UNIVERSIDADE DE SÃO PAULO
FACULDADE DE ECONOMIA, ADMINISTRAÇÃO E CONTABILIDADE
DEPARTAMENTO DE ECONOMIA
PROGRAMA DE PÓS-GRADUAÇÃO EM ECONOMIA

INSTITUIÇÕES, DESIGUALDADE E DESENVOLVIMENTO DE LONGO PRAZO: UMA PERSPECTIVA A PARTIR DE REGIÕES BRASILEIRAS

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Versão Original

SÃO PAULO
2014

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INSTITUIÇÕES, DESIGUALDADE E DESENVOLVIMENTO DE LONGO PRAZO: UMA PERSPECTIVA A PARTIR DE REGIÕES BRASILEIRAS

Dissertação apresentada ao Departamento de Economia da Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo como requisito para a obtenção do título de Mestre em Ciências.

Orientador: Prof. Dr. Renato Perim Colistete

SÃO PAULO

2014

FICHA CATALOGRÁFICA
Elaborada pela Seção de Processamento Técnico do SBD/FEA/USP

Funari, Pedro
Institutions, inequality, and long-term development : a perspective from Brazilian regions / Pedro Funari. -- São Paulo, 2014.
195 p.

Dissertação (Mestrado) – Universidade de São Paulo, 2014.
Orientador: Renato Perim Colistete.

1. Instituições 2. Desigualdade 3. Desenvolvimento I. Universidade de São Paulo. Faculdade de Economia, Administração e Contabilidade. II. Título.

CDD – 306

Aos meus pais.

AGRADECIMENTOS

Infelizmente (ou, talvez, felizmente), é impossível agradecer a todos que contribuem, das mais diversas maneiras, a um projeto de mestrado em espaço tão reduzido. Entretanto, tentarei.

Agradeço, primeiramente, ao meu orientador Renato Perim Colistete. Palavras não podem expressar, com a justiça necessária, minha gratidão. Seu incentivo e atenção, para que eu aproveitasse ao máximo este período da minha vida, foram fundamentais. Obrigado pela inspiração Professor.

Por conversas, comentários, críticas e sugestões, agradeço a Basília Aguirre, José Raymundo Chiappin, Nuno Fouto, Carlos Eduardo Gonçalves, Rodrigo Soares e Leonardo Weller. Em especial, aos professores Pedro Duarte, Gilberto Lima, Mauro Rodrigues e William Summerhill.

Tive, durante o mestrado, o privilégio de participar de congressos e *worshops*. Agradeço aos organizadores da 10ª Conferência da EHES, do 4º SHEHSS, do CLADHE IV e ao Prof. Renato Colistete pela organização do Workshop em História Econômica e Desigualdade no Brasil. Em especial, agradeço a Luis Bértola, Javier Cubillos, Margarita Fajardo, Johan Fourie, Ewout Frankema, Alfonso Herranz, Thomas Kang, Felipe Loureiro, Thales Pereira, José Retureta, Emiliano Travieso, e Bruno Witzel.

Um agradecimento especial deve, também, ser feito à Profa. Vera Fava. Além de todo ensinamento, desde a graduação, passando pelo mestrado e monitorias, pelo exemplo de profissionalismo, caráter, sacrifício e preocupação com os alunos. Obrigado pelo exemplo e oportunidades Professora. Agradeço também ao senhor Fábio Serrano, pelo companheirismo nessa jornada.

Agradeço aos meus colegas, desde os tempos de colégio aos de faculdade e mestrado. Agradeço profundamente à minha turma de mestrado no IPE-USP por toda ajuda ao longo do caminho. Em especial, agradeço aos colegas Marcos Campos, Rodrigo Campos e Gabriel Corrêa. Palavras aqui são desnecessárias, o tempo fala por si só.

Agradeço à FAPESP e CAPES pelo importante financiamento ao longo da pesquisa.

Por fim, e o mais importante, agradeço à Deus, pela Sua infinita misericórdia.

São Paulo, julho de 2014

Pedro Funari

"*Veritas filia temporis.*"

Thomas Aquinas

RESUMO

Este estudo apresenta novas evidências sobre a relação entre desigualdade e desenvolvimento de longo prazo a partir de dados de diferentes regiões brasileiras. A análise é realizada a partir de uma original estratégia de identificação: trabalhamos dentro de um ambiente institucional *de jure* constante – o Brasil – permitindo possíveis efeitos heterogêneos a partir de ambientes institucionais *de facto* (estados brasileiros) diferentes, resultantes de diferentes experiências coloniais. 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, e, de certo modo, surpreendente, 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 (o centro da produção cafeeira nos séculos XIX e XX que recebeu um forte fluxo de imigrantes e que se tornou o estado brasileiro mais dinâmico) e Minas Gerais (estado particularmente influenciado pelo ciclo do ouro, moldado também pela atividade de criação e produção de café); (ii) uma ausência de relação significativa entre os indicadores de desigualdade no início do século XX e desenvolvimento contemporâneo para o estado de Pernambuco (estado da região Nordeste, representativo da antiga estrutura colonial de produção de açúcar); e (iii) uma relação *negativa* entre desigualdade e desenvolvimento para o Rio Grande do Sul (estado da região Sul, com colonização mais associada a países da América do Norte). 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 significante para o Rio Grande do Sul e Pernambuco. Em outras palavras, nossas evidências sugerem que os efeitos positivos da desigualdade no início do século estão associados a uma particular organização em um período histórico específico, em contraste com uma desigualdade mais estrutural, exemplificada pelos casos de Pernambuco e Rio Grande do Sul, no qual os efeitos da desigualdade são negativos ou insignificantes no desenvolvimento de longo prazo. Finalmente, não encontramos uma relação estatisticamente robusta entre o índice de Gini da distribuição de terras considerando toda a população e o desenvolvimento das regiões consideradas. 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.

ABSTRACT

In this paper, we present evidence on the relationship between inequality and long-term development using data on different Brazilian regions. A new framework of analysis is provided in the sense that our empirical approach is developed within a constant de jure institutional environment – Brazil – accounting for possible differences in the de facto institutional environments (Brazilian regions) rooted in distinct colonial experiences within the same national territory. 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. And although our econometric analysis indicates a positive robust relationship between economic inequality and long-term development indicators for Southeastern states (São Paulo, the center of coffee production in the nineteenth and twentieth centuries and a state with a large influx of European immigrants, which became the most dynamic Brazilian region; and Minas Gerais, the gold cycle region, shaped also by cattle-farming and coffee production), we find no relationship for Pernambuco, a state in the Northeast region representative of the old agrarian structure of colonial sugar plantations; and a positive and robust relationship for Rio Grande do Sul, a Southern state with a colonial experience more similar to that of the United States and Canada. 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. In other words, evidence suggests that the positive effects of inequality are associated to 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 negative or no significant effects on long-term development. Finally, we find no robust relationship between the overall land Gini and long-term economic development. 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 important 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, 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. 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.[1]

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.

[1] The concept of "weakly institutionalized" is developed in Acemoglu, Robinson, and Verdier (2004).

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.

Therefore, 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 study is organized as follows. Chapter 1 sets out an extensive survey of the main bodies of literature related to this study. Chapter 2 explores the Brazilian development process from a historical perspective. A data analysis is presented in Chapter 3, and Chapter 4 presents the econometric results. Finally, a conclusion is presented.

1 A REVIEW OF THE LITERATURE AND SOME PERSPECTIVES

In this chapter we offer a broad review of the main bodies of literature related to this study. We first explore the recent literature on institutions and development. This literature, concerned with the fundamental causes of growth (North 1990; Acemoglu, Johnson, and Robinson 2005), has made significant progress at cross-country level (Pande and Udry 2005) and has recently turned to micro-data studies, seeking to understand the particular institutions and specific effects, channels of transmission and institutional change. We then turn to the discussion of inequality, the main focus of this dissertation. We also deal with the recent literature exploring the effects of political inequality. Next, we address the influential works led by Engerman and Sokoloff, who studied inequality and institutions in the Americas. We also explore the work of Acemoglu *et al.* (2008). In the end we summarize the main conclusions.

1.1 Institutions and Development

In this section we deal with the theoretical and empirical developments of the literature concerned with the role of institutions on long-term development.[2] It is possible to view the recent literature on institutions and development as an attempt to understand the fundamental causes of economic growth and development. The basic literature on economic growth, largely influenced by the works of Solow (1956; 1957) and the contributions of Ramsey (1928), Cass (1965), and Koopmans (1963) – known as the Ramsey-Cass-Koopmans model – , finds as causes of growth elements such as physical and human capital accumulation, savings and investment rates, as well as technological innovations (Barro 1991; 1996; Mankiw, Romer, and Weil 1992; Islam 1995).[3] However, "the factors we have listed (innovation, economies of scale, education, capital accumulation etc.) are not causes of growth; *they are growth*" (North and Thomas 1973, p. 2). An understanding of what drives economies into differential levels of such factors is an essential step towards understanding the development process.

[2] For reviews of this literature see Aron (2000), Gagliardi (2008), and Nunn (2009).

[3] For an excellent review of the main aspects of growth literature, see Temple (1999). Romer (1986; 1990) and Lucas (1988) have made important contributions on inclusion of the human capital perspectives. See also Becker (1975) for earlier important contributions. As widely discussed (see, e.g., Acemoglu 2009, and Jones 1998), technological progress is the source of sustained economic growth in the Solow model.

Acemoglu (2009) classifies what he calls the "fundamental causes of growth" into four groups: (i) the multiple equilibria / luck hypothesis; (ii) the geography hypothesis; (iii) the culture hypothesis; and (iv) the institutions hypothesis. Although these four broad hypotheses are potentially complementary, new theoretical and empirical findings in development literature suggest that the institutions hypothesis is, in modern times, the most important one (Acemoglu 2009; Acemoglu, Johnson, and Robinson 2001; 2002; 2005; North 1990; Gagliardi 2008; Pande and Udry 2005). It is therefore to this literature that we turn now.

Douglass North, in his influential work *Institutions, Institutional Change, and Economic Performance* (1990), defines institutions as the rules of the game in a society, or the humanly devised constraints that shape human interaction.[4] They shape the incentives in human exchange and the way societies evolve over time, affecting the performance of an economy by their effects on the costs of exchange and production. According to North, the major role of institutions in a society is to reduce uncertainty by establishing a stable (again, not necessarily efficient) structure for human interaction.[5]

Economic institutions determine the incentives and constraints on economic actors so that societies with economic institutions that facilitate and encourage factor accumulation, innovation and the efficient allocation of resources will prosper (Acemoglu, Johnson, and Robinson 2005; North and Weingast 1989). Yet, institutions are not necessarily efficient.[6] The central puzzle of human history, the widely divergent paths of historical change and economic performance across societies (North 1990; Lucas 1988; Acemoglu and Robinson 2012), suggests a natural question: why do not all societies adopt the most efficient set of institutions available (Acemoglu, Johnson, and Robinson 2005; North 1990)? The answer to this question is not a trivial one.[7] Different answers, largely complementary, have been proposed.

[4] See also North (1989; 1991; 1994).
[5] As stated by North (1990), the central focus of his study is the problem of human cooperation.
[6] We use the concept of efficiency as North (1990) does: a condition where the existing set of constraints will produce economic growth.
[7] For an essentially efficient view of institutions see North and Thomas (1973). In a zero transaction cost framework, a change in relative prices or preferences would induce an immediate restructuring of institutions to adjust efficiently (North 1990).

In order to answer the question made, we need to understand the process of institutional change. According to North (1990), it is the different interactions between institutions and organizations that shape the direction of institutional change.[8] While institutions determine the opportunity set in a society, organizations are created to take advantage of those opportunities, and they, in turn, alter the institutions. The impacts are not necessarily productive for the society as a whole, because the institutional framework often has perverse incentives. Increasing returns would then be a consequence of the relative dependence of the organizations on the institutional framework in which they arise (to be efficient in that particular context), and the consequent network externalities and complementary investments that arise. This increasing returns characteristic of an institutional matrix would produce a lock-in, a particular institutional trajectory. As also noted by North, agents frequently act on imperfect information in an environment with transaction costs, and process their information through mental constructs that do not necessarily incorporate all relevant aspects of reality (and, perhaps, some false ones) that might lead to the persistence in inefficient institutional paths.[9]

Now we will try to clarify some concepts implicit in the above line of thought. North (1990) argues further that incremental changes in technology, once they have begun on a particular track, may lead to the establishment of a specific technological structure that might be less efficient than another alternative. Here, his exposition is based on Arthur (1988; 1989).[10] Four self-reinforcing mechanisms are then identified in Arthur's exposition by North: (i) Large setup or fixed costs, which give the advantage of falling unit costs as output increases; (ii) Learning effects, which improve products or lower their costs as their prevalence increases; (iii) Coordination effects, which confer advantages on cooperation with other economic agents taking similar action; and (iv) Adaptive expectations, where increased prevalence on the market enhances beliefs of further prevalence. The consequences are (again in Arthur's terms): (i) Multiple equilibria – a number of solutions are possible and outcome is indeterminate; (ii) Possible inefficiencies – a technology that is inherently better than another loses out because of bad luck in gaining adherence; (iii) Lock-in – once a solution is reached,

[8] Organizations are groups of individuals bound by some common purpose to achieve objectives. They include political bodies (e.g., political parties), economic bodies (e.g., firms), social bodies (e.g., churches), and educational bodies (e.g., universities) (North 1990).

