

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

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## Resumo

Este estudo apresenta novas evidências sobre a relação entre desigualdade e desenvolvimento de longo prazo a partir de dados de diferentes regiões brasileiras. Novos indicadores de desigualdade são construídos a partir de dados primários para os municípios brasileiros em 1920 (usamos o Censo de 1920, que não foi sistematicamente utilizado para tais propósitos): o índice de Gini da distribuição de terras (entre donos de terras e considerando toda a população) e a porcentagem de potenciais eleitores. Primeiro, não encontramos uma relação significativa entre a desigualdade da distribuição de terras e a relativa concentração política para os municípios considerados no início do século XX. Segundo, encontramos, através de exercícios econométricos, relações entre desigualdade e desenvolvimento no longo-prazo particulares para cada conjunto de observações: (i) uma relação *positiva* entre desigualdade da distribuição de terras e desenvolvimento para os estados da região Sudeste, São Paulo e Minas Gerais; (ii) uma ausência de relação significativa entre os indicadores de desigualdade no início do século XX e desenvolvimento contemporâneo para o estado de Pernambuco; e (iii) uma relação *negativa* entre desigualdade e desenvolvimento para o Rio Grande do Sul. Terceiro, não encontramos uma relação estatisticamente robusta entre nosso indicador de concentração política e desenvolvimento no longo-prazo. O que seria um resultado possivelmente contra-intuitivo à luz da literatura internacional, é provavelmente consistente com um sistema político capturado e níveis bastante baixos de acesso ao voto. Os resultados acima são mantidos mesmo após controlarmos para *proxies* de mudanças estruturais ocorridas no período, entre elas: urbanização, industrialização e imigração. Além desses resultados, apresentamos evidência de que a desigualdade da distribuição da terra em 1920 é, no máximo, fracamente relacionada à desigualdade contemporânea para Minas Gerais e São Paulo, enquanto é significativa para o Rio Grande do Sul e Pernambuco. Estes resultados ressaltam a importância do estudo de elementos históricos no seu respectivo contexto, uma vez que são consistentes com um Brasil rural dominado por elites agrárias em um complexo ambiente institucional.

**Palavras-chave:** Instituições, desigualdade, desenvolvimento.

## Abstract

In this paper, we present evidence on the relationship between inequality and long-term development using data on different Brazilian regions. New inequality indicators are constructed from scratch for Brazilian municipalities in 1920 (using the Census of 1920, which, surprisingly, had thus far been ignored for such purposes). We find no significant relationship between economic (land) inequality (proxied by the Land Gini) and political concentration (proxied by the percentage of eligible voters) for Brazilian municipalities in the early twentieth century. Econometric analysis indicates a positive robust relationship between economic inequality and long-term development indicators for Southeastern states: São Paulo and Minas Gerais; we find no relationship for Pernambuco; and a positive and robust relationship for Rio Grande do Sul. We found no evidence of a robust relationship between the percentage of eligible voters and long-term development, a surprising result in light of the results provided in development literature, but likely consistent with a politically captured system with very low levels of enfranchisement. These results are shown to hold even when controlling for proxies for structural changes that happened in this time span, namely: urbanization, industrialization, and immigration. Moreover, land inequality in 1920 is at most weakly related to contemporaneous income inequality for Minas Gerais and São Paulo, but significant for Pernambuco and Rio Grande do Sul. These results highlight the importance of the study of historical and social elements in their respective context, as the results are consistent with the picture of a rural Brazil dominated by agrarian elites within a complex institutional environment.

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### Introduction

Undoubtedly inequality is one of the main issues in today's world. It is a subject of intrinsic interest, in the sense that it is related to moral concepts such as justice and fairness. It is also interesting for its effects, for example, on the growth and on the educational attainments of a society. Ironically, it is one of the most hotly-debated subjects within growth and development economic literature and one which is far from reaching a consensus.

A first wave of development literature (as characterized by Easterly 2007) presents the idea that high inequality could promote growth by concentrating income into the hands of high-saving capitalists (Kuznets 1955; Kaldor 1956). As presented in Aghion, Caroli, and García-Peñalosa (1999), the view that wealth inequality could be growth-enhancing is based on two different arguments: (i) investment indivisibilities; and (ii) the tradeoff between productive efficiency and equality. Later works indicate a possible negative effect of economic inequality on growth, both theoretically and empirically. 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) and investment in human capital (Bourguignon and Verdier 2000; Galor, Moav, and Vollrath 2009; Galor and Zeira 1993), and the composition of the aggregate demand (Murphy, Shleifer, and Vishny 1989).

Three important studies followed, casting doubt on the robustness of what were then considered consistent results, and finding a 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. Finally, 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 also 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 insightful studies on the 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.

It is in this context of apparently contradictory evidence that Acemoglu *et al.*'s (2008) study belongs. Their study is the first to distinguish 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* environment, the region of Cundinamarca in Colombia, which, according to Pande and Udry (2005) might provide deeper insights on the specific channels through which inequality affects development.

The authors present surprising 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 America 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>2</sup>

We provide a similar analysis 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) for each municipality in selected Brazilian states. We not only analyze how inequality (both economic and political) is related to long-term development, we also go further into analyzing how inequality is related to long-term development allowing for different *de facto* institutional environments and controlling for a constant *de jure* context (in line with Pande and Udry's reorientation argument).

