2, the number of municipalities has increased considerably between 1920 and 2000. In order to assess the effects of inequality on development in the long term, we had to match the municipalities in 2000 (2150 municipalities) to their counterpart in 1920 (512 municipalities). The construction of the comparable territorial units (CTU) was done manually using the reports of IBGE of each municipality’s origin. Table 2 presents the number of CTU for each state.

**Table 1** Brazilian agricultural statistics, 1920

Extension of the rural properties (ha)	Number of rural properties	Percentage to total (%)	Area (ha)	Percentage to total (%)
Smaller than 41	317,785	49.0	6,115,158	3.5
41–100	146,094	22.5	9,593,156	5.5
101–200	71,377	11.0	10,454,242	6.0
201–400	48,877	7.6	14,079,761	8.0
401–1000	37,705	5.8	23,881,734	13.6
1001–2000	13,186	2.0	18,891,552	10.8
2001–5000	8963	1.4	28,667,844	16.4
5001–10,000	2498	0.4	17,928,532	10.2
10,001–25,000	1207	0.2	18,256,042	10.4
Bigger than 25,000	461	0.1	27,236,654	15.6
Total	648,153	100.0	175,104,675	100.0

Source: IBGE (1923). *Census of 1920*. Rio de Janeiro: IBGE, Vol. 3

of an agricultural census is to “indicate the facts in which the complete knowledge of the conditions, process, and results of the agrarian statistics of each country at a specific time, depends” (IBGE 1923, p. v). Therefore, it is the first reliable survey of the agrarian conditions throughout the nation.

The Census contains detailed information on the quantity and average size of rural properties at the municipal level, which enables us to construct our measures of land inequality, which we use as proxy for economic inequality, for each of the four states of interest: Minas Gerais, São Paulo, Pernambuco, and Rio Grande do Sul.<sup>25</sup>

The number of rural properties surveyed throughout the country is 648,153, with a total area of 175,104,675 ha (Table 1), which corresponds to 20.6% of the country’s entire area. We have data on 115,655 rural properties in the 178 municipalities of Minas Gerais, 80,921 rural properties in the 204 municipalities of São Paulo, 23,336 rural properties in the 59 municipalities of Pernambuco, and 124,990 rural properties in the 71 municipalities of Rio Grande do Sul. Specifically, surveyed rural properties corresponded to 46.1% of the area of Minas Gerais (27,393,210 ha of a total of 59,381,000), 56.2% of the area of São Paulo (13,904,631 ha of a total of 24,723,900), 52.0% of the area of Pernambuco (5,157,198 ha of a total of 9,925,400), and 65.1% of the area of Rio Grande do Sul (18,589,996 ha of a total of 28,528,900).

Table 1 gives us an indication of the concentration of land distribution in Brazil. Nearly half (49.0%) of the properties are smaller than 41 ha. However, these rural properties constitute only 3.5% of the surveyed area. The largest share of the surveyed area consists of properties between 2001 and 5000 ha (16.4%). Impressively, properties larger than 25,000 ha correspond to 15.6% of the surveyed area (more than the area occupied by properties smaller than 200 ha, which is 14.9%).

<sup>25</sup>The average territorial extension of the rural properties is divided into the following measurements: (i) less than 41 ha; (ii) 41–100 ha; (iii) 101–200 ha; (iv) 201–400 ha; (v) 401–1000; (vi) 1001–2000 ha; (vii) 2001–5000 ha; (viii) 5001–10,000 ha; (ix) 10,001–25,000 ha; and (x) 25,001 ha or more.

As expected due to its large area and economic importance, Minas Gerais is the most populous state, with a population of 5,888,174 inhabitants. The second most populous state is São Paulo (population: 4,592,188), followed by Rio Grande do Sul (population: 2,182,713), and finally Pernambuco (population: 2,154,835). However, Pernambuco has the highest population density: 0.22 persons per hectare. Figures for São Paulo, Minas Gerais, and Rio Grande do Sul are 0.19, 0.10, and 0.08, respectively (Table 2).

Table 2 also presents figures on the number of foreigners and occupational shares. Consistent with the recent inflow of migrants, foreigners represent 18.1 % of the population of São Paulo. Figures for Minas Gerais and Pernambuco are much lower: 1.5 % and 0.5 %, respectively. Rio Grande do Sul, in between São Paulo and Minas Gerais and Pernambuco, has 6.9 % of its population composed by foreigners. Agricultural activities are the main occupation for the four considered states. The percentage of individuals working on these activities ranges from 16.9 % in Rio Grande do Sul to 21.4 % in Pernambuco. Figures for Minas Gerais and São Paulo are 21.0 % and 18.3 %, respectively. Industrial activities include a much lower share of the population. Minas Gerais has the lowest share of population working in such activities: 2.5 %. As expected, São Paulo has the highest share of population working in industrial activities: 5.0 %. Figures for Pernambuco and Rio Grande do Sul are 3.3 and 3.9 %. Less than 1.0 % of the respective populations work in “liberal professions.”

Considering the large and detailed data set provided by the census, we note with curiosity the lack of studies using the data to determine the levels of inequality. One possible reason is that the information has not yet been digitalized, which makes data collection very onerous. For this study, both data compilation and elaboration of the indexes have been done from scratch and have resulted in what are, to our knowledge, unique for the municipal level in Brazil for 1920.