[9] In his seminal work, Coase (1960) argues that with positive transaction costs, resources allocations are altered by property rights structure (the Coase Theorem). According to Coase (1937), these transaction costs are the basis of the existence of the firm (an important type of organization for North 1990).

[10] According to North (1990), the argument that small historical events can lead one technology to win over another was first developed by Arthur.

it is difficult to exit from; and (iv) Path dependence – the consequence of small events and chance circumstances determining solutions which, once they prevail, lead onto a particular path. These aspects apply perfectly to organizations' decision-making in the institutions framework proposed by North (1990) and provide clear reasons for the persistence of particular institutional paths that have largely been ignored in mainstream neoclassical economic thought (North 1990).

Still according to North (1990), the path-dependent character of the incremental change in institutions is connected with the persistence of patterns of long-run growth or decline: "Once a development path is set on a particular course, the network externalities, the learning process, and the historically-derived subjective modeling of the issues reinforce the course." (North 1990, p. 99). Therefore, both productive and unproductive paths can persist.

A complementary way to investigate the process of institutional persistence (and, therefore, change) has been developed by Acemoglu, Johnson, and Robinson (2005). In particular, economic institutions (e.g., property rights) matter because they shape the incentives of key economic actors in society. They also influence investments in physical and human capital and technology, and the organization of production. Therefore, economic performance and the future distribution of resources are also affected. However, economic institutions are themselves endogenous, "determined by collective choices of the society largely for their economic consequences" (Acemoglu, Johnson, and Robinson 2005, p. 390). As there will often be conflicts of interests in these choices, it is the relative political power of these groups that will determine the economic institutions. Accordingly, the distribution of political power is also endogenous. Political institutions determine the allocation of *de jure* political power, while *de facto* political power is determined by the ability of the groups in question to solve their collective action problems and by the economic resources of such groups.[11] Political institutions and the distribution of resources are the state variables in this dynamic system because, according to the authors, they typically change relatively slowly and determine economic institutions and economic performance both directly and indirectly. At the same time, political institutions are also endogenous, and are determined by political powers. We have then the following dynamic system:

[11] As noted by Acemoglu, Johnson, and Robinson (2005) we still need a more satisfactory theory for the collective action problems.

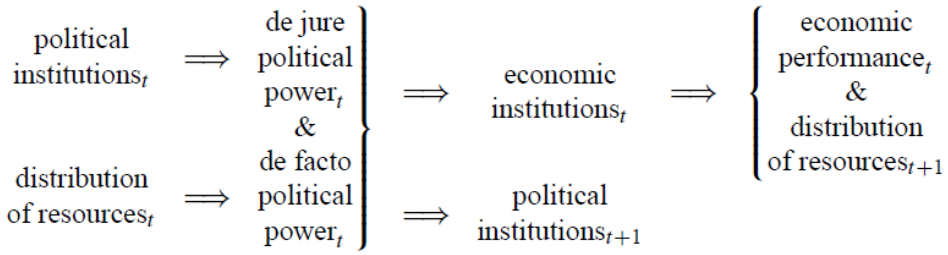

Figure 1 – Dynamic system of performance and distribution of resources within a society
Source: Acemoglu, Johnson, and Robinson (2005, p. 392).

We have two important sources of persistence in the behavior of the system. First, political institutions are durable. As argued by the authors, they allocate *de jure* political power, and those who hold political power influence the evolution of political institutions, and they will generally opt to maintain the political institutions that give them political power. Second, when a particular group is richer than the others, there is likely to be an increase of its *de facto* political power which will enable it to push for economic and political institutions in line with its interests, and one that will tend to perpetuate the initial relative wealth disparity. However, Acemoglu, Johnson, and Robinson (2005) note that, despite these tendencies towards persistence, this framework emphasizes the potential for change. In particular, "shocks" (e.g., changes in technologies and in the international environment) that modify the balance of (*de facto*) political power can lead to major changes in political institutions and therefore in economic institutions and economic growth.

A number of other relevant aspects presented by Acemoglu, Johnson, and Robinson (2005) are worthy of note. First, the distribution of resources is a decision which is inherently conflictual, and therefore political. Second, *de facto* political power is often transient: e.g., the collective action problems that are solved to amass this power are likely to resurface in the future, or other groups – especially those controlling *de jure* political power – can become stronger in the future, so that any change in policies and economic institutions that relies purely on *de facto* political power is likely to be reversed in the future. Third, the framework emphasizes the importance of political institutions, and changes in political institutions as a way of manipulating future political power, and thus indirectly shaping future (as well as present) economic institutions and outcomes. Finally, there are three important comparative statics in the framework developed by the authors: (i) political institutions that keep in check those who hold political power (for example, by creating a balance of power in society) are useful for the emergence of good economic institutions; (ii) good economic institutions are

more likely to arise when political power is in the hands of a relatively broad group with significant investment opportunities; and (iii) good economic institutions are more likely to arise and persist when there are only limited rents that power holders can extract from the rest of the society.[12]

Many empirical studies have been developed to assess the validity of this growing theoretical research. Nunn (2009) divides this literature, that extensively analyzed the colonization period, into three main lines of research: (i) Engerman and Sokoloff (1997; 2002), who "examined the importance of factor endowments and colonial rule for the subsequent economic development of colonies within Americas" (Nunn 2009, p. 66); (ii) Acemoglu, Johnson and Robinson (2001; 2002), which "developed a research agenda that sought to better understand the historical origins of current institutions and their importance for long-term development" (Nunn 2009, p. 66); and (iii) La Porta *et al.* (1997; 1998), who "also examined the importance of colonial rule, but focused on legal institutions that were transplanted by the different colonial powers and the long-term consequences this had for investor protection and financial development" (Nunn 2009, p. 66). We will explore in greater detail Engerman and Sokoloff's (and co-authors') contributions in Section 1.4. The works of La Porta *et al.*, although they formed the basis for a significant body of literature related to the financial sector, are of less interest for the present study.[13] We focus now on the literature related to the works of Acemoglu, Johnson, and Robinson.[14]

These works, concerned with the lack of empirical evidence, present strong evidences that institutions matter for economic development. Although earlier works have found correlations between measures of property rights and economic development (Knack and Keefer 1995; Mauro 1995; Hall and Jones 1999), the endogeneity of institutions in a specific socio-economic framework ("better" institutions could be the source of higher income – or other development indicator – or higher income could foster "better" institutions) make it very

[12] "Good economic institutions" are here defined as those providing security of property rights and relatively equal access to economic resources to a broad cross-section of society (Acemoglu, Johnson, and Robinson 2005).

[13] For a review of this body of literature, see La Porta, Lopes-de-Silanes, and Shleifer (2008). See also Levine (1997).

[14] We note that there is a somewhat related literature, mainly conducted by the World Bank and the Inter-American Development Bank, which attempts to measure the effects of the institutional reforms in Latin America in the late twentieth century. See, among others, Easterly, Loayza, and Montiel (1996), Fajnzylber and Lederman (1999), Fernández-Arias and Montiel (1997), Loayza and Palacios (1997), Lora (1997), and Lora and Barrera (1997).

difficult for a consistent identification strategy. In other words, the causal mechanism cannot be justified by the econometric tools used (mostly OLS regressions or arguably bad instruments).[15] It is in this sphere that the works of Acemoglu, Johnson and Robinson prove to be insightful. Using the European colonization of the Americas as a natural experiment, the authors employed new instruments to "develop a much more satisfying identification strategy than previous studies" (Nunn 2009, p. 69).[16]

Acemoglu, Johnson, and Robinson (2001) argue that different types of colonization policies, which created different sets of institutions, were influenced by the feasibility of settlements – institutions were more likely to be "extractive" (institutions that concentrate power in the hands of a small elite and create a high risk of expropriation for the majority of the population, e.g., those in the sugar plantation areas) in places where the disease environment was not favorable – and that these institutions persisted over time, even after colonies achieved independence.[17] The authors identify three elements that could explain institutional persistence: (i) setting up institutions that place restrictions on government power and enforce property rights is costly; (ii) the captured benefits of an extractive strategy may depend on the size of the ruling elite: within a small elite, each member would have a larger share of the revenue, so the elite would have greater incentives to be extractive; and (iii) if agents make irreversible investments that are complementary to a particular set of institutions, they will be more willing to support them. Therefore, using mortality rates as an instrument, the authors estimate significant effects of institutions on income *per capita* today.[18]

In a related work, Acemoglu, Johnson and Robinson (2002) document a "reversal of fortune" ("among countries colonized by European powers during the past 500 years, those who were relatively rich in 1500 are now relatively poor", Acemoglu, Johnson, and Robinson, 2002, p. 1278). The authors use urbanization patterns and population density as instruments, once, as

[15] For a general discussion on the validity of instruments and related econometric techniques, see Wooldridge (2010).

[16] An interesting instrumental approach is conducted by Feyrer and Sacerdote (2009). Using a database composed by islands located in the Atlantic, Pacific, and Indian Oceans, the authors use the wind patterns as an instrumental variable for the length of colonization, which, as suggested by the authors, has a significant positive relationship with GDP *per capita*.

[17] Albouy (2012), in an interesting and important discussion, criticized for its problems with data on mortality – an issue which has been addressed in Acemoglu, Johnson, and Robinson (2012).

[18] Huillery (2011), studying the former French West Africa, finds evidence that European settlement had a positive impact on current outcomes. The author deals with an extractive colonial context using African hostility towards colonial power as a source of random variation in European settlement. Feyrer and Sacerdote (2009) also find a positive impact of colonialism.

argued, their influence on income today would be only through the different types of colonization strategies that placed different sets of institutions. "Extractive" institutions were able to provide greater wealth accumulation for the elites up until the Industrial Revolution. The advent of the Industrial Revolution led to a strong comparative advantage for areas with "inclusive" institutions – i.e., a cluster of institutions ensuring secure property rights for a broad section of society (e.g., the United States and New Zealand) and these institutions were able to reverse their countries' relative positions in income, largely due to their newly-acquired capacity of maintaining sustainable growth. It is important to note that one of the subjects of this paper is the persistence of institutions: it was the opportunity to industrialize in the 19th century that changed the relative performance of the regions, reflecting the different institutional environments. Easterly and Levine (2003) and Rodrik, Subramanian, and Trebbi (2004) found similar results, also in a cross-country perspective: the primacy of institutions in the development process.[19]

As we can see, in the first instance, literature on institutions and growth relied heavily on cross-country evidence (Knack and Keefer 1995; Mauro 1995; La Porta *et al* 1997; 1998; Hall and Jones 1999; Acemoglu, Johnson, and Robinson 2001; 2002; Easterly and Levine 2003; Rodrik, Subramanian and Trebbi 2004; among others). According to Pande and Udry (2005), "this has provided compelling evidence for a causal link between a cluster of 'good' institutions and more rapid long-run growth" but "an inability to disentangle the effects of specific institutional channels on growth or to understand the impact of institutional change on growth will limit further progress using a cross-country empirical strategy" (Pande and Udry 2005, p. 1). The authors argue that fruitful research would arise from the use of micro-data to answer the questions posed by the literature on institutions and development. In other words, they emphasize studies on *de facto* rather than *de jure* institutions and the consequences for institutional change, since "development is, by definition, about change". Two important reasons are given: (i) the coarseness of the measures prevents more in-depth analysis of particular causal mechanisms from institutions to growth; and (ii) aside from being limited in number, instruments tend to be derived from persistent features of the countries' institutional environment, which limits their usefulness for studying institutional change.

[19] Although compelling, this evidence is not exempt from criticism. We would highlight Glaeser, La Porta, Lopez-de-Silanes, and Shleifer's (2004) study that argues that human capital is more important to growth than institutions. In particular, they argue that settlers affected especially the human capital levels of the colonies, not the institutions. For a more recent study corroborating the importance of institutions against human capital, see Acemoglu, Gallego, and Robinson (2014).

Many studies followed this line of research, focusing mostly on within-country analysis. We now explore these studies.

An important aspect of these studies is that they not only constitute a first step into disentangling the effects of particular institutions and specific mechanisms (Pande and Udry 2005; Banerjee and Iyer 2005), but also, they are insightful in their identification strategies, based mainly on historical elements in the quest of valid instruments, exemplified by works such as Acemoglu, Johnson, and Robinson (2001; 2002).[20] Banerjee and Iyer (2005) show that differences in the allocation of property rights by the British in colonial India led to persistent differences in economic outcomes across Indian regions. According to the authors, areas in which property rights were transferred to landlords have significant lower agricultural investments and productivity in the post-independence period than areas in which these rights were transferred to the cultivators of the land. As their identification strategy, they argue that areas where land revenue collection was taken over by the British between 1820 and 1856 are much more likely to have a non-landlord system, for reasons that do not affect the dependent variables (such as agricultural investments and yields). In this connection, we note that, when exploring the reasons for such persistence, Banerjee and Iyer argue that the channel is probably political and collective-action problems rather than through inequality in the distribution of land.