Therefore, we are able to present in a new framework both the inequality literature and the recent institutional literature (Acemoglu, Johnson, and Robinson 2001; 2002; Pande and Udry 2005; Banerjee and Iyer 2005). We calculate the respective inequality indicators for all the municipalities in four Brazilian states: Minas Gerais, Pernambuco, São Paulo, 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.

The evidence is surprising. First, in all samples, we find almost no correlation between the land Gini and the percentage of eligible voters in Brazilian municipalities in 1920. Second, and also somewhat surprisingly, we find a positive relationship between economic inequality in the early part of the twentieth century and contemporaneous development outcomes, for the sample as a whole, and for the states of Minas Gerais and São Paulo, both from the Southeast region. Pernambuco, a Northeastern state, presents no evidence of a relationship between economic inequality and long-term development outcomes, while the evidence for the South, the state of Rio Grande do Sul, is that this relationship is negative. Third, we find only a tenuous relationship between political inequality (measured as the percentage of eligible voters) and long-term development outcomes. This is an interesting result, for it appears to contradict the general view that greater political participation would foster development. Moreover, in states where there is a positive relationship between economic inequality and long-term development (Minas Gerais and São Paulo), we find no evidence of a correlation between economic (land) inequality in early twentieth century Brazil and contemporaneous income inequality.

This study not only presents new evidence on the relationship between inequality and long-term development within Latin America, it also provides a new strategy for exploring the interaction between inequality in general and the institutional structure of a society.

## The Data

### 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 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 municipality 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, Pernambuco, São

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<sup>2</sup> The concept of "weakly institutionalized" is developed in Acemoglu, Robinson, and Verdier (2004).

Paulo, and Rio Grande do Sul.<sup>3</sup> The average territorial extension of the rural properties is divided into the following measurements: (i) less than 41 hectares; (ii) 41 to 100 hectares; (iii) 101 to 200 hectares; (iv) 201 to 400 hectares; (v) 401 to 1,000 hectares; (vi) 1,001 to 2,000 hectares; (vii) 2,001 to 5,000 hectares; (viii) 5,001 to 10,000 hectares; (ix) 10,001 to 25,000 hectares; and (x) 25,001 hectares or more. We have data on 115,655 rural properties in the 178 municipalities of Minas Gerais, 23,336 rural properties in the 59 municipalities of Pernambuco, 80,921 rural properties in the 204 municipalities of São Paulo, and 124,990 rural properties in the 71 municipalities of Rio Grande do Sul.

The number of rural properties surveyed throughout the country is 648,153, with a total area of 175,104,675 hectares (Table 1), which corresponds to 20.6 percent of the country's entire area. Specifically, 65.1 percent of the area of the state of Rio Grande Sul, 56.2 percent of the area of the state of São Paulo, 52 percent of the state of Pernambuco, and 46.1 percent of the state of Minas Gerais, were surveyed rural properties (IBGE, 1923, p. xi).

Table 1 gives us an indication of the concentration of land distribution in Brazil. Nearly half (49 percent) of the properties surveyed are smaller than 41 hectares. However, these rural properties constitute only 3.5 percent of the surveyed area. The largest share of the surveyed area consists of properties between 2,001 and 5,000 hectares (16.4 percent). Impressively, properties larger than 25,000 hectares correspond to 15.6 percent of the surveyed area (more than the area occupied by properties smaller than 200 hectares, which is 14.9 percent).

The Census also provides a broad set of demographic and geographic data for a total of 1304 Brazilian municipalities in 1920. As we can see from Table 2, the number of municipalities was 178 for Minas Gerais, 59 for Pernambuco, 204 for São Paulo, and 71 for Rio Grande do Sul. The largest state is Minas Gerais, with an area of 59,381,000 hectares, followed by Rio Grande do Sul (28,528,900 hectares) and São Paulo (24,723,900), and finally, the smallest state, Pernambuco, with an area of 9,925,400 hectares.

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. Consistently with the recent inflow of migrants, foreigners represent 18.1 percent of the population of São Paulo. Figures for Minas Gerais and Pernambuco are much lower: 1.5 percent and 0.5 percent, respectively. Rio Grande do Sul, in between São Paulo and Minas Gerais and Pernambuco, has 6.9 percent 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 percent in Rio Grande do Sul to 21.4 percent in Pernambuco. Figures for Minas Gerais and São Paulo are 21.0 percent and 18.3 percent, 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 percent. As expected, São Paulo has the highest share of population working in industrial activities: 5.0 percent. Figures for Pernambuco and Rio Grande do Sul are: 3.3 percent and 3.9 percent. Less than 1.0 percent 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 that data to determine levels of inequality. One possible reason is that the information has not yet been digitized, 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.

## **Land Distribution and Political Concentration**

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<sup>3</sup> For some variables there are data available on the county level as well (and, obviously, on more aggregate levels, such as states). Our interest is on the municipality level.