### ***3.2 Land Distribution and Political Concentration***

Land has been very unequally distributed in Brazil since colonial times. Brazil’s agrarian structure has been largely characterized by large landholding. Figures from the Census of 1920 show that 71.5 % of the rural properties surveyed were smaller than 101 ha, while only 4.1 % were bigger than 1000 ha. However, the same 71.5 % of rural properties corresponded to only 9.0 % of the total area surveyed, while the 4.1 % corresponded to 63.4 % of the total area. Of the 648,153 rural properties surveyed, only 461 (0.1 %) were larger than 25,000 ha, which nevertheless corresponded to 15.6 % of the total area surveyed (a higher proportion than the 535,256 properties smaller than 201 ha, 14.9 %). However, the larger the landholdings, the lower the unit value of land (IBGE 1923, p. xii).

Table 3 presents the figures broken down by state, revealing several important features. First, Rio Grande do Sul, with 124,990 rural properties, is the state with the highest number of properties surveyed. Minas Gerais follows with 115,655 rural

**Table 2** Demographic and geographical statistics in state level, 1920

Variable	Minas Gerais	Pernambuco	São Paulo	Rio Grande do Sul
Number of municipalities in 1920	178	59	204	71
Number of municipalities in 2000	853	185	645	467
Number of observations (CTU)	143	51	188	58
Total area (ha)	59,381,000	9,925,400	24,723,900	28,528,900
Rural property share (%), 1920	46.1	52.0	56.2	65.1
Average municipality area (hectare, 1920)	333,601 (529,180)	168,227 (191,942)	121,196 (262,704)	401,815 (305,885)
Total population (1920)	5,888,174	2,154,835	4,592,188	2,182,713
Average total population (municipality, 1920)	33,080 (24,734)	36,523 (32,860)	22,511 (43,009)	30,742 (23,785)
Population density (hectare, 1920)	0.10	0.22	0.19	0.08
Total male (Brazilian) population (1920, total and %)	2,927,285	1,046,098	1,917,238	1,014,905
Total number of foreigners (1920, total and %)	49.7	48.5	41.7	46.5
	85,705	11,698	829,851	151,025
	1.5	0.5	18.1	6.9
Agricultural sector (% of population employed, 1920)	21.0	21.4	18.3	16.9
Land-use activities (% of population employed, 1920)	21.2	22.0	18.9	18.6
Industrial sector (% of population employed, 1920)	2.5	3.3	5.0	3.9
Commercial sector (% of population employed, 1920)	1.0	1.3	1.9	1.8
Public administration sector (% of population employed, 1920)	0.1	0.2	0.3	0.4
Liberal professions (% of population employed, 1920)	0.4	0.4	0.8	0.7

Source: IBGE (1923). *Census of 1920*. Rio de Janeiro: IBGE, Vols. 3 and 4

Notes: (1) Standard deviations in parenthesis; (2) density: individuals per hectare; (3) soil exploitation activities include agricultural activities, livestock, and hunting and fishing; (4) industrial activities include textiles, leather, wood, metallurgy, ceramics, chemical products, food industry, clothing, furniture, building, and transport devices; (5) public administration includes municipal, state, and federal spheres; (6) liberal professions include priests and nuns, lawyers, doctors, and teachers

**Table 3** Agrarian statistics in state level, 1920

Extension of the rural properties (ha)	Minas Gerais			Pernambuco				
	Number of rural properties	Percentage to total (%)	Area (ha)	Percentage to total (%)	Number of rural properties	Percentage to total (%)	Area (ha)	Percentage to total (%)
Smaller than 41	37,375	32.3	784,875	2.9	6175	26.5	142,025	2.8
41-100	32,650	28.2	2,252,850	8.2	5044	21.6	332,904	6.5
101-200	19,966	17.3	2,974,934	10.9	5268	22.6	742,788	14.4
201-400	12,883	11.1	3,736,070	13.6	3600	15.4	1,015,200	19.7
401-1000	8773	7.6	5,518,217	20.1	2515	10.8	1,551,755	30.1
1001-2000	2440	2.1	3,467,240	12.7	523	2.2	703,435	13.6
2001-5000	1174	1.0	3,639,400	13.3	197	0.8	577,013	11.2
5001-10,000	261	0.2	1,835,091	6.7	13	0.1	80,678	1.6
10,001-25,000	95	0.1	1,336,175	4.9	1	0.0	11,400	0.2
Bigger than 25,000	38	0.0	1,848,358	6.7	0	0.0	0	0.0
Total	115,655	100.0	27,393,210	100.0	23,336	100.0	5,157,198	100.0
<i>Rio Grande do Sul</i>								
Extension of the rural properties (ha)	Number of rural properties	Percentage to total (%)	Area (ha)	Percentage to total (%)	Number of rural properties	Percentage to total (%)	Area (ha)	Percentage to total (%)
Smaller than 41	39,190	48.4	783,800	5.6	77,096	61.7	1,619,016	8.7
41-100	20,410	25.2	1,326,650	9.5	27,433	21.9	1,700,846	9.1
101-200	9345	11.5	1,345,680	9.7	7790	6.2	1,137,340	6.1
201-400	5866	7.2	1,665,944	12.0	4777	3.8	1,399,661	7.5
401-1000	4111	5.1	2,536,487	18.2	4415	3.5	2,803,525	15.1
1001-2000	1190	1.5	1,712,410	12.3	1884	1.5	2,677,164	14.4
2001-5000	618	0.8	1,863,888	13.4	1200	1.0	3,681,600	19.8
5001-10,000	118	0.1	838,626	6.0	301	0.2	1,983,891	10.7
10,001-25,000	52	0.1	796,224	5.7	87	0.1	1,202,079	6.5
Bigger than 25,000	21	0.0	1,034,922	7.4	7	0.0	384,874	2.1
Total	80,921	100.0	13,904,631	100.0	124,990	100.0	18,589,996	100.0