Likewise, Iyer (2010) finds that areas that experienced "indirect colonial rule" (areas that were under the administration of Indian kings rather than the British Crown) have higher access to schools, health centers, and roads in the post-colonial period, in relation to areas that had had direct colonial rule. As an instrument, the author also uses a historical (and arguably), exogenous variation: the Doctrine of Lapse.[21] Like Banerjee and Iyer (2005), Iyer (2010) argues for a political element as the main channel of causality. According to the author, the explanation for the persistence of such effects is that in areas of indirect rule, rulers had more incentives to perform better (otherwise they could credibly be deposed) than in areas under

[20] There are, however, cross-country studies that attempt to unbundle the different effects of particular institutions. In particular, Acemoglu and Johnson (2005) suggest that "property right institutions" have an important effect on long-term economic growth, investment, and financial development, while "contracting institutions" seem to affect only financial intermediation. However, such studies, albeit important, still fail to shed light on a number of important questions relating to the mechanisms and particular micro questions. In other words, they are still included (although somewhat differently) in Pande and Udry's (2005) exposition.

[21] The Doctrine of Lapse was implemented by Lord Dalhousie, the Governor General for the East India Company in India from 1848 to 1856. It was an annexation policy, which, *inter alia*, supplanted the right of an Indian sovereign to choose a successor if he had no heirs.

direct rule. The studies of Banerjee and Iyer (2005) and Iyer (2010) have two elements in common: (i) both investigate the effects of institutions that disappeared when India became independent, showing the highly persistent outcomes of historical institutions; and (ii) both show persistent effects of institutional arrangements, and therefore ignoring the effects of institutional change and its mechanisms.

Dell (2010) investigates the long-term impacts of the *mita* (an extensive forced-labor mining system in Peru and Bolivia between 1573 and 1812) in the Peruvian Andes. Through a complex and original identification strategy (multidimensional regression discontinuity design) the author finds that "a *mita* effect" lowers household consumption by around 25% and increases the prevalence of stunted growth in children by around six percentage points in affected districts today. More importantly for our research are the identified channels of persistence: (i) land tenure; and (ii) public goods provision. In this connection, Dell (2010) finds 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.[22] Other examples of the study of the persistent effects of colonial institutions in the Americas include Berkowitz and Clay (2004) on the United States and Jimeno (2005) on Colombia.

In line with Dell's (2010) findings on the historical importance of public goods provision, Huillery (2009) presents evidence that early colonial investment had significant impacts on long-term development outcomes in French West Africa. The author not only investigates the nature of the investments (e.g., associating current educational outcomes to colonial investments in education, rather than in health or infrastructure), but shows that persistence of investments is the major mechanism for this historical dependency.[23] Banerjee and Somanathan (2006), studying the allocation of public goods in rural India, find that historically disadvantaged social groups that were able to mobilize themselves politically were better off than other groups.[24] This is an important counterfactual to have in mind when

[22] Dell (2010) documents that *haciendas* (rural estates with an attached labor force) developed primarily outside the *mita* catchment area and that, at the time of the *mita*'s enactment, no landed elite had yet been established. The reason for this was that, "in order to minimize the competition the state faced in accessing scarce *mita* labor, colonial policy restricted the formation of *haciendas* in *mita* districts, promoting communal land tenure instead" (DELL, 2010, p. 1865).

[23] For a model linking, through path dependence, Africa's colonial past to its current level of development, see Nunn (2007).

[24] Banerjee, Iyer, and Somanathan (2006) build a model of collective action in order to study the relationship between public action and access to public goods.

thinking on the Brazilian context of the First Republic, where it was very unlikely that disadvantaged social groups could solve their collective action problems in order to gain political voice (see Chapter 2).

Naritomi, Soares, and Assunção (2012) investigated the determinants of particular local institutions concentrating on the sugar cane and the gold cycles in Brazil.[25] Whereas the sugar cane boom, characterized by an oligarchic society, is associated with high land inequality, the gold boom, characterized by a heavily inefficient presence of the Portuguese state, is associated with precarious government and access to justice. These two findings suggest that individual colonial experiences might be associated with different *de facto* institutional arrangements and, consequently, different distributions of economic and political power within a constant *de jure* institutional environment.

Apart from Naritomi, Soares, and Assunção (2012), few other papers focus explicitly on the institutional dimension in the Brazilian case. Of these, Summerhill (2010), investigating the state of São Paulo, finds that a potentially coercive institution, the *aldeamentos*, has a positive correlation with income *per capita* in the long run.[26] More importantly, Summerhill (2010) finds no negative effect for inequality on long-term development. Nakabashi, Pereira, and Sachsida (2013) find a positive correlation between a measure of institutional quality and income levels in Brazilian municipalities.

We have therefore approached the institutional literature on development in order to shed a light on the relevance of the institutional environment for economic development. We note the consensus among the importance of studies dealing with *de facto* institutional environments. Considering the level of importance, we will study the potential effects of inequality on a particular *de jure* institutional environment (Brazil) – in line with Pande and Udry's (2005) proposal – but we will also assess if particular *de facto* institutional environments provide different mechanisms through which inequality interacts with the development process. We highlight one important result discussed above: Dell (2010) suggests that the presence of large landowners would encourage public goods provision by

[25] The authors date the sugar cycle from the beginning of the effective colonization to 1760, and the gold cycle in the eighteenth century. In Chapter 2 we explore these events in greater detail.

[26] "*Aldeamentos* were settlements that the Portuguese created to fix the semi-nomadic indigenous population in place, convert them to Christianity, provide with ongoing religious instruction, and defend against less-cooperative raiding Indians" (Summerhill 2010, p. 5). According to Summerhill (2010), the *aldeamentos* presented both negative and positive characteristics for economic growth.

providing a more stable environment. We suggest that this might be one channel of linking inequality and long-term development in Brazil, especially in the states of Minas Gerais and São Paulo. We continue this chapter by reviewing the literature on inequality.

1.2 The Effects of Economic Inequality: What We Know and What We Do Not

The last two centuries have been characterized by a great divergence in income *per capita* across the globe (Galor, Moav, and Vollrath 2009; Milanovic 2011; Acemoglu 2009). If we look at recent global income distribution – PPP adjusted – we will see that the top 1 percent of the world's richest have seen their real income rise by more than 60 percent over the last two decades. The largest increases were registered around the median of the world population (70 percent) and the bottom third had its real income raised by 40 percent to almost 70 percent, while the real income of the poorest 5 percent of the population remained unchanged. When exploring the level of inequality, one sees that a mere 8 percent of the world population control half of the world's income, with the other half of the world's income distributed among the remaining 92 percent of the world's population (Milanovic 2012).[27]

It is important here to clarify the conceptual problem of inequality. Inequality *per se* is neither a simple problem nor an obvious one. One might argue that the problem is not inequality, but poverty levels.[28] In fact, the proportion of the absolute poor in the world – people whose income *per capita* is less than 1.25 PPP dollars per day – has decreased from 44% to 23% over the last two decades (Milanovic 2012).[29] Even if we accept this view, we still have the question about the effects of inequality levels on poverty levels. In other words, is high inequality inconsistent with the absence (or even decrease) of poverty? We should also be concerned if certain levels of inequality are a social and economic problem for a society. We have an economic argument: high levels of inequality, as we will see, might hinder economic growth through a variety of channels. We have also the political and the related philosophical problem: high inequality might lead to the exclusion of certain social groups from the political process and also, probably, from economic progress. Moreover, there are social justice concerns, an aspect that economists still are not sure how to deal with (we are not even sure if

[27] This figure is 78-22 for the United States and 71-29 for Germany (Milanovic 2012).
[28] See, e.g., Feldstein (1998; 1999).
[29] Largely due to Indian and Chinese growth.

we *can* deal with it).[30] In any case it is important that we understand the effects of inequality, and it is to these studies that we now turn.[31]

While there has been a shift towards the analysis of inequality in the world as a whole (Milanovic 2012) – an important step in a context of globalization in which the world is ever more integrated and connected – the empirical analyses of the effects of such inequality need to shift towards the micro-level. Adapting Pande and Udry's (2005) vision of the prospects of the institutional literature (see Section 1.1), it is useful to move towards a micro-level analysis within, preferably, constant *de jure* environments in order to better understand the channels of causality and the particular effects of the inequality structure of a society on its development process. Regarding the conclusions of the literature (based mainly on cross-country evidence), "whether a high initial level of inequality hinders economic development is one of the most highly contested questions in recent literature on economic growth and development" (Easterly 2007, p. 758) is a good summary of the "conclusions" reached thus far in the literature regarding the effects of economic inequality. There is no consensus on whether these possible effects are positive, negative, or even if there is any effect at all.

What has been called a first wave of development literature presents the idea that high inequality could promote growth by concentrating income into the hands of high-saving capitalists (Easterly 2007). Kuznets (1955), examining the character and causes of long-term changes in the personal distribution of income, suggested a long swing in the inequality characterizing the secular income structure: widening inequality in the early phases of economic growth, during the transition from the pre-industrial to the industrial civilization, then becoming stable for a while, and finally narrowing in the later phases.[32] This hypothesis, that income inequality first increases and then decreases with development, is known as the

[30] An example of this approach is Milanovic's (2003) answer to Feldstein (1998; 1999). The problem with such an approach is that it is limited to the idea that inequality "is" in the individuals' utility functions. This cannot be a valid justification for reducing the inequality levels *per se*. Individuals value many different things, and without knowing the particular effects of inequality and the channels of causality, we might "harm" individuals in several other ways that would not compensate for the reduction of inequality. Moreover, it would be better for public policy to not be so sensitive to the subjective value that individuals give to such social aspects at a particular point in time (remembering that intertemporal shifts in utility functions are not well understood). For the debate of justice and redistributive policies in modern political philosophy, see Rawls (1971).

[31] This importance is exemplified by, e.g., Lindert and Williamson (1985).

[32] According to Ray (1998, p. 199), the work of Kuznets (1955) is the "earliest attempt to correlate the presence of economic inequality with other variables such as income". See also Kuznets (1963) and Oshima (1962). For an interesting analogy concerning the Kuznets curve, the "Tunnel Effect", see Hirschman and Rothschild (1973).

Kuznets curve.[33] It remains a controversial concept, both theoretically and empirically (Persson and Tabellini 1994; Galor and Zeira 1993; Benabou 1996; Lindert and Williamson 1985).[34] Kaldor (1956), presented a "bird's eye view" of the various theoretical attempts since David Ricardo at understanding the laws which regulate distributive shares in society and also presents evidence that there might be a positive link between economic inequality and development.[35]

Galor and Zeira (1993) present a didactic view of what followed in this literature. According to the authors, attention shifted towards the relationship between income distribution and growth in the 1950s and the 1960s (as explored above – see Cline, 1975, for an interesting survey).[36] During the 1970s and the 1980s macroeconomic theory lost interest in issues of distribution, partly due to the decline of interest in growth, and partly due to increased use of models of representative agents and overlapping generations. During the late 1980s and early 1990s (when Galor and Zeira's work was published) the recently renewed interest in growth and development, has rekindled interest in distributional issues as well. And it is this phase that we will now explore.

Several of these later works, which usually use a cross-country basis, indicate a possible negative effect of economic inequality on growth. This negative effect could be due to a variety of mechanisms, such as political economy mechanisms (Persson and Tabellini 1994; Alesina and Rodrik 1994), imperfect capital markets (Banerjee and Newman 1991; Galor and Zeira 1993) and investment in human capital (Galor and Zeira 1993; Bourguignon and Verdier 2000; Galor, Moav, and Vollrath 2009), and through the composition of aggregate demand (Murphy, Shleifer, and Vishny 1989).[37] Important surveys of this literature include

[33] For a regional extension of the Kuznets' curve, see Williamson (1965). See also Crafts and Mulatu (2005) and Rosés, Martínez-Galarraga, and Tirado (2010).
[34] Early empirical studies on the inverted-U hypothesis (the Kuznets curve) include Paukert (1973) and Ahluwalia (1976). For a broader analysis, see Ray (1998, chapter 7).
[35] Other studies, associating inequality, capital accumulation, and economic growth, include Lewis (1954) and Bourguignon (1981).
[36] Before that, Keynes (1936) stressed the effect of income distribution on aggregate demand (Galor and Zeira 1993).
[37] For a theory of unification between the "classical approach" (inequality stimulating capital accumulation and, therefore, growth) and the "modern approach" ("for sufficiently wealthy economies equality stimulates investment in human capital and economic growth", Galor 2000, p. 706), see Galor (2000). The work builds largely on Galor and Weil (1996; 1999; 2000), who "develop unified models that encompasses the transition between three distinct regimes that have characterized the process of economic development: the 'Malthusian Regime', the 'Post-Malthusian Regime', and the 'Modern Growth Regime', focusing on the historical evolution of the relationship between population growth, technological change, and economic growth" (Galor 2000, p. 707). For further models, see Galor and Moav (2004).

Bénabou (1996), Perotti (1996), and Aghion, Caroli, and García-Peñalosa (1999). We now explore some of these works in greater detail.

Both Persson and Tabellini (1994) and Alesina and Rodrik's (1994) independent works rely on the median voter theorem to show that, in societies characterized by a high level of inequality (and, therefore, significant distributional conflicts), redistributive policies will be implemented through a tax-distorting system, hindering economic growth. The modeled mechanism is only valid in *de facto* democratic systems. Where there is a captured political system (such as in the Old Republic in the Brazilian case), it is very unlikely that significant redistributive policies as proposed by the authors will be implemented, even if an implicit large majority is in favor of it.