Land has been very unequally distributed in Brazil since colonial times. Brazil's agrarian structure has been largely characterized by large landholdings. Figures from the Census of 1920 show that 71.5 percent of the rural properties surveyed were smaller than 101 hectares, while only 4.1 percent were bigger than 1,000 hectares. However, these same 71.5 percent of rural properties corresponded to only 9 percent of the total area surveyed, while the 4.1 percent corresponded to 63.4 percent of the total area. Of the 648,153 rural properties surveyed, only 461 (0.1 percent) were larger than 25,000 hectares, which nevertheless corresponded to 15.6 percent of the total area surveyed (a higher proportion than the 535,256 properties smaller than 201 hectares, 14.9 percent). 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 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 hectares) than in Rio Grande do Sul (18,589,996 hectares). 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 hectares, there are important variations within this pattern. Whereas only 26.5 percent of the rural properties in Pernambuco are smaller than 41 hectares (with 48.1 percent smaller than 101 hectares), a total of 61.7 percent of the rural properties in Rio Grande do Sul are smaller than 41 hectares (with 83.6 percent smaller than 101 hectares). The figures for São Paulo and Minas Gerais are 48.4 percent (with 73.7 percent smaller than 101 hectares) and 32.3 percent (with 60.5 percent smaller than 101 hectares), respectively. Third, of the total area surveyed, rural properties smaller than 101 hectares represent only 9.2 percent for Pernambuco (with 2.8 percent of properties smaller than 41 hectares) and 11.1 percent for Minas Gerais (with 2.9 percent of properties smaller than 41 hectares). However, properties smaller than 101 hectares make up 17.9 percent of the surveyed area for Rio Grande do Sul and 15.2 percent for São Paulo.

Another important aspect of the agrarian structure of the four states is that the largest share of the surveyed area is composed of properties between 401 and 1,000 hectares: Minas Gerais (20.1 percent), Pernambuco (30.1 percent), and São Paulo (18.2 percent). However, for Rio Grande do Sul, properties between 2,001 and 5,000 hectares occupy the largest area (19.8 percent). Finally, we highlight the impressive share of properties bigger than 25,000 hectares in São Paulo and Minas Gerais: 7.4 percent and 6.7 percent, 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. For each municipality we constructed the Gini coefficient using the same formula as Nunn (2008):<sup>4</sup>

$$1 + (1/n) - \frac{2 \sum_{i=1}^n (n-i+1)a_i}{n \sum_{i=1}^n a_i}$$

where  $n$  is the number of rural properties,  $a_i$  is the farm size, and  $i$  denotes the rank, where rural properties are ranked in ascending order of  $a_i$ .

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 also 0.65 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 amongst 10% of the individuals of a given society, while the other 90% remain without land, the standard land Gini coefficient will indicate that this society is an egalitarian one. Therefore, if we want a proxy for economic inequality for the population as a whole, we need an 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 equation (1) assigning zero land holdings to the

<sup>4</sup> The calculation is made using the Stata program *ineqdec* and *ineqdec0*.

estimated number of families that do not have land holdings.<sup>5</sup> The average overall land Gini for all the CTU considered in this study, is 0.87. The average overall land Gini coefficients are 0.87 for Minas Gerais and Pernambuco, 0.88 for São Paulo, and 0.76 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>6</sup> Therefore, using the data on population and literacy for the 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 7.4 percent. In 1920, 8.2 percent of the population was eligible to vote in Minas Gerais, 5.4 percent in Pernambuco, 6.8 percent in São Paulo, and 10.3 percent in 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.

We have also constructed, as robustness checks, two other variables for political inequality: the percentage of individuals eligible to vote considering only the male population and the percentage of individuals eligible to vote considering only the literate male population.

## Quantitative Analysis

### Inequality and Long-Term Development

In order to explore the long-term consequences for development in Brazil of land (economic) inequality and political inequality, 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.

Following Acemoglu *et al.* (2008), we first estimate cross-sectional ordinary least squares (OLS) regressions of the following form:

$$y_i^{2000} = \alpha g_i^{1920} + \beta p_i^{1920} + \delta' \mathbf{x}_i + \varepsilon_i$$

where  $y_i^{2000}$  is a measure of development for the CTU  $i$  for the year 2000,  $\mathbf{x}_i$  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. Therefore, our main interest is the consistent estimation of  $\alpha$  and  $\beta$ .

The regressions will be estimated for five different samples. First, we will estimate the regression using all available CTU. Afterwards we will estimate this regression for each of the four states individually. We will therefore be able to capture possible different *de facto* institutional environments, with such differences rooted in the specific colonial experience of each state. As dependent variables, we will first use what we have been calling “main outcome variables”, which are the (natural logarithm of) GDP *per capita*, the (natural logarithm of) average years of schooling, and infant mortality. These are the three aspects of development needed to construct the HDI, income, education, and health attainments.

As previously discussed (see Chapter 2), 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 development indicator. Pernambuco is representative of an old agrarian structure, of great importance during the colonial era due to the sugar production that, as stated before (see Section X), 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

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<sup>5</sup> Acemoglu *et al.* (2008) use an estimate of 10 members per family, while Summerhill (2010) constructs his coefficients by assuming 5 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>6</sup> The Constitution of 1891 was in force from 1891 to 1934.

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>7</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 (see Section X), 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  $\mathbf{x}_i$ ).

### Contemporary Outcomes

Table 5 presents the econometric results with geographical and econometrics results.