Source: IBGE (1923). Census of 1920. Rio de Janeiro: IBGE, Vol. 3

properties while São Paulo and Pernambuco had 80,921 and 23,336 rural properties, respectively. However, the total area of the properties surveyed is larger in Minas Gerais (27,393,210 ha) than in Rio Grande do Sul (18,589,996 ha). This is consistent with our second feature: while all states present a similar pattern to the country as a whole by presenting a higher concentration of rural properties smaller than 101 ha, there are important variations within this pattern. Whereas only 26.5 % of the rural properties in Pernambuco are smaller than 41 ha (with 48.1 % smaller than 101 ha), a total of 61.7 % of the rural properties in Rio Grande do Sul are smaller than 41 ha (with 83.6 % smaller than 101 ha). The figures for São Paulo and Minas Gerais are 48.4 % (with 73.7 % smaller than 101 ha) and 32.3 % (with 60.5 % smaller than 101 ha), respectively. Third, of the total area surveyed, rural properties smaller than 101 ha represent only 9.2 % for Pernambuco (with 2.8 % of properties smaller than 41 ha) and 11.1 % for Minas Gerais (with 2.9 % of properties smaller than 41 ha). However, properties smaller than 101 ha make up 17.9 % of the surveyed area for Rio Grande do Sul and 15.2 % for São Paulo.

Another important aspect of the agrarian structure of the country is that the largest share of the surveyed area is usually composed of properties between 401 and 1000 ha: 20.1 % of the area of Minas Gerais, 30.1 % of the area of Pernambuco, and 18.2 % of the area of São Paulo. However, for Rio Grande do Sul properties between 2001 and 5000 ha occupy the largest relative area: 19.8 %. Finally, we highlight the impressive share of properties bigger than 25,000 ha in São Paulo and Minas Gerais: 7.4 % and 6.7 %, respectively.

With the available information, we were able to construct two types of measures of economic inequality. The first one is the standard land Gini coefficient, which measures land inequality among landowners.<sup>26</sup> The average land Gini considering all the comparable territorial units (CTU) from the four states was 0.61. The average coefficient was 0.60 for Minas Gerais, 0.44 for Pernambuco, 0.65 for São Paulo, and 0.63 for Rio Grande do Sul (Table 4).

Although widely used, the standard land Gini does not capture one important aspect of economic inequality: it does not take into account individuals who do not own land. If, for example, land is divided equally among 10 % of the individuals in a given society, while the other 90 % remain without land, the standard land Gini coefficient will indicate that this society is perfectly egalitarian. Therefore, if we want a proxy for economic inequality for the population as a whole, we need an

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<sup>26</sup>For each municipality we constructed the Gini coefficient using the same formula as Nunn

$$(2008): 1 + \left(\frac{1}{n}\right) - \frac{2 \sum_{i=1}^n (n-i+1) a_i}{n \sum_{i=1}^n a_i}, \text{ where } n \text{ is the number of rural properties, } a_i \text{ is the farm size,}$$

and  $i$  denotes the rank, where rural properties are ranked in ascending order of  $a_i$ . The calculation is made using the Stata programs *ineqdec* and *ineqdec0*.



**Table 4** Descriptive statistics (CTU)

	All CTU	Minas Gerais	Pernambuco	São Paulo	Rio Grande do Sul
Land Gini (1920)	0.61 (0.13)	0.60 (0.08)	0.44 (0.12)	0.65 (0.11)	0.63 (0.18)
Overall land Gini (1920)	0.85 (0.14)	0.87 (0.06)	0.87 (0.12)	0.87 (0.13)	0.71 (0.21)
Voters (% , 1920)	7.56 (2.61)	8.14 (2.41)	5.52 (1.99)	6.71 (1.85)	10.71 (2.47)
GDP per capita (log, 2000)	8.50 (0.62)	8.35 (0.51)	7.65 (0.52)	8.77 (0.51)	8.71 (0.53)
Average years of schooling (2000)	5.18 (111)	4.93 (0.91)	3.67 (1.12)	5.63 (0.87)	5.68 (0.86)
Infant mortality (2000)	23.50 (14.03)	25.42 (6.55)	54.75 (14.47)	15.53 (4.90)	17.15 (3.79)
HDI (2000)	0.76 (0.06)	0.76 (0.04)	0.64 (0.05)	0.79 (0.03)	0.79 (0.03)
Poverty (% , 2000)	28.76 (17.60)	31.04 (14.30)	62.16 (11.15)	19.17 (10.26)	24.84 (9.54)
Income Gini (2000)	0.55 (0.04)	0.56 (0.04)	0.59 (0.04)	0.54 (0.04)	0.55 (0.05)