Galor and Zeira (1993) suggest a different mechanism. In their model, the investment of each individual in human capital is determined by the particular inheritances. Therefore, the distribution of wealth determines the aggregate levels of investment and output. Similarly, Bourguignon and Verdier (2000) also propose a framework in which the equilibrium patterns of political institutions, income distribution and growth are characterized as a function of the initial income inequalities through human capital investments. This is an important theoretical concept for our case because, although it is also in a cross-country framework like the majority of the discussed studies, it is credibly adapted to within-country analysis, as is the case with our study. Moreover, Bourguinon and Verdier (2000) suggest that, despite the potential externality benefits of investing in education for the society as a whole, elites might restrict investments in education in order to preserve their political power and avoid future taxation.

Galor, Moav, and Vollrath (2009) suggest that inequality in the distribution of landownership adversely affected the emergence of human-capital promoting institutions (e.g. public schooling), and thus the pace and nature of the transition from an agricultural-based economy to an industry-based economy, contributing to the emergence of the great divergence in income *per capita* across countries. The theoretical model constructed expresses the authors' idea that the transition from agricultural to industrial economy has changed the nature of the main economic conflict in society. Its dynamic implies that, unlike the agrarian economy, which was characterized by a conflict of interests between the landed aristocracy and the masses, the process of industrialization has brought about an additional conflict between the

entrenched landed elite and the emerging capitalist elite. The capitalists who were striving for an educated labor force supported policies that promoted the education of the masses, whereas landowners, whose interest lay in reducing the mobility of the rural labor force, favored policies that kept the masses away from education. The proposed theory suggests that the adverse effect of public education on landowners' income from agricultural production is magnified by the concentration of landownership, and that land reforms that sufficiently reduce inequality in land ownership permit earlier implementation of an efficient education policy. The corollary of their theory, i.e., the adverse effect of the concentration of landownership on education expenditure, is shown to be established empirically based on the evidence from the beginning of the 20th century in the US.

The insightful survey of this inequality literature conducted by Perotti (1996) corroborates the negative effects found by other authors. Perotti develops four main messages from the set of reduced-form estimates and tests performed. First, there is a positive association between equality and growth, although a good deal of it is subject to intercontinental variation. Second, this positive association is quantitatively much weaker (and statistically insignificant) for poor countries, although this can be explained both empirically and theoretically. Third, there is some indication that the association between equality and growth is stronger in democracies, even though the democracy effect does not seem to be very robust. Finally, because of the high concentration of democracies in rich countries, it is virtually impossible to distinguish an income effect from a democracy effect when looking at the relationship between income distribution and growth.

However, as argued by Forbes (2000), although most of these works focus on the theories establishing a negative effect of inequality on growth, a careful reading of this literature suggests that this negative relationship is far less definitive than is generally believed. In many models, the negative relationship depends on exogenous factors, such as aggregate wealth, political institutions, or the level of development. Also, many of these papers predict multiple equilibria, so that under certain initial conditions, inequality could have a positive relationship with growth. Moreover, some studies made during this time (Saint-Paul and Verdier 1993; Galor and Tsiddon 1997a; 1997b; Benabou 1996) found a positive theoretical relationship between inequality and growth. According to Forbes (2000), these papers received less attention because of the empirical negative relationship +reported at the time.

Soon after, new studies cast doubt on the robustness of these previous results: studies, such as those by Barro (2000), Forbes (2000), and Banerjee and Duflo (2003), make use of new data and strategies, and find either a positive relation or no relation between inequality and development indicators.

Forbes (2000) challenges the current belief that economic inequality has a negative effect on economic growth, pointing out several potential problems with previous empirical works. First, there are robustness problems. When, for example, additional explanatory variables or regional dummy variables are included, the inequality coefficient often becomes insignificant (although it usually remains negative). Second, one can argue that there are measurement errors. Although random measurement error could generate an attenuation bias and reduce the significance of the results, a systematic measurement error could lead to either a positive or negative bias, depending on the correlation between the measurement error and the other variables in the regression. Third, there is an omitted variable bias that could be equally problematic, although, as noted by the author, it is impossible to predict the direction of this bias in a multivariate context.[38] The last issue with this cross-country work is that it does not directly address the important policy question of how a change in a country's level of inequality will affect growth within a country. The direct method for estimating this relationship would be to utilize panel estimation.

Forbes (2000) then uses an improved data set on income inequality which not only reduces measurement error, but also allows estimation via a panel technique, making it possible to check for time-invariant country-specific effects.[39] By focusing on a particular General Method of Moments (GMM) technique developed by Arellano and Bond (1991), the paper directly estimates how changes in inequality are correlated with changes in growth within a given country. Results suggest that in the short and medium term, an increase in a country's level of income inequality has a significant positive relationship with subsequent economic growth. Therefore, these results indicate that country-specific, time-invariant, omitted variables generate a significant negative bias in the estimated inequality coefficient (these variables could be, e.g., levels of corruption, higher share of government spending on basic

[38] Omitted variables that might have a positive relationship with growth and inequality (e.g., support for entrepreneurship and labor-market flexibility) would generate a positive bias on the estimated coefficients, while the omitted variable with a negative relation with growth and a positive one with inequality (e.g., level of corruption) would lead to a negative bias.

[39] The source of the data is basically the important compilation made by Deininger and Squire (1996). Many later works use this source (e.g., Banerjee and Duflo, 2003). See also Deininger and Squire (1998).

health and primary education, better quality of public education). And yet, the results suggest that countries may face a trade-off between reducing inequality and improving growth performance. Forbes, however, concludes by affirming that if we focus on the short- and medium-term relationship within individual countries, the estimates do not directly contradict the previously-reported negative relationship between inequality and growth.

There are, however, several *caveats* to Forbes' (2000) somewhat disappointing results (most of them mentioned by the author herself). First, sample selection remains a problem. For example, poor countries are sub-represented. Second, endogeneity problems are not fully addressed. For example, we could have endogeneity arising for the correlation of the inequality variable and some omitted variable specific for each country but that varies significantly over time (not captured by the panel estimation). Serial correlation (a bigger problem if using Arellano and Bond's technique) could still influence the results. As noted by Aghion, Caroli, and García-Peñalosa (1999), other problems are: (i) the Arellano-Bond-GMM estimation technique used by Forbes results in excessively small standard errors with small samples; (ii) the assumed lag structure of the model – inequality today affects growth in five years' time – is *ad hoc*; and (iii) in order to obtain a positive and significant coefficient, Forbes needs to restrict the data on inequality to the "high-quality" subset compiled by Deininger and Squire (1996). Easterly (2007) also questions whether panel methods using relatively high frequency data are the appropriate test of a relationship whose mechanisms seem to be long run characteristics that are fairly stable over time.

Barro (2000) presents evidence from a broad panel of countries that shows little overall relation between income inequality and rates of growth and investment. An interesting piece of evidence found by Barro is that, for growth, higher inequality tends to retard growth in poor countries and encourage growth in richer ones. The Kuznets curve – whereby inequality first increases and later decreases during the process of economic development – then emerges as a clear empirical regularity. However, as stressed by the author, this relation does not explain the bulk of variations in inequality across countries or over time.

Finally, Banerjee and Duflo (2003) present a broad criticism of this literature that explores the relation between economic inequality and growth by questioning, above all, the linearity assumption of the econometric approach commonly used. The authors affirm that, when we examine the data without imposing a linear structure, it quickly becomes clear that the data

does not support the linear structure that is routinely been imposed on. There are, therefore, strong *a priori* reasons to doubt the validity of previous results. Here, three findings of the authors should be stressed in particular: (i) changes in inequality (in any direction) are associated with lower future growth rates; (ii) there is a non-linear relationship between inequality and the magnitude of changes in inequality; and (iii) there seems to be a negative relationship between growth rates and inequality lagged by one period. According to Banerjee and Duflo, these facts taken together, and in particular the non-linearities in those relationships (rather than differences in the control variables, the sample, and the lag structure), explain why different variants of the basic linear model (OLS, fixed effects, random effects) have generated very different conclusions. In many cases, it turns out that the differences arise from different structural interpretations being given to the same reduced-form evidence. The general conclusion of the study on the empirical relation between economic inequality and growth is: the analyzed data has little to say.[40] They conclude their new analysis with a more subtle thought: in the end, the paper is probably best seen as a cautionary tale, warning that "imposing of a linear structure where there is no theoretical support for it can lead to serious misinterpretations" (Banerjee and Duflo 2003, p. 268).

We now turn to more recent literature that sheds more light on the effects of economic inequality on development. Some of these studies maintain the cross-country approach using new data and/or strategies (e.g., Easterly 2007); some explore evidence within country variations, taking advantage of more disentangled data and a constant *de jure* environment, which reduces the potential impact of latent institutional and political variables (e.g., Summerhill, 2010; Ramcharan 2010; Nunn 2008). We will now explore these works.

Easterly (2007) finds that high inequality is – independently of other factors – a large and statistically significant barrier to prosperity, "good" institutions, and good quality schooling. Supported by the work of Engerman and Sokoloff (see Section 1.4), Easterly uses agricultural endowments – specifically the abundance of land suitable for growing wheat relative to that suitable for growing sugarcane – as an instrument for inequality in his contribution to the approach to problems of measurement and endogeneity of inequality.[41] The paper thus confirms the Engerman and Sokoloff's hypothesis on the mechanisms – institutions and

[40] Data set that included most, if not all, of the information used in the previous studies discussed earlier.

[41] Engerman and Sokoloff suggest that factor endowments are a central determinant of inequality (what Easterly's paper calls "structural inequality"), and (structural) inequality in turn is a determinant of bad institutions, low human capital investment, and underdevelopment (Easterly 2007).

schooling – according to which higher levels of inequality hinder development. Easterly concludes that earlier literature has missed the big picture, which is that inequality does cause underdevelopment. Despite the innovative approach and the clever instrument, there are a number of caveats to this work too. As noted by Acemoglu *et al.* (2008), the presence of sugar plantations may create negative effects through a variety of channels, including political inequality, so this evidence does not establish that it is economic inequality that matters or that there is a causal effect between overall economic inequality and growth (which implies that the instrument might not be an econometrically valid one).

A question related to the fiscal policy approach (see Perotti 1996), is whether inequality affects the redistributive policy. The literature provides contrasting answers. Works already explored, such as Alesina and Rodrik (1994) and Persson and Tabellini (1994), conclude that the distortive effects of redistribution (through higher taxes) would explain the negative relationship between inequality and growth. Other models, which incorporate credit market imperfections and allow variation in political participation across groups, can yield a nonlinear relationship between inequality and redistribution (Benabou 2000). Ramcharan (2010) turns to United States county data on land inequality from 1890 to 1930 to help address what he calls a "fundamental question" in political economy. The author's evidence shows that – somewhat surprisingly – greater inequality is significantly associated with lower levels of redistribution.[42] Ramcharan concludes by asserting that political economy models that emphasize a connection between economic inequality, credit markets constraints, and differences in political influence across economic groups appear to offer the most attractive explanation for the negative correlation between inequality and redistribution found in the data of works such as Benabou (2000), Bourguignon and Verdier (2000), and Galor, Moav, and Vollrath (2009). He goes further, supposing that these results also tentatively suggest that the negative correlation found between inequality and economic growth in cross-country data might stem from too little rather than too much productive distribution.

So what can we conclude from our analysis of this literature? For our purposes, the main aspects are the following. First, the empirical literature is based mainly on cross-country evidence. We believe that it is theoretically important to extend Pande and Udry's (2005)

[42] "More specifically, the negative relationship is especially large in heavily rural counties, where concentrated landownership implied that landed elites also controlled the majority of economic production" (Ramcharan 2010, p. 729).

analysis from the institutional theory (Section 1.1) to the inequality literature, therefore highlighting the importance of micro studies in preferably constant *de jure* environments, in order to understand more clearly the impacts and mechanisms of inequality (e.g., Acemoglu, Bautista, Querubín, and Robinson 2008, see Section 1.5). Second, as already mentioned, findings are mixed. The empirical results are rather heterogeneous, which shows the complexity of the effects of economic inequality on the development process.

We conclude this section by commenting on the few studies that have been made which integrate both recent institutional literature and inequality literature.

Wegenast (2010) argues that Brazil's different agrarian structures determined, in the long run, the educational outputs. His state-level analysis suggests that in states with higher land concentration ("plantation style"), there were fewer incentives to invest in education. He argues for a political economy channel of causality: landlords not only blocked educational measures because of the higher taxation that would involve, but also because they wanted to keep a cheap labor force and maintain their monopoly over the decision-making process. In a more comprehensive statistical analysis, De Carvalho Filho and Colistete (2010), examining the state of São Paulo at the beginning of the 20th century, find a negative correlation between land concentration and the supply of public education at that time. However, Summerhill (2010), studying the same state, found no negative effect of the land inequality in 1905 on long-term development, a result which conflicts with Wegenast's (2010) findings.

As we will explain in more detail further on, our analysis, at the municipality level, presents evidence of a heterogeneous relationship between inequality and long-term development indicators (including educational outcomes) broadly consistent with the colonial experiences of the states considered.[43]

In the next section, we will take a closer look at another important sphere of inequality: political inequality.