In summary, the first robust results linking inequality and long-term development within Brazilian regions (Table X) provide evidence of a positive relationship between economic inequality and GDP *per capita* and average years of schooling. These general results hide a very interesting heterogeneity between states which, as already mentioned, had unique colonization experiences.

### Overall Land Gini

Table 6 presents the econometric result including the overall land Gini.

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

### Inequality Yesterday and Today

Table 7 presents the econometric results with the contemporary Gini coefficient as the dependent variable.

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

### De facto Institutional Environments, Structural Change and Further Results

Tables 8 and 9 present the results with the econometric results.

Thus, we have presented a robustness check for our hypothesis that the heterogeneous relationships between economic (land) inequality 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.

Finally, two additional investigations are conducted. First, immigration is another structural change that might be related to the effects of inequality on long-term development. We have collected data on the number of foreigners and included it in our regressions (as a percentage of the population). Three results are noteworthy: (i) the inclusion of the new variable does not alter any of the results

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<sup>7</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:  $E(\varepsilon/\mathbf{x}) = 0$ , which means that the error term is not correlated with any function of the independent variables. In applied econometrics, endogeneity arises in one of three ways: (i) omitted variable bias; (ii) measurement error; and (iii) 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:  $plim \hat{\beta}_k = \beta_k + \gamma \left[ \frac{cov(x_k, q)}{var(x_k)} \right]$  (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  $q$ : (i) the proxy variable should be redundant in the structural equation:  $E(y|x, q, z) = E(y|x, q)$ , where  $z$  is the proxy variable; and (ii) 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).



discussed in Section 4.2; (ii) the immigrant variable is insignificant or of very small magnitude when included in regressions including the land Gini and the percentage of eligible voters as independent variables and an indicator of development as a dependent variable; and (iii) the immigrant variable is not significant even when we control for the control variables included in Tables X and X. Appendix 5 presents the regression results.

Second, quantile regressions suggest that, except for the state of Pernambuco, the already mentioned results are concentrated in CTU with relative small values for the dependent variable, i.e., CTU relatively less developed have stronger relations between inequality in the 1920 and development indicators in 2000. Appendix 6 presents the estimations for the quantile regressions.

### Conclusion

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

Our first contribution was to construct from scratch both economic inequality variables (the standard land Gini and the overall land Gini) and a proxy for political concentration (the percentage of eligible voters) variables at the municipal level for the states of Minas Gerais, Pernambuco, São Paulo, and Rio Grande do Sul. The states were specifically chosen for the fact that they had 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.

Second, our analysis was set in a new framework. We not only explored the relationship between economic and political inequality in Brazil at the beginning of the twentieth-century with contemporaneous development outcomes for all comparable territorial units, we also explored these relationships within each of the selected states. This strategy, made possible due to the rich variety of colonial experiences within the Brazilian territory, allowed us to account for possibly different *de facto* institutional environments rooted in the unique respective colonial experience of each state.

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 surprising, we find a positive relationship between economic inequality in early twentieth century and contemporaneous development outcomes when using the whole sample, and for the states of Minas Gerais and São Paulo, both from the Southeast region. Pernambuco, a Northeastern state, presents no evidence of a relationship between economic inequality and long-term development outcomes, while the evidence for the South, the state of Rio Grande do Sul is that this relationship is negative. Third, we find no robust significant relationship between political inequality, measured as 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 be costly for a society and that greater political participation would foster development. The answer to 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 regards 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. As thoughtfully stated by Dell (2010):

In existing theories about land inequality and long-run growth, the implicit counterfactual to large landowners in Latin America is secure, enfranchised smallholders (ENGERMAN; SOKOLOFF, 1997; 2002). This is not an appropriate counterfactual for Peru, or many other places in Latin America, because institutional structures largely in place before



the formation of the landed elite did not provide secure property rights, protection from exploitation, or a host of other guarantees to potential smallholders (Dell 2010, p. 1899).

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 contemporaneous 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 developed 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: (i) industrialization; (ii) urbanization; and (iii) immigration. After controlling these elements, our main results were maintained, strengthening our hypothesis. Interestingly, we also found no significant effect of immigration on long-term development, even when controlling for other structural factors such as industrialization.

It is important to note that we do not argue that inequality is conducive to development. 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 *de jure* institutional environment. In other words, relative equality would be better for a particular country, but within an unequal country (with certain socio-political and economic characteristics) more inequality would be associated with better outcomes.<sup>8</sup>

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. 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>9</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.

As usual, when exploring such important issues, it is only possible to make a very modest contribution to the small pool of knowledge, compared to the vast oceans of the unknown. Much exciting and necessary work lies ahead.

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<sup>8</sup> See, for example, Robinson (2006).

<sup>9</sup> In our view, another fruitful investigation of this kind would be the effects of slavery.