Source: (1) IBGE. *Censuses*; (2) IPEA; (3) Own calculations

Notes: (1) Standard deviations in parenthesis; (2) these are descriptive statistics constructed for the CTU

overall land Gini. We constructed our overall land Gini for the municipalities in 1920 using the same formula as Acemoglu et al. (2008) and Summerhill (2010), by computing the same equation assigning zero landholdings to the estimated number of families that do not have landholdings.<sup>27</sup> The average overall land Gini for the CTU considered in this study is 0.85. The average overall land Gini coefficients are 0.87 for Minas Gerais, Pernambuco, and São Paulo (with the standard deviation for Minas Gerais, 0.06, being half of those for Pernambuco and São Paulo, 0.12 and 0.13, respectively), and 0.71 for Rio Grande do Sul (Table 4).

The Census of 1920 also allows the construction of our proxy for political inequality in the early twentieth century: the percentage of individuals eligible to vote.

According to the Constitution of 1891, only literate Brazilian men 21 and older were eligible to vote.<sup>28</sup> Therefore, using the data on population and literacy for

<sup>27</sup>Acemoglu et al. (2008) use an estimate of ten members per family, while Summerhill (2010) constructs his coefficients by assigning five members per family. We constructed the overall land Gini with the assumption of 7, 10, and 15 members per family. Our main variable is the one using an estimate of 15 individuals per family because it supposedly includes relatives and other aggregates living in the same property, an important element in early twentieth-century Brazil.

<sup>28</sup>The Constitution of 1891 was in force from 1891 to 1934.

municipalities, we can easily calculate the percentage of the population of each municipality which was eligible to vote in 1920. The average percentage of individuals eligible to vote considering all the CTU of our study is 7.6. In 1920, the average percentage of individuals eligible to vote was 8.1 for Minas Gerais, 5.5 for Pernambuco, 6.7 for São Paulo, and 10.7 for Rio Grande do Sul (Table 4). We see that Rio Grande do Sul appears to be more equal not only in an economic sense (overall land Gini coefficient), but in a political sense as well. Moreover, we see a higher level of political inequality in Pernambuco, where a high percentage of the population was illiterate at the beginning of the twentieth century.

## 4 Quantitative Analysis

### 4.1 *Inequality and Long-Term Development*

In order to explore the long-term consequences of land (economic) inequality and political inequality for development in Brazil, we exploit the cross-sectional variation in the CTU for our four states of interest: Minas Gerais, Pernambuco, São Paulo, and Rio Grande do Sul.

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

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

where  $y_i^{2000}$  is a measure of development for the CTU  $i$  for the year 2000,  $x_i$  is a vector of control covariates, and  $\varepsilon_i$  is an error term. The key variables in this equation are  $g_i^{1920}$  and  $p_i^{1920}$ , the (standard) land Gini coefficient for the CTU  $i$  in 1920 and the constructed variable for political inequality (percentage of eligible voters) for the same CTU  $i$  in 1920, respectively.<sup>29</sup> Therefore, our main interest is the consistent estimation of  $\alpha$  and  $\beta$ .

The regressions will be estimated with all the observations and dummy interactions, allowing for differential statistical relationships for each state. We will therefore be able to capture possible different de facto institutional environments, with such differences rooted in specific colonial experiences of each state. As dependent variables, we will first use what we call “main outcome variables,” which are GDP *per capita*, average years of schooling, and infant mortality.

As previously discussed, the inclusion of these specific states has a clear purpose. Each of these regions is representative of a particular colonial experience within a constant *de jure* environment. This likely led to different de facto institutional environments that might cause inequality to relate in heterogeneous ways with each

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<sup>29</sup>We note that there is no uniform framework in the literature for the econometric analysis of the effects of historical inequality. In this study, we follow mainly Acemoglu et al. (2008).

development indicator. Pernambuco is representative of the old agrarian structure, of great importance during the colonial era due to the sugar production that had far-reaching implications for the political, economic, and social structure of the region. Minas Gerais was the center of the gold cycle and later became an important producer of coffee and a center for the supply of goods for the domestic market. São Paulo was the main coffee producer, and in the late nineteenth century became Brazil's most important economic center, a position that it still occupies today. Rio Grande do Sul had a later occupation with characteristics associated to those of North America (see, e.g., Engerman and Sokoloff 1997, 2002), and vast numbers of European immigrants (as in São Paulo) shaping its development path.

The main econometric concern with this specification is the possible endogeneity bias generated by omitted variables.<sup>30</sup> In other words, if omitted factors in  $\varepsilon_i$  are correlated with the explanatory variables, the estimation by OLS will generate inconsistent estimators. Easterly (2007), based on the extensive economic history developed by Engerman and Sokoloff, has argued that growing conditions (topography, climate, and soil) favorable to the production of cash crops contribute to higher inequality. Therefore, we will control for a rich set of covariates (included in the vector  $x_i$ ).