[43] Actually, as we will explain in more details further on, the level of analysis is of Comparable Territorial Units (CTU), hoping to be as close as possible to the municipal level (as in De Carvalho and Colistete 2010, and Summerhill 2010).

1.3 Political Inequality

Several recent studies investigate the relationship between political inequality and development. The basic idea is that "government policies and institutions shape economic incentives, and via this channel, have a first-order impact on economic development" (Acemoglu and Robinson 2006b, p. 115), and if inequality within the political sphere plays a role in shaping these policies and institutions, we have a causal link between political inequality and economic performance. It is also important to stress that political inequality, like economic inequality, is important in its own right, especially in the terms of philosophical concepts as justice. Either way, the study of political inequality is of integral relevance for the development process.

It is often argued that differences in income *per capita* between countries can be explained partly due to institutional failures that prevent these societies from adopting the best available technology. Acemoglu and Robinson (2000a) reject the "economic-losers hypothesis" – "powerful 'interest groups' block the introduction of new technologies in order to protect their economic rents, and therefore societies are able to make technological advances only if they can defeat such groups" (Acemoglu and Robinson 2000a, p. 126) – arguing that despite the intuitive appeal of the idea, there are relatively few instances where major economic change was blocked by economic losers and that the hypothesis relies on the assumption that certain groups have the political power to block innovation.[44] They propose the "political-losers hypothesis", in which the introduction of innovations – and economic change in general – may simultaneously affect the distribution of political power. Groups which stand to have their political powers (not economic rents) eroded would block technological advances. A consequence of this framework is that if agents are economic losers but have no political power, they cannot impede technological progress, and if they have and maintain their political power (i.e., are not political losers), then they have no incentive to block progress.

Acemoglu and Robinson (2000a) argue that these ideas are related to North's emphasis on the political determinants of the institutional structure. North (1981) argued that good institutions might not be chosen by those with political power because they do not necessarily maximize their revenues. The arguments are related in that the groups in power would block

[44] The authors then go on to ask: "Why then not use this political power to simply tax the gains generated by the introduction of new technology?" (Acemoglu and Robinson 2000a, p. 126).

technological change because there is no credible commitment to compensate them once these changes have been implemented. It is also important to note that, according to this thought, even technological changes that might harm the process of development will be implemented if the benefits (political and economic) for the political ruling elite are sufficiently large.

A related argument is presented in Acemoglu and Robinson (2006b). The authors construct a model where political elites may block technological and institutional development because of a "political replacement effect". The argument runs as follows: "innovations often erode elites' incumbency advantage, increasing the likelihood that they will be replaced and it is because of fear of this replacement that these political elites are unwilling to initiate change and may even block economic development" (Acemoglu and Robinson 2006b, p.115). According to the authors, it is only when political competition is limited and their power is threatened that elites will block development.[45] Extensions of this main result are: (i) blocking is more likely when political stakes are higher, for example, because of land rents enjoyed by the elites; and (ii) external threats, on the other hand, may reduce the incentive to block. One can think of this work as a formalization of the idea presented in Acemoglu and Robinson (2000) with the introduction of the political replacement effect in the context of a forward-looking dynamic political economy model, leading to the novel result that the relationship between political competition and the desire of political elites to block innovation can be non-monotonic.[46]

Acemoglu and Robinson (2006a), distinguishing between *de jure* and *de facto* political power, take the first step towards the development of a framework in which changes in some dimensions of institutions are consistent with overall institutional persistence. This is a very important step in a literature that often implicitly or explicitly assumes that institutions persist.[47] The basic argument is that the holding of *de facto* political power by a political elite would nullify the changes in specific institutions, therefore not changing economic institutions that are essential for the allocation of resources in society. An important aspect of

[45] More formally, the relationship between blocking innovations and political competition is non-monotonic: elites are unlikely to block development where there is a high degree of political competition or when they are highly entrenched (Acemoglu and Robinson 2006b).

[46] As we saw above, the greater impediment to economic development was not groups whose economic interests were already affected by economic change, but those whose political power was threatened (Acemoglu and Robinson 2006b).

[47] *De jure* political power is power allocated by political institutions (such as constitutions or electoral systems), while *de facto* political power emerges from the ability to engage in collective action, or use brute force or other channels such as lobbying or bribery (Acemoglu and Robinson 2006a).

this is that what really matters are the *incentives*, not the elites themselves.[48] In other words, even if the political elites were to change, a constant set of incentives would make the new elite adopt the same prejudicial policies. Here we can see one mechanism of the possible negative effects of the concentration of *de facto* political power.

Acemoglu and Robinson (2008a) construct a model to study the implications for economic institutions of changes in political institutions.[49] The authors show that the impact of institution on economic outcomes depends on the interaction between *de jure* political power, whose allocation is determined by political institutions, and *de facto* political power, which is determined by the equilibrium investments and organizations of different groups. A change in political institutions alters the distribution of *de jure* political power, but creates incentives for investments in *de facto* political power to partially or even fully offset changes in *de jure* power. The model can imply a pattern of "captured democracy", whereby a democratic regime may survive but choose economic institutions favoring a particular elite.

Acemoglu (2008) creates a model in which he compares an oligarchic and a democratic society.[50] Whereas an oligarchic society, where the political power is in the hands of a few main producers, protects property rights but tends to erect significant entry barriers against new entrepreneurs, a democracy, where political power is more widely diffused, imposes redistributive taxes on producers, but tends to avoid entry barriers. It is the balance between the costs of entry barriers and redistributive policies that will account for the path of growth of the respective societies over time.[51] According to Acemoglu, the typical pattern is one of rise and decline of oligarchic societies, which implies that – under certain parameter configurations – democracy, despite its potential economic distortions, is better for long-run economic performance. The author also discusses the possibility of democracies being better able to take advantages of new technologies (a democracy allows agents with a comparative

[48] This argument is extensively explored in Acemoglu and Robinson's (2012) book *Why Nations Fail*, with a large number of historical accounts.
[49] Acemoglu and Robinson (2008b) present a simple empirical discussion based on Acemoglu and Robinson (2008a).
[50] The author defines "oligarchy" as Aristotle (1996, p. 72): "oligarchy is when men of property have the government in their hands; democracy, the opposite, where the indigent, and not the men of property are the rulers… Whenever men rule by reason of their wealth… that is an oligarchy, and where the poor rule, that is democracy".
[51] "Taxes, which redistribute income from entrepreneurs to workers, are distortionary because they discourage entrepreneurial investment (…). Entry barriers, which redistribute income toward the entrepreneurs by reducing labor demands and wages, also distort the allocation of resources because they prevent the entry of more productive agents into entrepreneurship." (Acemoglu 2008, p. 2).

advantage in the new technology to engage in entrepreneurship), and how the unequal distribution of income may keep inefficient oligarchic institutions in place (path dependence may arise because those enriched by the oligarchic regime can use their resources to sustain the systems that serve their interests).

As we can see from the last two subsections, political inequality and economic inequality are closely related. Most approaches present a direct link between the two. For our purposes, the most important link is between a landed elite, the economic elite in an agrarian society such as Brazil in the early 20th century (see Chapter 2), and the control of the political sphere. As we will also attempt to show in Chapter 2, these two inequalities are closely linked in our context.

We will now explore the influential line of research developed mainly by Engerman and Sokoloff. The powerful insights in their works and the significant number of relevant studies deserve to be the focus a separate section.

1.4 Engerman and Sokoloff's Theory and Further Studies

In a series of very influential studies (Engerman and Sokoloff 1997b; 2000; 2002; 2012; etc.), economic historians Stanley L. Engerman and Kenneth L. Sokoloff explore the differential post-colonization development paths of American societies.[52] We discuss their work in a separate subsection for a number of important reasons. First, their work provides us with a unified and recognized original theory of development that gives us many different insights on the roots, causes and particularities of the development process in the Americas. Second, the various works complement each other very well, dealing with different aspects of the same broad framework. Third, it is a theory that integrates all the different aspects emphasized so far, namely institutions, economic and political inequality and development (the core themes of this work), that focus on the particular context relevant to American (and, therefore, also Brazilian) development history. Finally, apart from compilations of the individual studies, there are few broader views of the authors' work as a whole; we therefore

[52] Coatsworth (2005; 2008) criticizes Engerman and Sokoloff's view by arguing against the proposed divergent inequality levels in American colonies. However, evidences presented by the author are not very consistent, being sometimes simple generalizations from the Mexican case (Kang 2010).

also aim to acquaint the reader with a more comprehensive view of this particular part of the literature.[53]

The theory begins with a surprising fact: territories such as the United States and Canada, that were largely regarded to be of marginal economic interest at the time of their colonization, by 1800 had begun to overtake hitherto more prosperous societies (in terms of output *per capita*), such as the Caribbean colonies.[54] Moreover, "the magnitude of the gap [that opened up during the industrialization process of North America – closely linked to the Industrial Revolution – over the 19th century] has been essentially constant in proportional terms [which represents a significant difference in levels, because of the rapid increase] since 1900" (Sokoloff and Engerman 2000, p. 218). How can such divergent development paths be explained?

Explanations offered tend to highlight the importance of the different institutional environments between American societies (discussed in Section 1.1). Dimensions such as property rights security, corruption, structure of the financial sector and public structure are especially highlighted. However, that raises the question that Engerman and Sokoloff address too, which is: "Where did such institutional differences come from"?

Engerman and Sokoloff's (1997b; 2000; 2002) explanation centers on the role of factor endowments of the colonized territories. According to the authors, differences in factor endowments (climate, topography, population density, *inter alia*) led to different levels of inequality between American societies, which, in turn, shaped different institutional structures (that tended to reproduce themselves and the respective inequality levels) that account for the differences that we now have in the levels of development.

In order to highlight the different patterns of inequality and institutional paths, the authors divided the American colonies into three main groups.[55]

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[53] For this point, see also Nunn (2009).

[54] Voltaire, for example, considered the conflict in North America (mainly in what is now Canada) between the French and the British during the Seven Years' war (1756-1763) to be madness and characterized the two countries as "fighting over a few acres of snow" (as quoted by Sokoloff and Engerman 2000, p. 217). Haiti, in 1790 (on the eve of its revolution), was probably the richest (although extremely non-egalitarian) society in the world in terms of income *per capita* (see Sokoloff and Engerman 2000). As we can see, this theory is closely related to the ideas presented in Acemoglu, Johnson, and Robinson (2002) discussed elsewhere in this paper.

[55] "The usefulness of such abstractions, drawn from the uniqueness of each society, must be judged ultimately by how meaningful and coherent our stylized types are and by the explanatory power they help to provide" (Engerman and Sokoloff 1997a, p. 12).

The first group consists of colonies in which factor endowments (such as climate, soil, etc.) were especially favorable to the production of highly-valued crops in international markets, such as sugar. They were characterized by extensive scale economies associated with the use of slaves (Engerman and Sokoloff 1997b) and subsequent high levels of wealth inequality. The group includes Caribbean territories such as Barbados, Cuba and Jamaica as well as South American territories, such as Brazil. The high degree of inequality of these territories "contributed to the evolution of institutions that commonly protected the privileges of the elites and restricted opportunities for the broad mass of the population to participate fully in the commercial economy even after the abolition of slavery" (Engerman and Sokoloff 1997a, p. 13). The second group is composed of Spanish colonies such as Mexico and Peru. These colonies had relatively substantial numbers of natives surviving contact with European colonizers which made possible the "distribution among a privileged few (*encomenderos*) of claims to often enormous blocs of native labor, land, and mineral resources" (Engerman and Sokoloff 1997a, p. 13). Altbeit for different reasons, these colonies were also characterized by high levels of inequality in wealth distribution among their populations that were also perpetuated by the dominant elites. Finally, the last group of colonies is composed of the territories in the North American mainland. "With the exception of the southern United States, these economies were not endowed with substantial indigenous populations of natives able to provide labor, nor with climates or soils that gave them a comparative advantage in the production of crops characterized by major economies of scale or of slave labor" (Engerman and Sokoloff 1997a, p. 16). Therefore, the growth and development of these regions were based on small properties (with independent proprietors) of European-descent labor, with relative equality in the distribution of human capital. Although there were different conditions in the southern colonies, where some limited scale economies in the production of crops such as tobacco and rice permitted relatively large plantations with slave labor, the "degree of inequality in these colonies were quite modest by the standards of Brazil or the sugar islands" (Engerman and Sokoloff 1997a, p. 16).

To summarize the theory, Engerman and Sokoloff suggest that the different characteristics of factor endowments when the European colonizers arrived predisposed the colonies "towards paths of development associated with different degrees of inequality in wealth, human capital, and political power, as well as with different potentials for economic growth" (Engerman and Sokoloff 1997a, p. 17). These initial conditions might have had such long-term effects

because the institutions established and the government policies (controlled by the elites) tended to reproduce the conditions that made the different degrees of inequality possible. We now need to understand what these institutions and policies are, as well as how this persistent evolution occurred.