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## Tables

Table 1 – Brazilian agricultural statistics, 1920

Extension of the Rural Properties	Number of Rural Properties	Percentage to Total, %	Area, hectares	Percentage to Total, %
Smaller than 41 hectares	317,785	49.0	6,115,158	3.5
41 - 100 hectares	146,094	22.5	9,593,156	5.5
101 - 200 hectares	71,377	11.0	10,454,242	6.0
201 - 400 hectares	48,877	7.6	14,079,761	8.0
401 - 1,000 hectares	37,705	5.8	23,881,734	13.6
1,001 - 2,000 hectares	13,186	2.0	18,891,552	10.8
2,001 - 5,000 hectares	8,963	1.4	28,667,844	16.4
5,001 - 10,000 hectares	2,498	0.4	17,928,532	10.2
10,001 - 25,000 hectares	1,207	0.2	18,256,042	10.4
Bigger than 25,000 hectares	461	0.1	27,236,654	15.6
Total	648,153	100.0	175,104,675	100.0

Source: IBGE. *Census of 1920*. Rio de Janeiro: IBGE, v. 3, 1923.

**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)	157	52	172	27
Total Area, hectares	59,381,000	9,925,400	24,723,900	28,528,900
Rural properties share (% , 1920)	46.1	52.0	56.2	65.1
Average Land Value (hectare, 1920)	60	59	161	92
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)	2,927,285	1,046,098	1,917,238	1,014,905
Male (Brazilian) Population (% , 1920)	49.7	48.5	41.7	46.5
Total number of foreigners (1920)	85,705 1.5	11,698 0.5	829,851 18.1	151,025 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. *Census of 1920*. Rio de Janeiro: IBGE, 1923 (volumes 3 and 4).

Notes: (i) Standard deviations in parenthesis; (ii) Density: individuals per hectare; (iii) Soil exploitation activities include: agricultural activities, livestock, and hunting and fishing; (iv) Industrial activities include: textiles, leather, wood, metallurgy,

ceramics, chemical products, food industry, clothing, furniture, building, transport devices; (v) Public administration includes municipal, state, and federal spheres; (vi) Liberal professions include: Priests and Nuns, lawyers, doctors, teachers, etc.

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

Extension of the Rural Properties	Minas Gerais				Pernambuco			
	Number of Rural Properties	Percentage to Total, %	Area, hectares	Percentage to Total, %	Number of Rural Properties	Percentage to Total, %	Area, hectares	Percentage to Total, %
Smaller than 41 hectares	37,375	32.3	784,875	2.9	6,175	26.5	142,025	2.8
41 - 100 hectares	32,650	28.2	2,252,850	8.2	5,044	21.6	332,904	6.5
101 - 200 hectares	19,966	17.3	2,974,934	10.9	5,268	22.6	742,788	14.4
201 - 400 hectares	12,883	11.1	3,736,070	13.6	3,600	15.4	1,015,200	19.7
401 - 1,000 hectares	8,773	7.6	5,518,217	20.1	2,515	10.8	1,551,755	30.1
1,001 - 2,000 hectares	2,440	2.1	3,467,240	12.7	523	2.2	703,435	13.6
2,001 - 5,000 hectares	1,174	1.0	3,639,400	13.3	197	0.8	577,013	11.2
5,001 - 10,000 hectares	261	0.2	1,835,091	6.7	13	0.1	80,678	1.6
10,001 - 25,000 hectares	95	0.1	1,336,175	4.9	1	0.0	11,400	0.2
Bigger than 25,000 hectares	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

  

Extension of the Rural Properties	São Paulo				Rio Grande do Sul			
	Number of Rural Properties	Percentage to Total, %	Area, hectares	Percentage to Total, %	Number of Rural Properties	Percentage to Total, %	Area, hectares	Percentage to Total, %
Smaller than 41 hectares	39,190	48.4	783,800	5.6	77,096	61.7	1,619,016	8.7
41 - 100 hectares	20,410	25.2	1,326,650	9.5	27,433	21.9	1,700,846	9.1
101 - 200 hectares	9,345	11.5	1,345,680	9.7	7,790	6.2	1,137,340	6.1
201 - 400 hectares	5,866	7.2	1,665,944	12.0	4,777	3.8	1,399,661	7.5
401 - 1,000 hectares	4,111	5.1	2,536,487	18.2	4,415	3.5	2,803,525	15.1
1,001 - 2,000 hectares	1,190	1.5	1,712,410	12.3	1,884	1.5	2,677,164	14.4
2,001 - 5,000 hectares	618	0.8	1,863,888	13.4	1,200	1.0	3,681,600	19.8
5,001 - 10,000 hectares	118	0.1	838,626	6.0	301	0.2	1,983,891	10.7
10,001 - 25,000 hectares	52	0.1	796,224	5.7	87	0.1	1,202,079	6.5
Bigger than 25,000 hectares	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. *Census of 1920*. Rio de Janeiro: IBGE, v. 3, 1923.