## 4.2 Contemporary Outcomes

We start by providing results of simple regressions (weighted correlations), using as independent variables the land Gini (as discussed, among landowners) and the percentage of eligible voters (our franchise—political inequality—indicator) and one

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<sup>30</sup>The key condition for OLS consistency is the absence of correlation between the independent variables and the error term. A sufficient condition is the zero conditional mean assumption:

$E(\varepsilon / x) = 0$ , which means that the error term is not correlated with any function of the independent variables. In applied econometrics, endogeneity arises in one of the three ways: (1) omitted variable bias; (2) measurement error; and (3) simultaneity (Wooldridge 2010). Our main concern is the omitted variable bias due to the inability to control directly for variables such as land quality.

The usual formula for analyzing the omitted variable bias is 
$$p \lim \hat{\beta}_k = \beta_k + \gamma \cdot \left[ \frac{\text{cov}(x_k, q)}{\text{var}(x_k)} \right]$$
 (Wooldridge 2010, p. 67). Our strategy in this study is to use a proxy variable solution. There are

two formal requirements for a proxy variable for the omitted variable  $q$ : (1) the proxy variable should be redundant in the structural equation,  $E(y | x, q, z) = E(x, q)$ , where  $z$  is the proxy variable; and (2) the correlation between the omitted variable  $q$  and each  $x_j$  be zero once we partial out  $z$ :  $L(q | 1, x_1, \dots, x_k, z) = L(q | 1, z)$ , where  $L(\cdot)$  represents a linear projection (Wooldridge 2010).

<sup>31</sup>Technically, we have a simple regression when there is only one independent variable. In our case, we have at least four dummy interactions for each variable. Aiming to keep language as simple as possible, I will use the term “simple regressions” when there is only one independent variable of interest (irrespective of the number of interactions).

multiple regression, including both inequality variables.<sup>31</sup> As dependent variables we will use our “main outcome variables,” namely (natural logarithm of) GDP *per capita*, (natural logarithm of) average years of schooling, and infant mortality.<sup>32</sup>

Table 5 presents the estimated coefficients. As we can see from Column 1, the bivariate relationship between the land Gini and GDP *per capita* is heterogeneous. The estimated coefficients for Minas Gerais and São Paulo are positive and highly significant (2.43 and 1.25, respectively). While the coefficient for Pernambuco is not significant, the estimated coefficient for Rio Grande do Sul is not only significant, but also negative (−1.09). The simple regression of GDP *per capita* on the percentage of eligible voters is presented on Column 2. Only for Minas Gerais and Rio Grande do Sul the estimated coefficients are significant. Nevertheless, they have the expected positive sign. When we regress GDP *per capita* on both inequality variables, the picture remains broadly the same, a reflection of the surprising low correlation between the land Gini and the percentage of eligible voters (0.09, considering all CTU).

Columns 6 and 11 suggest similar relationships between economic inequality in the early twentieth century and average years of schooling and infant mortality. In other words, we estimated, for both dependent variables, positive and highly significant coefficients for Minas Gerais and São Paulo, a negative and significant coefficient for Rio Grande do Sul, and a nonsignificant coefficient for Pernambuco. Concerning the bivariate relationship between the percentage of eligible voters and average years of schooling, the coefficients are positive and highly significant (Column 7). There is, however, a surprise when we estimate the regressions with infant mortality as the dependent variable: the significant coefficient for São Paulo suggests a positive relationship between political *equality* and infant mortality (Column 12). We discuss these results in greater detail below. Regressions including both inequality variables present similar results (Columns 8 and 13).

Although important in their own right, the results discussed above are only historical correlations. The natural concern with those correlations is the possible bias generated by the inconsistency of OLS estimation in the presence of omitted variables. We attempt to correct the estimation for this bias by controlling for a rich set of control variables. Another concern is that the positive correlation between the political inequality variable is being driven by the association of this variable with an educational indicator. In order to construct the franchise indicator, we took the number of literate males, which is likely to reflect the educational environment of that particular CTU. In order to control for this specific source of bias, we control for the educational variables in 1920.

We now discuss the extended results from regressions with GDP *per capita* as the dependent variable. The inclusion of educational controls reduces marginally, for Minas Gerais and Rio Grande do Sul, the significance of the estimated coefficients

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<sup>32</sup> For now on, when I mention “GDP *per capita*” or “average years of schooling” I will be referring to their natural logarithms.

**Table 5** OLS regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
All comparable territorial units															
Log GDP <i>per capita</i>															
MG*Gini	2.43***		2.50***	1.48***	1.23**	0.84***		0.91***	0.67***	0.55***	-26.19***		-26.82***	-7.74	-6.35
PE*Gini	-0.24		-0.16	-0.19	-0.29	-0.04		0.06	0.05	-0.00	2.90		-0.57	-1.13	-0.56
SP*Gini	1.25***		1.24***	0.89**	0.60*	0.50***		0.48***	0.41***	0.27***	-10.05**		-10.41***	-3.50	-1.90
RS*Gini	-1.09***		-1.10***	-0.90***	-0.81***	-0.15*		-0.15*	-0.15	-0.10	10.57***		10.53***	11.48***	10.97***
MG*Voters		0.04**	0.05***	0.03*	0.01		0.04***	0.04***	0.02***	0.01**		-0.37	-0.42*	0.25	0.38*
PE*Voters		0.06	0.06	0.02	-0.01		0.09***	0.09***	0.07***	0.05***		-2.92***	-2.93***	-1.79***	-1.62**
SP*Voters		0.01	0.01	0.03	-0.01		0.03***	0.03***	0.03***	0.01		0.56***	0.58***	0.20	0.43**
RS*Voters		0.05**	0.05***	0.04**	0.02		0.02***	0.02***	0.02**	0.01		0.17	0.15	0.19	0.29*
Geographic controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Educational controls	No	No	No	No	Yes	No	No	No	No	Yes	No	No	No	No	Yes
Observations	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440
R <sup>2</sup>	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.94	0.94	0.94	0.96	0.96