In the introduction to their book, *Economic Development in The Americas Since 1500* (2012a), Engerman and Sokoloff note an important characteristic of the literature on institutions and development: a broad range of institutions have been studied, presenting many possible variations individually, which leads to a certain level of uncertainty in interpreting the relationship between institutions and economic performance. The authors also highlight that "the issue is the mix of institutions and not just the presence or absence of any specific one" (Engerman and Sokoloff 2012a, p. 5). We will focus our discussion on the three principal institutions discussed by the authors, because "of their major impacts on the level of production and the distribution of incomes over time" (Engerman and Sokoloff 2012a, p. 5): (i) land policy; (ii) suffrage; (iii) and educational policies.

According to Engerman and Sokoloff, land policies were significantly influenced by the nature of factor endowments (broadly conceived, as already mentioned) and the particular crops grown (which were also largely dependent on the factor endowments). In turn, these policies had an important role in determining (and more specifically, maintaining) the respective distributions of income. We first note that practically all New World colonies had ample supplies of public land and were characterized by a high marginal productivity of labor, even into the 19th century. As the governments were the legal owners of such assets, "they were able to set those policies which would influence the pace of settlement for effective production as well as the distribution of wealth, by controlling its availability, setting prices, establishing minimum or maximum acreages, granting tax credits, and designing tax systems" (Engerman and Sokoloff 1997a, p. 23). Following the authors' division of the American colonies, we see that the United States (particularly the northern states) and Canada relied on relatively smaller landholdings and remained largely open to immigrants (particularly Europeans).[56] Elsewhere, there were larger landholdings (e.g., Caribbean and Brazilian

[56] A very important institutional improvement in the United States was the Homestead Act of 1862 that "essentially made land free in plots suitable for family farms to all those who settled and worked the land for a specified period" (Sokoloff and Zolt 2006, p. 217). Canada's Dominion Lands Act of 1872 was closely related to the Homestead Act.

plantations) which were associated with higher levels of inequality and, in the long-term, lower levels of economic growth in modern times.

Fundamental to Engerman and Sokoloff's hypothesis is the notion that elites had relatively more power to influence the choice of legal and economic institutions in countries exhibiting a high degree of inequality than in more equal societies. An important aspect to empirically exploring this theory is suffrage (Table 1 provides historical data on the laws governing franchise and the extent of voting in some American countries, over time). The authors' estimates reveal that "while it was common in all countries to reserve the right to vote to adult males until the twentieth century, the United States and Canada were the clear leaders in doing away with the restrictions based on wealth and literacy, and much higher fractions of the populations voted in these countries than anywhere else in the Americas" (Engerman and Sokoloff 2002, p. 71-72). Moreover, other important mechanisms, such as voting secrecy, were adopted much earlier in these territories. Higher literacy rates (which we will examine below) also permitted a much higher political participation in the colonies that later became the United States and Canada. As a consequence, these colonies had a much higher proportion of the population voting compared to the rest of Americas. It is likely that this significant political participation was the main cause of the higher availability of public goods, access to education and other economic opportunities in these territories.

Therefore, it is important to understand whether if the unequal distribution of political power fed back into the distribution of access to economic opportunities and the provision of public goods. The benefits of education are well acknowledged by the literature (see, e.g., Wegenast 2010), therefore, a closer investigation of the educational institutions would provide further evidence for the hypothesis of development presented by Engerman and Sokoloff. The authors argue that many New World economies had the material resources to provide basic education for a broad section of the population, but only a few colonies made such investments (Engerman and Sokoloff 2002). As expected, the territories with most significant improvements in schooling – even compared with more "progressive" Latin American countries such as Argentina and Uruguay – are those that later became the United States and Canada (Engerman and Sokoloff 2002).[57] So the question is: how would high levels of inequality depress investment in educational aspects? Engerman and Sokoloff (2002) argue

[57] The United States were most probably the country with the highest literacy rate in the world at the beginning of the 19th century (Sokoloff and Zolt 2006).

that where private schooling predominated (more unequal societies), poor families could not afford to educate their children, perpetuating low levels of literacy and, as a likely consequence, low levels of income, which would also be responsible for the persistence of these high levels of inequality. Furthermore, in territories with high levels of inequality in terms of both economic and political opportunities, collective-action problems would be exacerbated when trying to establish funding for universal public schools.

Therefore, we have seen that the development of policies and institutions related to public lands, suffrage and schooling over time in the Americas seem consistent with the hypothesis presented by Engerman and Sokoloff (1997, 2002, 2012a, *inter alia*); that the initial extent of inequality, influenced by the factor endowments, affected the evolution of strategic institutions. "Where there was relative equality and population homogeneity, the institutions that evolved were more likely to make opportunities more accessible to the general population" (Engerman and Sokoloff 2002, p. 82), while in societies that began with extreme inequality "elites were likely better able to establish a basic legal framework that insured them disproportionate shares of political power, which they used to establish rules, laws, and other government policies that advantaged members of the elite – contributing to persistence over time of the high degree of inequality" (Sokoloff and Zolt 2006, p. 209).

In summary, Engerman and Sokoloff suggest that the initial conditions, namely the factor endowments of the New World territories, had long-term impacts on the development process of the American colonies not just because some "fundamental" characteristics were difficult to change, but also because the policies pursued and the institutions structured tended to reproduce the *status quo*, perpetuating the levels of inequality. The greater opportunities presented by more egalitarian colonies such as the United States and Canada provided an environment more suited for the population as a whole to become better educated, and thus to participate in commercial activities, in the political process and contribute to a more consistent process of long-term growth.

Other theories were presented in order to explain the institutional differences across the American continent. North (1989) attributes the differences to national heritage; his view being that British colonies were more prompted to higher level of development. Some critics were made to this view. First, it tends to equate "British colonies" with the United States and Canada, ignoring other British territories such as Barbados, Jamaica, Belize and Guiana that,

in broad terms, tend to have had a similar development path to other Caribbean colonies. Also, it does not explain the "reversal of fortune" concept stated in the work of Acemoglu, Johnson, and Robinson (2002), or in other words, the above-mentioned fact that between the 16th and 18th centuries, Caribbean colonies had much higher levels of income *per capita* than the United States and Canada. However, North, Summerhill, and Weingast (2000), introducing a new framework for dealing with order and disorder within societies that emphasizes the political mechanisms of path dependence, argue that endowments are insufficient to explain the differential development paths between British North America and Latin America. Their view, as North's, highlights through a more complex perspective the importance of national heritage, being the British colonization more conducive to consensual order and, therefore, prosperity.[58] Frankema (2009, Chapter 3), discussing what he called *endowments perspective* (related to the works of Engerman and Sokoloff) and *metropolitan institutions perspective* (related to the works of North *et al.*), adds two arguments to the discussion: (i) that the nature and causes of land inequality in Latin American countries are more differentiated than often suggested; and (ii) the role of indigenous population and pre-colonial institutions in shaping the political economic context in which land inequality requires more attention than granted so far.

Nugent and Robinson (2010) suggest that the differential processes of economic development over the last century cannot be understood simply by examining the physical endowments of the countries and technologies available. The authors use the experience of the comparative economic development of four coffee-exporting economies in Latin America: Costa Rica, Colombia, Guatemala and El Salvador – relatively similar economies from a structural point of view but with radically different development paths, conventionally traced to the differential organization of the coffee industry – to show that the different forms that the coffee economy took in the 19th century were critically determined by the legal environment determining access to land, and that different laws resulted from differences in the nature of political competition and the background of political elites. The authors argue that, while Costa Rica and Colombia developed relatively egalitarian smallholder economies, El Salvador and Guatemala instead created unequal plantation societies, and these different structures had significant effects on institutions and development paths, particularly on the incentives of political elites to invest resources in education. The consequences are that Costa Rica and

[58] As mentioned in Section 1.1, studies such as La Porta *et al.* (1997; 1998) and Acemoglu and Johnson (2003) also discuss the role of different national heritages.

Colombia developed more affluent and more democratic societies than did El Salvador and Guatemala. According to Nugent and Robinson, political economy factors were decisive, and they concluded that – at least for the economies they studied – endowments are not fate.

A number of comments can be made on this insightful study. The authors aim to contribute to the development literature by showing the *caveats* to the simplistic theory that links development solely to the role of a particular set of specific factors, such as factor endowments. Although these theories derive from the broad picture by the works of Engerman and Sokoloff (discussed in Section 1.4), for example, it is not true that this broad picture is not valid. It is true that there were clear divergences in the development paths of the economies of the northern part of the Americas – the United States and Canada (and other former colonies elsewhere, for example, New Zealand and Australia) – and Latin America. These former colonies reached a level of economic growth and development still unmatched by any other of these later economies. GDP figures are significant here: while the PPP-adjusted *per capita* GDP of Guatemala, Costa Rica, El Salvador, and Colombia in 2010 was US$ 4,863, US$ 11,267, US$ 6,855, and US$ 9,499, respectively, the same figures for the United States and Canada were US$ 48,294 and US$ 39,978 (IMF 2013). It is quite clear that, although there are internal differences within the groups, the former group is very different from the latter. Therefore, although there is important heterogeneity among Latin American economies, and the authors introduce more formally political economy mechanisms into this discussion, one should not ignore the role played by elements such as factor endowments. Although they are not fate and don't explain all in our comparative histories, there is relevant evidence showing how important they are. Moreover, the reasons why the political elites in these otherwise apparently similar countries pursued such different strategies for exploiting the potential opportunities provided by the expansion of the world coffee market during the 19th century, namely the different levels of militarization (lower in Costa Rica and Colombia) and the fact that elites did not primarily consists of landowners (in Costa Rica and Colombia, unlike in Guatemala and El Salvador), seem to be the determinant for this particular set of countries, and therefore cannot be generalized. Therefore, although they do not oppose Engerman and Sokoloff's view, Nugent and Robinson (2010) present an insightful work that shows a possible way for us to escape from a deterministic view of the development process, incorporating in an original way a very important player – political economy.

Two other works address possible problems with Engerman and Sokoloff's hypothesis. Nunn (2008) and Acemoglu *et al.* (2008) find (as does our study) a possible positive relationship between economic inequality and long-term development outcomes.[59] According to the authors, this implies possible problems with Engerman and Sokoloff's idea that inequality was responsible for the development paths of American societies. It is important to note, however, that Acemoglu *et al.* (2008) find different effects than Nunn (2008) when exploring the relationship between inequality and development indicators in the United States using the Gini as an inequality measure.[60]

The problem with such a conclusion, in our view, lies in the different levels of analysis. According to Engerman and Sokoloff (1997; 2002; etc.), the initial circumstances and geographic conditions were associated with particular paths of colonization, which, through their inequality implications, translated into the establishment of different types of institutions that would account for the different growth patterns across the American economies. This analysis is a cross-country empirical investigation. Institutional differences *across countries* would account for different development evolution patterns, or, in other words, Engerman and Sokoloff's theory would be valid at a *cross-country* level. Nunn (2008) and Acemoglu *et al.* (2008) empirical evidence is for a within-country sphere, for the United States and Cundinamarca (a Colombian region) respectively. This does not necessarily contradict Engerman and Sokoloff's view. While a country might have a more egalitarian historical evolution (such as the United States) that would engender national institutions which would foster sustainable growth, regions within such a framework might benefit from a higher level of inequality. The same is valid for Colombia, being more unequal (than Canada and the United States as a whole), regions within such an institutional environment might benefit from a higher level of inequality.

We do not aim to investigate the channels that would lead to such results nor the validity of such a hypothesis. Our objective is to show that when comparing long-term development theories, one must be careful of how excludable some theories are.

[59] While Acemoglu *et al.* (2008), like this study, find such evidence using inequality variables such as the land Gini, Nunn (2008) tests a particular channel proposed by Engerman and Sokoloff, i.e., the effects of slavery.
[60] Summerhill (2010) also does not find a negative effect for inequality in long-term development. However, the author does not directly oppose this result to Engerman and Sokoloff's view.

So, did Engerman and Sokoloff get it all? Obviously not. Nor does that seem to be their intent. However, they provide a powerful and insightful theory that provides answers to several developmental questions. Their work also gives us an important and fascinating collection and compilation of data with an important long-term vision of development aspects of American nations. We do not believe that within-country evidence would suffice to prove that there is a problem with such theories.[61]

1.5 Economic and Political Inequality - The Case of Cundinamarca

Acemoglu *et al.* (2008) offer the first investigation of the effects of inequality at micro level, distinguishing between economic and political inequality. This is a new and interesting approach, as it deals with the possible endogeneity of the economic inequality variable in the absence of a political inequality one. The investigation of the relationship between inequality and long-term development is made within a constant *de jure* environment, in line with Pande and Udry's (2005) critique on the literature on institutions (as seen in Section 1.1). With data from nineteenth-century Cundinamarca, the authors construct variables proxying for economic inequality (the land Gini) and for political inequality (a variable of political concentration) at municipality level. The paper is based on Engerman and Sokoloff's hypothesis which, according to Acemoglu *et al.*, asserts that the roots of the different performances of the north and the south parts of the American continent lie in their different levels of economic inequality in the nineteenth century.

The authors present several interesting results. First, their data confirm that Cundinamarca was more unequal than the northern United States in the nineteenth century. Second, the authors found that municipalities in Cundinamarca were more equal than the South of the United States, which is of great interest, bearing in mind Engerman and Sokoloff's hypothesis explored in the previous section. Third, and surprisingly, they find a negative association between economic and political inequality across municipalities of Cundinamarca in the 19th century. Finally, and these are the main results of the study, the authors find a positive association between economic (land) inequality and long-term development and a negative association between political inequality and long-term development.