**Table 4 – Descriptive statistics**

	All Municipalities	Minas Gerais	Pernambuco	São Paulo	Rio Grande do Sul
Land Gini (1920)	0.61 (0.12)	0.60 (0.08)	0.44 (0.12)	0.65 (0.10)	0.65 (0.16)
Overall Land Gini (1920)	0.87 (0.11)	0.87 (0.06)	0.87 (0.12)	0.88 (0.12)	0.76 (0.19)
Income Gini (2000)	0.55 (0.04)	0.55 (0.04)	0.59 (0.04)	0.54 (0.04)	0.57 (0.06)
Voters (% , 1920)	7.4 (2.4)	8.2 (2.4)	5.4 (1.8)	6.8 (1.8)	10.3 (2.2)
GDP per capita (log, 2000)	8.46 (0.63)	8.33 (0.50)	7.65 (0.53)	8.78 (0.49)	8.73 (0.66)
Average Years of Schooling (2000)	5.1 (1.1)	4.9 (0.9)	3.6 (1.0)	5.7 (0.8)	5.9 (0.8)
Infant Mortality (2000)	24.6 (14.4)	25.8 (7.0)	54.7 (14.0)	15.4 (4.6)	17.9 (4.1)
HDI (2000)	0.76 (0.06)	0.75 (0.04)	0.64 (0.05)	0.79 (0.03)	0.79 (0.03)
Poverty (% , 2000)	29.7 (18.4)	31.5 (14.6)	63.5 (10.5)	18.4 (9.2)	26.1 (8.8)

Sources: (i) IBGE. *Censuses*; (ii) IPEA; (iii) Own calculations.

Notes: (i) Standard deviations in parenthesis; (ii) These are descriptive statistics constructed for the CTU.

**Table 5 – Ordinary Least Squares Regressions with Controls**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
<b>All Comparable Territorial Units</b>															
	<i>Log GDP per capita</i>				<i>Average Years of Schooling</i>					<i>Infant Mortality</i>					
MG*Gini	2.45***		2.51***	1.46***	1.17**	3.83***		4.09***	3.26***	2.49***	-29.13***		-29.83***	-11.56*	-9.41
PE*Gini	-0.36		-0.23	-0.03	-0.16	0.75		1.61	1.68	1.34	-0.54		-7.17	-9.76	-8.80
SP*Gini	1.13***		1.13***	0.89**	0.61*	2.25***		2.25***	2.11***	1.36**	-9.37**		-9.38**	-3.93	-1.85
RS*Gini	-0.96***		-1.97***	-1.65**	-1.48**	0.52		-0.60	-0.70	-0.25	14.91***		11.60***	16.03***	14.78***
MG* Voters		0.04**	0.05***	0.03**	0.01		0.18***	0.19***	0.13***	0.07***		-0.46*	-0.50**	0.13	0.28
PE* Voters		0.06	0.06	0.05	0.02		0.37***	0.38***	0.36***	0.28***		-2.87***	-2.93***	-2.44***	-2.22***
SP* Voters		0.00	0.00	0.02	-0.02		0.14***	0.14***	0.15***	0.03		0.59***	0.59***	0.20	0.51**
RS* Voters		0.06	0.14**	0.12**	0.09*		0.13**	0.15**	0.15**	0.09		0.90***	0.44	0.47	0.64*
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	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408
R <sup>2</sup>	1.00	1.00	1.00	1.00	1.00	0.97	0.98	0.98	0.98	0.99	0.94	0.94	0.94	0.96	0.96

**Table 6 – Ordinary Least Squares Regression including the Overall Land Gini**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
<b>All Comparable Territorial Units</b>																		
	<i>Log GDP per capita</i>						<i>Average Years of Schooling</i>						<i>Infant Mortality</i>					
MG*Gini	2.87***	1.58***	1.33**	2.87***	1.58***	1.33**	4.23***	3.23***	2.57***	4.23***	3.24***	2.57***	-37.94***	-16.80**	-14.87**	-37.94***	-16.89**	-14.96**
PE*Gini	-0.58	-0.06	-0.17	-0.58	-0.04	-0.15	1.24	1.54	1.26	1.24	1.57	1.28	-6.72	-10.47	-9.65	-6.72	-10.58	-9.74
SP*Gini	0.95*	0.82	0.64	0.83	0.73	0.60	1.60*	1.98**	1.50**	1.26	1.80**	1.47*	-1.96	-2.37	-0.97	0.55	-0.94	0.03
RS*Gini	-2.32	-2.43	-2.34	-2.87	-3.16	-2.95	-0.24	-0.40	-0.16	-1.33	-1.52	-0.94	19.40***	19.70**	18.99**	20.96***	22.46**	20.79**
MG*Gini (10)	-1.89	-0.48	-0.76				-0.74	0.29	-0.43				42.70***	23.19*	25.30**			
PE*Gini (10)	2.69***	0.24	0.01				2.91**	1.11	0.51				-3.55	6.91	8.65			
SP*Gini (10)	0.30	0.11	-0.08				1.06	0.26	-0.24				-12.15***	-2.20	-0.75			
RS*Gini (10)	0.38	0.90	1.02				-0.39	-0.48	-0.15				-8.62	-5.41	-6.36			
MG*Gini (15)				-1.26	-0.30	-0.49				-0.50	0.21	-0.28				28.47***	15.28*	16.70**
PE*Gini (15)				1.79***	0.08	-0.05				1.94**	0.62	0.26				-2.37	4.96	5.99
SP*Gini (15)				0.39	0.21	-0.01				1.33*	0.44	-0.16				-13.42***	-3.79	-2.07
RS*Gini (15)				0.92	1.65	1.63				0.75	0.79	0.73				-9.63	-8.03	-7.85
MG*Voters	0.05***	0.04**	0.01	0.05***	0.03**	0.01	0.19***	0.13***	0.07**	0.19***	0.13***	0.07**	-0.62**	0.07	0.23	-0.61**	0.07	0.23
PE*Voters	0.07**	0.06	0.02	0.07**	0.06*	0.03	0.40***	0.37***	0.28***	0.40***	0.37***	0.29***	-2.96***	-2.42***	-2.19***	-2.96***	-2.43***	-2.19***
SP*Voters	-0.00	0.02	-0.02	-0.00	0.02	-0.02	0.13***	0.14***	0.04	0.12***	0.14***	0.04	0.70***	0.22	0.52**	0.74***	0.24	0.53**
RS*Voters	0.13***	0.10**	0.08*	0.12***	0.09**	0.07*	0.15*	0.16**	0.09	0.14*	0.14*	0.08	0.58**	0.53	0.73**	0.58**	0.57	0.75**
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408	408
R <sup>2</sup>	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.99	0.98	0.98	0.99	0.95	0.96	0.96	0.95	0.96	0.96