Source: Own calculations

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

for the percentage of eligible voters (Column 4). We note that, while this is not the case for average years of schooling (Column 9), the picture is similar when infant mortality is the dependent variable (Column 14). When geographic and educational controls are included, we have a clearer picture. Column 5 shows that the results for Minas Gerais and São Paulo, of economic inequality in 1920 being positively and significantly correlated to GDP *per capita* in 2000, are robust. For Pernambuco, economic inequality appears to be non-correlated with income in the long run. For Rio Grande do Sul, economic inequality in 1920 remains negatively (and highly significant) correlated to GDP *per capita* in 2000. Moreover, all estimated coefficients for our political inequality variable become insignificant with the inclusion of geographic variables.

However, the results for average years of schooling and infant mortality are different. First, economic inequality in 1920 is only significantly related to average years of schooling in 2000 for Minas Gerais and São Paulo, the states in which the coefficients are positive (Column 10). In other words, only positive relationships between economic inequality and educational attainments in the long run are significant. Considering infant mortality, we have the opposite picture: only negative relationships, as the case of Rio Grande do Sul, between economic inequality and development in the long run are significant (reflected in a positive estimated coefficient, Column 15). The percentage of eligible voters does not appear to have had important effects on development in the long run. Either the coefficients lose their significance or they present small magnitudes (Columns 10 and 15).

We now expand our analysis by introducing the overall land Gini calculated index. This variable, as already mentioned, shows the inequality of land distribution across the whole population. Extending the analysis in this direction provides further insights into the relationship between inequality and long-term development.

Table 6 presents the regression results. Several noteworthy aspects emerge. First, when including both Gini variables and the percentage of eligible voters in regressions with no controls and GDP *per capita* as the dependent variable, the land Gini among landowners remains significant for Minas Gerais and São Paulo, while the overall land Gini is significant for Pernambuco (Column 1). The inclusion of controls makes all overall land Gini coefficients become insignificant (Column 2). Moreover, regressions with the overall land Gini as the only economic inequality variable (and with control variables) show no significant relationship (Column 3). Regressions with average years of schooling as the dependent variable present similar results (Columns 4–6), somewhat more favorable to the standard land Gini (the coefficient for Rio Grande do Sul is significant, Columns 4 and 5). Coefficients for the overall land Gini remain broadly insignificant as well in regressions with infant mortality as the dependent variable the inclusion of the control variables (Columns 8 and 9). Notwithstanding, the comparison of regressions with the standard land Gini (Table 5, Columns 5, 10, and 15) with regressions with the overall land Gini (Table 6, Columns 3, 6, and 9) indicates a stronger effect of the standard land Gini.

Therefore, our empirical results suggest that the effects of land inequality among landowners would possibly dominate over the effects of the inequality of land distribution across the population as a whole.

**Table 6** OLS regressions including the overall land Gini

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All comparable territorial units								
	Log GDP <i>per capita</i>								
MG*Gini	2.84***	1.46***		0.95***	0.60***		-33.61***	-11.85	
PE*Gini	-0.53	-0.34		-0.06	-0.05		1.18	-0.77	
SP*Gini	1.09**	0.69		0.34**	0.31**		-1.40	-0.10	
RS*Gini	-1.94	-1.92		-0.63**	-0.47*		10.58	6.53	
MG*Overall Gini	-1.24	-0.72	0.02	-0.16	-0.16	0.15	24.67***	16.46*	10.26
PE*Overall Gini	1.87***	0.29	0.19	0.60***	0.27	0.24	-8.87	2.16	2.20
SP*Overall Gini	0.20	-0.15	0.14	0.19	-0.06	0.07	-11.92***	-2.11	-1.64
RS*Overall Gini	0.78	1.08	-0.49	0.44*	0.35	-0.04	-0.05	3.86	9.39***
MG*Voters	0.05***	0.01	0.01	0.04***	0.01**	0.01*	-0.50**	0.33	0.37*
PE*Voters	0.07**	0.00	-0.01	0.09***	0.06***	0.05***	-2.97***	-1.62**	-1.55**
SP*Voters	0.01	-0.01	-0.01	0.02***	0.01	0.01	0.71***	0.47**	0.46**
RS*Voters	0.04**	0.01	0.02	0.02**	0.01	0.01	0.15	0.27	0.25
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observations	440	440	440	440	440	440	440	440	440
R <sup>2</sup>	1.00	1.00	1.00	0.99	0.99	0.99	0.95	0.96	0.96

Source: Own calculations  
 \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$



### 4.3 *De Facto Institutional Environments and Structural Change*

This section presents the estimated inequality coefficients when controlling for different occupations and for immigration. The reason behind these exercises is straightforward: our hypothesis—that the heterogeneous relationships between inequality and development indicators within Brazil in the long run reflect the different de facto institutional environments rooted in differing colonial experiences—is only implicit. However, other elements could plausibly account for our statistical results. Our main concern is with possible structural changes that might have taken place during our time span. In particular, we control for industrialization, urbanization, and immigration in the various considered municipalities.