[61] We should stress that it is not our belief that the authors mentioned are supporters of such a view. We restrict ourselves to discussing the possible interpretations of the results of the works quoted.

The interpretation of these results is based on Bates' (1981) political economy investigation on Africa. Bates (1981) discovered that economic policy in post-independence Kenya was more conducive to better economic outcomes than in Ghana "because of the balance of power between politicians and economic elites in the former country" (Acemoglu *et al.* 2008, p. 187). Although presenting mainly small landholders (growing cocoa), long-term economic growth was more restricted in Ghana than in Kenya, where land was more concentrated. The reason according to the authors is that in Ghana, the small landholders had more difficulties in solving their collective-action problems and were therefore unable to keep in check the costly clientelism and distortionary economic policies of politicians. However, in Kenya, more affluent economic agents were able to restrain such government policies.[62]

Acemoglu *et al.* (2008) then integrate into Bates' (1981) interpretation the concept of "weakly institutionalized" societies developed in the work of Acemoglu, Robinson, and Verdier (2004). This concept relates to the level of political development of a society: in "weakly institutionalized" societies, political institutions placed few constraints on what actions politicians could take. The authors then interpret the results of Colombia as possibly indicating that powerful and rich landowners were keeping in check the most rapacious tendencies of politicians, which, when unchecked, had been less accountable and therefore able to accumulate large amounts of land and wealth (Acemoglu *et al.* 2008). In such an environment, and when landed elites are distinct from incumbent politicians, it is possible to have a positive association between economic (land) inequality and better development outcomes.

The opposite was the case in nineteenth-century United States. In such a "strongly institutionalized" environment, political institutions placed certain constraints on politicians so that it was not necessary to have a powerful landed elite to keep politicians in check and a landed elite would not necessarily have created a tendency towards better outcomes. Rather (and possibly consistent with evidence for the United States case) in such environments, greater inequality may have negative economic or political consequences (Acemoglu *et al.* 2008).

[62] An important implicit hypothesis within this theory is that politicians are distinct from the economic elites.

The work of Acemoglu *et al.* (2008) is the most closely related to the one presented here. We also calculate economic and political inequality indexes for early-twentieth century Brazil and investigate their relationship with long-term development. We present, therefore, further micro-level evidence on the relationship between inequality (both economic and political) and development but for a very different context.

One significant difference is that we cannot argue, as did Acemoglu *et al.* (2008) and Bates (1981), that the economic elites were different from the political elites. Although there were conflicts, government policies were often in the interests of the big landholders during the First Republic (1889-1930). We will explore the historical context in greater detail in the next chapter.

The next section presents a reflection on the discussion between the two main "rival" causes of development: institutions and geography.

1.6 Are Geographical Views Deterministic? A Comment on a Possible Unification Theory

As previously mentioned (Section 1.1), Acemoglu (2009) presents a classification of the four hypothetical *fundamental* causes of growth: (i) the multiple equilibria / luck hypothesis; (ii) the geography hypothesis; (iii) the culture hypothesis; and (iv) the institutional hypothesis. Like the recent developments in the development literature, we focus on the geographical and institutional views (already discussed in Section 1.1).

According to Acemoglu, Johnson, and Robinson (2002) we have a geographical hypothesis and a "sophisticated" geographical hypothesis. The first claims that "differences in economic performance reflect differences in geographic, climatic, and ecological characteristics across countries" (Acemoglu, Johnson, and Robinson 2002, p. 1259). According to the authors, there are different views of this hypothesis. The common view would be that represented by such different authors as Machiavelli (1519), Montesquieu (1748), Marshall (1890), and Toynbee (1934), which suggests a direct effect of climate on income through the influences on work effort. The authors also classify the works of Bloom and Sachs (1998), Sachs (2001), and Diamond (1997) as supporting the geography hypothesis. While Diamond (1997) states that

"the timing of the Neolithic revolution has had a long-lasting effect on economic development" (Acemoglu, Johnson, and Robinson 2002, p. 1259), Bloom and Sachs (1998) and Sachs (2001) emphasize "the importance of geography through its effect on the disease environment, transport costs and technology" (Acemoglu, Johnson, and Robinson 2002, p. 1259). Acemoglu, Johnson, and Robinson's (2002) view is that this hypothesis would predict persistence in economic outcomes, but, as they show in their study, there has been a "reversal of fortune" among colonized societies (as discussed in Section 1.1) and, therefore, a theory that cannot account for changes would be unsuitable for modern economic development.

The "sophisticated" geography hypothesis suggests that "certain geographic characteristics that were not useful, or that were even harmful, for successful economic performance in 1500 may turn out to be beneficial later on" (Acemoglu, Johnson, and Robinson 2002, p. 1260). It also includes different views. For example, the "Temperate Drift Hypothesis" suggests that the center of economic gravity changes over time from tropical to temperate zones. Another view suggests that industrialization is facilitated by specific geographical elements such as the availability of coal. Acemoglu, Johnson, and Robinson (2002) likewise argue against this view by presenting evidence that the reversal was unlikely to be related to geographical elements.

We suggest that the discussion presented in Acemoglu, Johnson, and Robinson (2002, 2005) and Acemoglu (2009) is oversimplified. The first important element of our argumentation is that the classification of the potential fundamental causes of growth is elaborated by these authors (supporting the institutional view), not by Sachs, Bloom or others. The second important element is that there is indeed an impressive relationship between geographical aspects and development across the world (Figure 2).[63]

[63] "Of the thirty economies classified as high-income by the World Bank, only two small economies – Hong Kong and Singapore – are in the geographical tropics, and these constitute just one percent of the population of the rich economies" (Sachs, 2001, p. 1). The author makes a further distinction between landlocked and sea-navigable regions. According to Sachs, temperate sea-navigable regions are almost always developed while tropical landlocked regions are often among the poorest in the world.

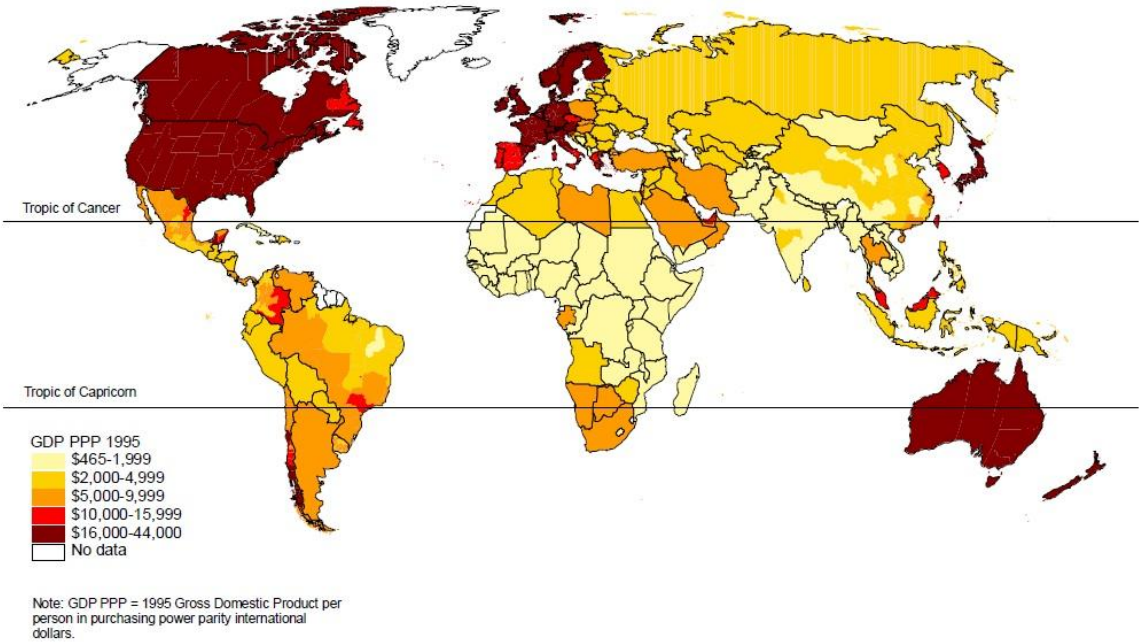


Figure 2 – Income per person world map, 1995 (with sub-national data for 19 countries)
Source: Sachs, 2001, p. 35.

The message that emerges from the studies of Bloom and Sachs (1998) and Sachs (2001) is clear and slightly different to what we saw above. The authors argue that the literature has omitted an important factor from the analysis, namely that geography matters. They do not argue that geography is the fundamental cause of growth, but that it is significant. Sachs (2001) suggests five hypotheses on tropical underdevelopment: (i) technology in critical areas (especially health and agriculture in which technology in tropical ecological zones lagged behind temperate ones); (ii) higher productivity in temperate zones; (iii) technological innovation being an increasing-returns-to-scale-activity; (iv) societal dynamics (urbanization and demographical transition); and (v) geopolitical factors.[64] He concludes: "Rather than continuing to put all of the international energies into markets reforms – as if markets alone could address the special ecological and technological needs of the underdeveloped tropical world – it will be necessary for the global community to find new ways to harness global science to meet the challenges of tropical health, agriculture, and environmental management" (Sachs, 2001 p. 28). Bloom and Sachs (1998), in a closely related study, deal specifically with the African case. They explicitly put themselves in a non-deterministic position and recognize the importance of economic policy, but argue – and we fully agree – that good policies must be tailored to geographical realities, which implies that we need to understand such realities.

[64] The demographic transition is the shift from high-fertility, high-mortality societies to low-fertility, low-mortality societies.

Diamond (1997), in an insightful book, indeed appears to be more determinist. He takes the longest-term view, closely studying 13,000 years of the evolution of human societies. The objective of his study is to find the *ultimate* cause of development, what we called the *fundamental* cause of development. Exploring the agricultural revolution and the establishment of sedentarism, the development of writing, technological improvements and diffusion, the sources of military power, the evolution of population densities from bands to tribes, to chiefdoms and finally to states and empires, he finds a background of broad geographical patterns. According to his theory, it is no coincidence that the Spaniards conquered the Incas, and not the other way around. Although Diamond does leave institutional analysis aside, he is concerned (and correctly so) with proving another view wrong. He rejects the idea that differing development paths of societies are linked to individual factors, such as certain human societies being more intelligent or capable than others. For example, New Guineans are just as clever and insightful as Americans or Germans, but were constrained by factors beyond their control. We, too, consider that racist views contribute nothing to an understanding of development issues and find that Diamond's statement (above) is a further important contribution to his fantastic research.

So what do we make of all this? Do we need to pick a "winning theory"? We believe that it is possible, with some adjustments, to unite all these studies together, not discarding some, as the important works of Acemoglu, Johnson, and Robinson (2001; 2002), Easterly and Levine (2003), among others, have done. What we intend to offer here is the outline of a possible unification theory.

In our view, the best way to explore this question is chronologically. Diamond's (1997) investigation of the broad patterns of geographical possibilities indeed appears to be determinant for ancient societies. The availability of edible crops, animals for possible domestication and climatic features probably determined the development of groups of humans thousands of years ago. The reason for this is that technology was insufficient, therefore geographical barriers were determinant. For thousands, of years technological improvements were only possible in certain areas of the world, and that made some societies more affluent than others. These developments (well explained in Diamond's book) shaped the broad patterns of conquests and society's evolution up to a certain time. At some point in history, technology, due to constant increasing returns of scale, and institutions pushed

geography into the background. From this moment on, institutions enabled certain societies to overcome geographical limitations, which in turn led to development in some areas which had previously stagnated. An important example of this is Australia, which had the most primitive societies at the time of modern European conquest and which is now much more developed than Iraq or Iran, the cradle of ancient civilization and development. But when did institutions became to "rule"?[65] We believe that (as expected) it was different for each society, so we cannot pinpoint any specific moment. Broadly, however, we can expect it to be linked to the Industrial Revolution – a time when growth, as we understand it today, really began. Modern economic growth and the significant development disparities between countries originated less than three hundred years ago (Acemoglu 2009; Sachs 2001). Bloom and Sachs' (1998) and Sachs' (2001) contribution is precisely that of presenting evidence that geography is still determinant for some aspects of development in some regions of the world.

Interesting questions then arise. What institutions enable societies to "conquer" modern geographical limitations? Or should we instead be concerned with specific policies and geographical adaptations (while pursuing the "good" institutions) as suggested by Sachs (2001)? Brazil offers a very insightful case. Although better institutions (such as a more efficient tax system) are clearly important, geographical constraints (such as the dry and isolated country-side of the Northeast region) still present important challenges to regional development.

Concerning the moment of "conquest" of geography by institutions, so as to generate sustainable growth, we believe that the task will be fruitfully dealt with through case studies, and in this connection, Acemoglu and Robinson (2012) provide an excellent starting point.

2.7 Final Remarks

Our intent, with this chapter, was to provide an overview of the insightful development theories that, in our view, are the most useful for understanding the relationship between inequality and development in the Latin American historical growth process.

[65] Terminology adopted from Rodrik, Subramanian, and Trebbi (2004).