**Table 7 – Contemporary Gini as Dependent Variable**

	(1)	(2)	(3)
	<b>Gini (2000)</b>		
	<i>All</i>		
MG*Gini	0.03	0.08*	0.08*
PE*Gini	0.06*	0.06	0.06
SP*Gini	-0.03	-0.00	-0.00
RS*Gini	0.20***	0.17***	0.17***
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	408	408	408
R <sup>2</sup>	1.00	1.00	1.00



	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
<b>Panel A</b>	<b>Log GDP per capita</b>														
	<i>All CTU</i>			<i>Minas Gerais</i>			<i>Pernambuco</i>			<i>São Paulo</i>			<i>Rio Grande do Sul</i>		
Land Gini (1920)	2.16***	0.53**	0.31	2.51***	1.35**	1.29**	-0.06	-0.25	-0.42	0.99***	0.88**	0.75*	-1.73***	-0.42	-0.43
Eligible Voters (1920, %)	0.03**	0.01	-0.00	0.05***	0.04**	0.03	0.09*	0.03	-0.01	-0.02	0.01	-0.01	0.15*	0.17***	0.17***
Agricultural Sector (%)	-0.00	-0.00**	-0.00	-0.00	0.00	0.00	0.00*	-0.00	-0.00	-0.00***	-0.00**	-0.00	0.00	-0.00	-0.00
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.21	0.47	0.50	0.21	0.49	0.49	0.07	0.37	0.38	0.12	0.24	0.26	0.21	0.90	0.90
<b>Panel B</b>	<b>Log GDP per capita</b>														
	<i>All CTU</i>			<i>Minas Gerais</i>			<i>Pernambuco</i>			<i>São Paulo</i>			<i>Rio Grande do Sul</i>		
Land Gini (1920)	2.15***	0.53**	0.31	2.51***	1.35**	1.29**	-0.03	-0.23	-0.42	1.02***	0.88**	0.75*	-1.99***	-0.26	-0.28
Eligible Voters (1920, %)	0.02*	0.01	-0.00	0.04***	0.04**	0.03	0.09*	0.03	-0.01	-0.02	0.01	-0.01	0.13*	0.17***	0.17***
Land use activities (%)	-0.00*	-0.00***	-0.00	-0.00	0.00	0.00	0.00	-0.00	0.00	-0.00***	-0.00**	-0.00	-0.00	-0.00	-0.00
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.21	0.47	0.50	0.21	0.49	0.49	0.07	0.37	0.38	0.12	0.24	0.26	0.20	0.89	0.90
<b>Panel C</b>	<b>Log GDP per capita</b>														
	<i>All CTU</i>			<i>Minas Gerais</i>			<i>Pernambuco</i>			<i>São Paulo</i>			<i>Rio Grande do Sul</i>		
Land Gini (1920)	2.05***	0.41*	0.27	2.60***	1.27**	1.29**	-0.23	-0.21	-0.41	0.80**	0.75*	0.70*	-1.96***	-0.59	-0.33
Eligible Voters (1920, %)	0.01	-0.00	-0.01	0.05***	0.02	0.03	-0.04	0.01	-0.03	-0.03*	-0.01	-0.02	0.14	0.19***	0.17***
Industrial sector (%)	0.01***	0.01***	0.00*	-0.00	0.00	0.00	0.01**	0.00	0.00	0.01***	0.01***	0.01***	-0.00	0.00	-0.00
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.25	0.49	0.51	0.21	0.49	0.49	0.28	0.37	0.38	0.19	0.30	0.31	0.19	0.88	0.89

**Table 8 – Structural Controls R<sup>2</sup>**

## Panel D

	Log GDP per capita														
	All CTU			Minas Gerais			Pernambuco			São Paulo			Rio Grande do Sul		
Land Gini (1920)	1.87***	0.31	0.22	2.28***	1.16**	1.23**	-0.85	-0.32	-0.41	0.88**	0.70*	0.67	-2.21***	-0.52	-0.38
Eligible Voters (1920, %)	-0.00	-0.01	-0.01	0.03	0.02	0.02	-0.07	0.01	-0.01	-0.04	0.00	-0.01	0.07**	0.16***	0.15**
Commercial sector (%)	0.02***	0.02***	0.01***	0.02***	0.01***	0.02***	0.04***	0.01	-0.00	0.02***	0.02***	0.01*	0.03*	0.01	0.01
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.27	0.50	0.51	0.24	0.51	0.51	0.23	0.37	0.38	0.12	0.26	0.27	0.29	0.89	0.89