Fortunately, the Census of 1920 provides detailed data on the number of foreigners and of individuals working in particular occupations. We sorted the data for each municipality and constructed the share of the population dedicated to each particular category. Our main control variables are (1) the share of immigrants; (2) the share of individuals working in agricultural activities (as a proxy for urbanization); and (3) the share of individuals working in industry (such as textiles, metallurgy, and construction).

The econometric approach is the same as in previous exercises. Table 7 presents the estimated coefficients using the GDP *per capita* as the dependent variable.

**Table 7** OLS regressions with structural controls: GDP *per capita*

	(1)	(2)	(3)	(4)	(5)	(6)
	Log GDP <i>per capita</i>					
	Immigration		Agriculture		Industrialization	
MG*Gini	2.38***	1.41***	2.48***	1.26**	2.28***	1.22**
PE*Gini	-0.19	-0.31	-0.29	-0.34	-0.15	-0.21
SP*Gini	0.46	0.37	1.15***	0.60*	0.94***	0.54
RS*Gini	-0.99***	-0.82***	-1.27***	-0.88***	-1.25***	-0.95***
MG*Voters	0.05***	0.02	0.04**	0.01	0.03	0.01
PE*Voters	0.06	0.00	0.04	-0.01	0.00	-0.02
SP*Voters	0.04*	0.01	-0.00	-0.01	-0.02	-0.01
RS*Voters	0.06***	0.03**	0.04**	0.02	0.02	0.01
Immigration (1920, %)	0.02***	0.01***				
Agricultural activities (1920, %)			-0.01***	-0.01		
Industrial sector (1920, %)					0.07***	0.04**
Geographic controls	No	Yes	No	Yes	No	Yes
Educational controls	No	Yes	No	Yes	No	Yes
Observations	440	440	440	440	440	440
R <sup>2</sup>	1.00	1.00	1.00	1.00	1.00	1.00

Source: Own calculations

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

An interesting picture emerges. When controlling for the share of individuals working in agricultural activities, we still have a positive and significant relationship between economic inequality and GDP *per capita* in the long run for Minas Gerais and São Paulo, even when geographic and educational controls are included; for Pernambuco, coefficients remain largely insignificant; as for Rio Grande do Sul coefficients remain negative and highly significant (Columns 3 and 4).

However, controlling for immigration the economic inequality coefficient for São Paulo is no longer significant even in regressions without further controls (Column 1). Although the remaining coefficients maintain similar properties as the above-made discussion, this analysis suggests that the effects of land inequality in São Paulo might be reflecting the positive effects of immigration. Moreover, when controlling for the percentage of individuals in industrial activities São Paulo's land Gini coefficient remains significant only in regressions without geographic and educational controls (Columns 5 and 6). Finally, we note that, with the exception of agriculture in regressions with the usual controls (Column 4), all coefficients of structural controls are highly significant and have the expected sign.

Thus, we have presented a robustness check for our hypothesis that the heterogeneous relationships between economic inequality and development within Brazil are due to the different *de facto* institutional environments. Several regression specifications show that controlling for variables proxying structural changes nonetheless maintains the heterogeneous results within the country. This evidence is in accordance with the hypothesis.

#### ***4.4 Inequality Yesterday and Inequality Today***

Finally, we present a natural extension of our investigation: the relationship inequality in the past and inequality today. This is an especially interesting question in the Brazilian context, for Brazil is one of the most unequal countries in the world, often portrayed as an example of high structural and persistent inequality.

Using a framework similar to previous investigations, we econometrically examine the relationship between the (standard) land Gini in 1920 and inequality today, measured by the income Gini in 2000. Again, our units of analysis are the CTU. Results are in Table 8.

Results are broadly the same across specifications. For Minas Gerais the estimated coefficient for economic inequality in 1920 is not significant in regressions with no controls (Column 1) and with the full set of controls (Column 3). Moreover, we find no significant relationship between political inequality in 1920 and economic inequality today. For São Paulo, although the estimated coefficient changes its sign (it is negative in regressions with no controls, Column 1), the land Gini estimated coefficient is never significant. The estimated coefficient for the percentage of eligible voters is only significant without the inclusion of the controls and is very small across specifications. Therefore, we find no statistical significance for the relationship between economic or political inequality in the early twentieth century and economic inequality in 2000 in Minas Gerais and in São Paulo.