## Panel E

	Log GDP per capita														
	All CTU			Minas Gerais			Pernambuco			São Paulo			Rio Grande do Sul		
Land Gini (1920)	2.16***	0.58**	0.31	2.47***	1.25**	1.29**	-0.71	-0.35	-0.40	1.11***	0.91**	0.73*	-1.97***	-0.60	-0.30
Eligible Voters (1920, %)	0.02*	0.02	-0.00	0.04**	0.03	0.03	-0.07	0.00	-0.00	0.01	0.04*	0.00	0.14*	0.19***	0.16***
Public Administration sector (%)	0.02	0.01	-0.00	0.02	0.04**	0.04*	0.24***	0.06	-0.05	-0.01	-0.01	-0.01	-0.00	0.01	-0.01
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.21	0.46	0.50	0.21	0.50	0.50	0.17	0.37	0.38	0.06	0.22	0.26	0.19	0.88	0.89

## Panel F

	Log GDP per capita														
	All CTU			Minas Gerais			Pernambuco			São Paulo			Rio Grande do Sul		
Land Gini (1920)	1.66***	0.28	0.26	2.14***	1.09**	1.15**	-0.25	-0.20	-0.63	0.80**	0.66*	0.67*	-1.97***	-0.67	0.19
Eligible Voters (1920, %)	-0.01	-0.01	-0.01	0.01	0.01	0.02	-0.03	0.06	0.02	-0.04**	-0.01	-0.00	0.14	0.21***	0.18***
Liberal Professions (%)	0.08***	0.06***	0.05**	0.06***	0.04**	0.06***	0.10**	-0.02	-0.08	0.06***	0.06***	0.07*	-0.00	-0.02	-0.13**
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.31	0.51	0.52	0.25	0.50	0.51	0.13	0.37	0.40	0.18	0.30	0.30	0.19	0.88	0.92

**Table 9 – Immigration**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
<b>Panel A</b>	<b>Log GDP per capita</b>														
	<i>All CTU</i>			<i>Minas Gerais</i>			<i>Pernambuco</i>			<i>São Paulo</i>			<i>Rio Grande do Sul</i>		
Land Gini (1920)	2.06***	0.50**	0.30	2.37***	1.09**	1.15**	-0.65	-0.39	-0.44	0.98***	0.80*	0.70*	-1.96**	-0.64	-0.38
Eligible Voters (1920, %)	0.03**	0.02*	-0.00	0.04**	0.03*	0.04*	-0.01	0.00	-0.01	-0.00	0.03	0.00	0.13*	0.19***	0.16***
Immigration (per 1000 inhabitants)	0.00**	0.00***	0.00	0.00**	0.00***	0.00***	0.00**	0.00	0.00	0.00***	0.00***	0.00**	0.00	-0.00	-0.00
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.23	0.48	0.51	0.24	0.51	0.51	0.11	0.38	0.38	0.09	0.24	0.27	0.19	0.88	0.89
<b>Panel B</b>	<b>Log Average Years of Shchooling</b>														
	<i>All CTU</i>			<i>Minas Gerais</i>			<i>Pernambuco</i>			<i>São Paulo</i>			<i>Rio Grande do Sul</i>		
Land Gini (1920)	3.89***	1.74***	1.13***	3.68***	2.31***	2.13**	1.24	1.14	0.70	1.95***	1.43***	1.14**	-0.12	0.96	1.67
Eligible Voters (1920, %)	0.16***	0.12***	0.05***	0.17***	0.13***	0.11***	0.32***	0.41***	0.27***	0.13***	0.16***	0.07**	0.10	0.09	0.00
Immigration (per 1000 inhabitants)	0.00**	0.00**	0.00	0.00***	0.00***	0.00***	0.00	-0.00	-0.00**	0.00**	0.00***	0.00*	0.00	0.00***	0.00***
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.40	0.58	0.66	0.46	0.60	0.61	0.49	0.71	0.76	0.23	0.41	0.49	0.25	0.70	0.75
<b>Panel C</b>	<b>Infant Mortality</b>														
	<i>All CTU</i>			<i>Minas Gerais</i>			<i>Pernambuco</i>			<i>São Paulo</i>			<i>Rio Grande do Sul</i>		
Land Gini (1920)	-59.76***	-3.75	-0.74	-28.95***	-6.14	-4.27	-6.63	-0.10	5.23	-9.64**	-4.18	-3.61	10.87***	14.22**	14.43**
Eligible Voters (1920, %)	-0.80***	0.25	0.59***	-0.46*	-0.09	0.17	-2.85**	-2.49*	-0.84	0.58***	0.09	0.26	0.51	0.41	0.39
Immigration (per 1000 inhabitants)	-0.00	-0.00	0.00**	-0.00	-0.00	-0.00	-0.00	0.00	0.00**	0.00	0.00	0.00**	-0.00	-0.00	-0.00
Geographic controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Educational controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	408	408	408	157	157	157	52	52	52	172	172	172	27	27	27
R <sup>2</sup>	0.30	0.80	0.81	0.15	0.56	0.57	0.15	0.60	0.64	0.10	0.32	0.33	0.37	0.75	0.75