**Table 8** OLS regressions for the income Gini (2000)

	(1)	(2)	(3)
	All CTU		
	Gini (2000)		
MG*Gini	0.01	0.06*	0.06
PE*Gini	0.06*	0.06*	0.06*
SP*Gini	-0.02	0.02	0.01
RS*Gini	0.19***	0.14***	0.14***
MG*Voters	-0.00	0.00	-0.00
PE*Voters	0.01***	0.01**	0.01**
SP*Voters	0.01***	0.00**	0.00
RS*Voters	0.00	0.00**	0.00*
Geographic controls	No	Yes	Yes
Educational controls	No	No	Yes
Observations	440	440	440
R <sup>2</sup>	1.00	1.00	1.00

Source: Own calculations

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.10$

Results for Pernambuco and Rio Grande do Sul are different. For Pernambuco, the state for which no statistical significance was found for the relationship between the land Gini in 1920 and several development outcomes (see Table 5), we now find a positive and significant relationship between economic inequality in 1920 and economic inequality in 2000 (Column 1), a result which remains robust when controls are included (Columns 2 and 3). For Rio Grande do Sul, we find even stronger relationships. The estimated coefficient for the land Gini is positive and highly significant in all specifications (Columns 1–3). The estimated coefficient for political inequality, although sometimes significant, is again of very small magnitude for both states.

Therefore, there is a positive relationship between economic inequality at the beginning of the twentieth century and economic inequality in 2000 precisely in those states where we do not find a statistically significant positive relationship between economic inequality in 1920 and development in the long run. In other words, where economic inequality is not “structural,” there is a positive relationship between inequality in land distribution and long-term development.

## 5 Conclusion

This study aimed to investigate the historical consequences of inequality and the role of institutions. By focusing on the Brazilian case, we provide evidence of the relative and potentially distinct roles of economic inequality and political inequality on long-run development. We believe this to be a necessary step to improve our understanding of the causes of underdevelopment in Latin America.

We constructed from scratch both economic inequality variables (the standard land Gini and the overall land Gini) and a variable proxy for political concentration

(the percentage of eligible voters) at the municipal level for the states of Minas Gerais, Pernambuco, São Paulo, and Rio Grande do Sul. The states were specifically chosen for their different colonial experiences, which probably shaped their *de facto* institutional environment. Our selection was made on the basis of the abundant data provided by the 1920 Census, a source which, surprisingly, had not yet been exploited for this purpose.

The results are surprising. First, we find almost no correlation between the land Gini and the percentage of eligible voters in Brazilian municipalities in 1920. Second, and somewhat unexpectedly, we find a positive relationship between economic inequality in early twentieth century and development outcomes in 2000 for the states of Minas Gerais and São Paulo, both from the Southeast region. Pernambuco, a Northeastern state, presents no evidence of a significant relationship between economic inequality and long-term development outcomes, while the evidence for the South, the state of Rio Grande do Sul, is that the relationship is negative. Third, we find no robust significant relationship between political inequality, measured by the percentage of eligible voters, and long-term development outcomes. Fourth, the effects of economic inequality are largely due to the concentration of land among landowners, as shown by the insignificance of the overall land Gini.

These are interesting results, for they appear to contradict the general view that economic inequality would always be costly for a society and that greater political participation would foster development. The answer to part of this riddle might lie in the fact that political participation was very low in early twentieth-century Brazil, and a marginal increase (the econometrically captured effect) might have given more irrelevant votes to a captured political system, leaving the economic outcomes unchanged. In other words, greater franchise might not have given the population more political participation. With regard to the effects of economic inequality, when considering the land Gini in an agrarian structure, these are likely to be strongly linked to collective action problems. In a captured political system such as Brazil in the Old Republic, land concentration might have differing effects, especially when taking into account that, in some regions, landowners were largely responsible for the provision of public goods.

Further important analyses were conducted. First, we find evidence that there is almost no correlation between economic (land) inequality in the early twentieth century and recent income inequality in states where there is a positive relationship between economic inequality and long-term development (Minas Gerais and São Paulo). In other words, the positive effects of inequality are associated with a particular structural organization at a specific time, in contrast to a more structural inequality, which, as exemplified by the cases of Pernambuco and Rio Grande do Sul, would have either negative or no significant effects on long-term development.

Finally, our hypothesis that different *de facto* institutional environments are associated with different relationships between inequality and long-term development was, initially, only implicit in our analysis. Important structural changes that occurred during this time span might be responsible for the heterogeneous

relationships found previously between inequality and long-term development. Three elements were our main concern: (1) immigration; (2) industrialization; and (3) urbanization. After controlling for these variables, our main results were maintained, strengthening our hypothesis.

It is important to note that we do not argue that inequality is conducive to development in general. We present evidence that inequality might be associated with better development outcomes in the long run in a particular political context in a *within-country* framework. It is possible that the theoretically harmful effects of inequality are better reflected in a cross-country framework, in which the mechanisms are related to the different *de jure* institutional environment. In other words, relative equality would be better for a particular country, but within an unequal country (with certain sociopolitical and economic characteristics) more inequality would be associated with better outcomes.

Much work remains to be done. We mention some possible extensions. First, there are few works that attempt to control for different *de facto* institutional environments. Further employment of this strategy likely will provide beneficial insights in order to better understand the development paths of societies. Second, empirical and theoretical studies that offer a differentiation between within-country and cross-country effects of variables are largely welcome.<sup>33</sup> Third, models attempting to capture the *within-country* effects of variables such as inequality in politically captured environments are lacking. Finally, the external validity of our results remains questionable. Comparative studies within Latin America are a logical next step.

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<sup>33</sup> See, for example, Robinson (2006).

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