The institutional literature is a rich and powerful basis for the understanding of development issues. Even though, as we have seen, "institutions" is a broad term that has only recently began to be more concretely defined, we believe that thinking in terms of a *fundamental* cause of development might provide an important answer to development issues. At the same time, we recognize that thinking in terms of one broad answer to the issue of development is simplistic, and therefore suggest the integration of institutional theories with other areas of development literature. Finally, it is our view that newly-developed econometric methods and the increasing use of historical elements in within-country investigations will continue to provide important insights for policy-making within societies across the world.

The effects of economic inequality on development are far from consensus. We believe that it is through historical analysis that we are should walk now in order to understand the patterns within empirical heterogeneity. Once more, within-country studies such as Acemoglu *et al.* (2008) and this one are probably the best marginal contribution. And although there are more consensuses on the prejudicial effects of political inequality, there should be theoretical and empirical gains in uniting these investigations with the analysis of economic inequality.

2 THE BRAZILIAN CONTEXT

This chapter outlines the main aspects of Brazilian history in order to provide a context in which the results of this study should be understood. Economic interpretations of relationships between variables should be historically understood, always.[66] The historical perspective not only makes the figures (especially inequality) understandable; it also sheds light on the possible channels of transmission. Our findings, that inequality might have had heterogeneous effects, probably depending on specific *de facto* institutional environments, can only be understood by taking into account the historical context of the research. Moreover, the particular historical path of any society frames its differential *de facto* institutional environments.

The chapter is divided as follows. First, we provide a broader perspective by introducing some general data on Brazilian history. Within this section we look more closely at the more specific features of the four states covered by the study: Pernambuco, Minas Gerais, São Paulo and Rio Grande do Sul. Afterwards, we examine some political aspects of the Brazilian Empire and its subsequent decline. We then move on to, we move onto the analysis of the First Republic (1889-1930), the key period of our study. Finally, we discuss some relevant contemporary issues and data.

2.1 General History

Brazil was first claimed by modern Europeans on April 22nd, 1500, by an expedition led by Pedro Álvares Cabral, from Portugal, as part of the great navigations in which the European powers took part.[67] Unlike the people of what is now Mexico, Central America and the northern Andean territories, when the Portuguese landed, Brazil's population consisted of small communities of semi-nomadic Indigenous people in societies with relatively low levels of complexity in terms of socioeconomic and political organization.[68] Low population

[66] For the implicit counterfactual analysis in historical perspective, see Fogel (1967).
[67] Brazilian lands had been visited before by Europeans. For example, in 1499, Spanish mariner Vicente Yáñez Pinzón explored some of the Brazilian shores and ventured to the mouth of the Amazon, but failed to establish a settlement there.
[68] For a description of the Brazilian Indigenous people, see Hemming (1984).

density, a dominant tropical climate and large coastal territory, the absence of great discoveries of mineral deposits ("factor endowments" in their broadest sense), the population shortage of Portugal – which numbered no more than a million and half (Johnson 1984) – and the attractive prices of some agrarian products in international markets led to a particular path of institutional development, very much in line with Engerman and Sokoloff's hypothesis (see Section 1.4).

Brazil was a Portuguese colony from 1500 until 1822, and, during this time, had distinct important economic enterprises whose primary objective was to provide commercial benefits for the metropolis, being mainly oriented towards external interests. At the beginning, at a time when its American colony was only of secondary interest to the Portuguese, the first economic activity in Brazilian lands was exploitation of natural resources. The main product was the "Pau-Brasil" (*Caesalpinia echinata*), an abundant native tree highly valued in Europe in the sixteenth century.[69] The activity of collecting and trading brazilwood soon became a monopoly of the Portuguese Crown and continued until around 1530 (Prado Jr. 1956 [1945]; see also Johnson 1984).

With his attention divided between the territories in the East and the American colony, João III, king of Portugal, worried about the protection of the latter, tried to encourage the settlement of New World lands by dividing the territory into twelve linear sectors called *capitanias*.[70] "From the beginning of its colonization, Brazil was gradually parceled out in estates of immense size" (Dean 1971b, p. 606). These estates would be given to settlers (so-called *donatários*) who, by paying their own travel and settlement expenses and being loyal to the Crown, attained practically absolute power over those lands, nominating administrative authorities and judges, establishing and collecting taxes and allocating the land as they saw fit (Prado Jr. 1956 [1945]). Although it enabled Portugal to retain a large part of its maritime forces in the East Indies, the *capitanias* strategy did not provide the expected results, and the *capitanias* of Pernambuco and São Vicente were the only successful ones. As we can see,

[69] The name of the country is probably derived from the name of the tree.
[70] The *capitanias* had an ocean frontage of around 150 miles with unlimited depth (Denis 1911). They were "a a kind of a feudal fief, to be bestowed upon such of his subjects as would undertake, at their own cost, to settle, pacify, and develop the new country. In return they would be made governors, with powers of life and death." (Denis 1911, p. 31).

land distribution in Brazil has strong colonial roots, and this is arguably the most important reason for its historical social and political inequality.[71]

The interest of Crown and settlers would soon turn to the production of sugar, which became the colony's first major export.[72] 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. As expected, geographical characteristics were determinant for the success of this enterprise. At the time, the main production centers were in Pernambuco and 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]).[73] Although Higman (2000, p. 229) only applies the concept of "sugar revolution" to the Brazilian experience after 1650, some important elements highlighted by the author were characteristic of the Brazilian case much earlier on, mainly the establishment of large monoculture plantations, the use of African slave labor and the increase in the level of output *per capita*.[74]

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. Discoveries in Minas Gerais were soon followed by other findings in what are now the states of Goiás and Mato Grosso. 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 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 replaces Salvador (Bahia) as the capital of the colony in 1763. However, the

[71] For other examples, see Frankema (2010).
[72] The know-how was of great importance in a time of extremely high levels of information asymmetry and protectionist policies (see, e.g., Furtado 2006 [1959]).
[73] 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]).
[74] Regarding the latter, see Furtado (2006 [1959]).

decline of the Brazilian gold rush came soon, due to its geographic characteristics (alluvial), inferior extraction techniques and a bureaucracy incapable of providing sustainable incentives to the enterprise. With the decline of the gold cycle and the persistent low international prices for sugar, the last years of the eighteenth century would be 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 three hundred years the principal institutions of Brazilian society" (Dean 1971b, p. 607).

Early in the nineteenth century, a major political event changed the development path followed by the colony. In 1808, by order of the Prince Regent Dom João, fleeing from Napoleon's troops, the Portuguese royal family is transferred to Brazilian lands.[75] 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, and a national press was established (Denis 1911), new educational and financial institutions (such as the first *Banco do Brasil*, in 1808) were established as well. However, there was a sharp contrast between these "progressive" institutional measures and the deplorable educational level of the colony, and one which persisted for many more years. Other important international events were beneficial for a colony whose main activity was the export of primary products: the Industrial Revolution, beginning in England, the American Revolutionary 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.

The century was also marked by a new dynamic in terms of political events. In 1821, political pressure from Portugal, demanding the return of their king, made Dom João return to his home country. His son, Dom Pedro, stayed on in the colony as regent. A year later, on September 7th, 1822, in a country with approximately 3.9 million inhabitants (of which 1.2 million approximately were slaves), Dom Pedro declared independence and was proclaimed Constitutional Emperor, remaining in power until 1831. After a regency period (1831-1840)

[75] According to Prado Jr. (1956 [1945]) this was effectively the end of the colonial period for Brazil.

characterized by great social instability, his son, Dom Pedro II, 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 1971b). 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. Once international markets returned to normal conditions, a new phase of difficulties would begin 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 would lead to a series of social rebellions. In the midst of these difficulties, a new source of wealth would emerge: coffee. Furtado (2006 [1959]) associates the relative prosperity of the coffee boom era with the emergence of a stable social-economic nucleus that opposed the disaggregation forces in the north and south of the country. Therefore, although the first half of the nineteenth century was characterized by economic difficulties and a consequent decrease in real *per capita* income (Furtado 2006 [1959]), coffee production led to a new period of economic affluence in the country.[76] However, this new impulse to the economy did not last long. As noted by Faoro (1977, p. 403), the country "produces for export, it does not export because it produces".

According to Furtado (2006 [1959]), the most relevant aspect of the Brazilian economy in the last quarter of the 19th century was the increase in the relative importance of the wage sector. An economy based on wages instead of slave labor would, under external economic stimulus, use existing production factors more efficiently, with its productivity increases affecting other sectors in the economy. Furthermore, the wages paid would form the basis for a stronger internal market.

[76] 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).

According to Martínez-Fritscher, Musacchio, and Viarengo (2010), the First Republic was a time of important educational achievements, due especially to the decentralization of taxes introduced by the Constitution of 1891. While Brazil's literacy rate in 1890 was only 14.8% – the lowest among the larger American economies – it had risen to 30.0% in 1920 and to 57.0% in 1939 (Engerman, Mariscal, and Sokoloff 2002).

Finally, the role of primary exports during the First Republic has recently been redefined. Aldrighi and Colistete (2013) argue that "linkages and learning effects generated by the fast-growing coffee export sector seem to have been strong enough to stimulate investments in activities like immigration, railways, banking, public utilities, non-export agricultural goods and manufacturing industries, which led to an even more rapid growth of the domestic sector in the Brazilian economy" (Aldrighi and Colistete 2013, p. 5, see also Dean 1971a).[77] In other words, this period was an example of a successful growth process induced by exports due to their effects on other sectors of the economy.[78]

2.1.1 Pernambuco

The territories that are now the state of Pernambuco (one of only two successful *capitanias*) soon specialized in the production of sugar, being one of the first production centers, along with Bahia.[79] Although there was no general overall plan for the enterprise, potential problems in the sugar enterprise in Brazilian territories were largely avoided thanks to favorable circumstances (Furtado 2006 [1959]). 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. The labor question was solved through the profitable slave trade with African regions.

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.[80] By mid-sixteenth

[77] For a related argument, see Leff (1969).
[78] For a complementary discussion, see Fishlow (1980).
[79] By that time, the Northeast had become the country's most important region by far. The political center of the colony was Salvador, which was also the capital of the state of Bahia.
[80] The large rural properties associated with sugar production were known as *engenhos*. Settlers largely preferred using African slaves to do the work, as Native Brazilians were scarce in numbers and not suited for working in sugar production.

century, there were already large numbers of African slaves in the Portuguese New World (Prado Jr. 1956 [1945]).[81] Each *latifúndio* was a microcosm which regulated the lives of many. Clearly, sugar production was rooted in extreme economic and political inequality.

There was a steady increase of sugar exports for almost a century (1550-1650). 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 improvements 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.

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 was associated with its high profitability (Furtado 2006 [1959], p. 93). As a result, cattle-raising shifted to the countryside of the Northeast 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. Also, there was no need for large initial capital investments and subsistence for the population involved was naturally provided. The large amount of land available hindered profitability increases.

In the early seventeenth century, Brazil was the main supplier of sugar in the world. However, in the same century, exports began to decline, mainly due to increasing competition from British, Dutch, and French colonies, rather than a possible failure of technological improvements. Prices continued to fall throughout the eighteenth century. With the decline of the sugar industry, income fell 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, especially after the fall of sugar prices on the international market (around 1650), brought with it a decline in the region's average *per capita* productivity and income. This was a fundamental element of the formation of society in the northeast, and one which is still reflected in that society today: a relatively high share of the population (especially in the countryside) lives in near-subsistence conditions without

[81] Although it varied, the number of slaves in a prosperous *engenho* was usually between 80 and 100. It was unusual to have a labor force consisting of free men (Prado Jr. 1956 [1945]).

productivity or technological improvements, with further difficulties brought by long dry seasons.[82]

The problem was that the accelerate growth of the sugar enterprise had no structural evolutionary 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. This would be a recurrent process in Brazilian history: its particular socioeconomic organization means that secondary effects are often absent in the country's economic enterprises.

The legacy of the sugar cycle is, in many aspects, a negative one. Not only would the organization of the agriculture in the Northeast remain archaic (both at the coast and in the rural interior) but also, the system of slavery meant that considerable human resources remained underdeveloped. Moreover, income was highly concentrated, meaning that the profits of the sugar enterprise went to the Portuguese, foreign intermediaries and to the landowners, who spent much of the profits on imported consumer goods rather than on improvements in infrastructure or production techniques.

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, being drier and, therefore, more suitable for the production of cotton rather than cattle-raising, would also benefit from the cotton industry, which is also based on large landholdings. The process was largely facilitated by the simplicity of production (Prado Jr. 1956 [1945]). We agree with authors such as Aurélio de L. Tejo, who have criticized the establishment of economic activities without regarding the suitability of the land and its geographic characteristics. Since the region is unsuited to cattle-

[82] Although the advent of the Brazilian gold rush meant that some regions in the countryside of the Northeast were stimulated economically by the increasing demand for food supplies, this stimulus was relatively short-lived.

raising, forcing such an activity, like has being done for centuries, only helps to perpetuate the extremely poor living conditions (Tejo 1998).

2.1.2 Minas Gerais

In the initial stages of colonization, not much attention was paid to the rural areas that make up the present-day state of Minas Gerais. Basically, this was due to the focus on the lucrative production of sugar that was located mainly in the Northeast, because of the comparative advantages resulting from geographic characteristics such as climate and proximity to the coast.

The first significant economic enterprise in the lands of Minas Gerais was triggered by discoveries of gold at the beginning of the seventeenth century. The findings reshaped the regional distribution of population, production, and income in the colony and fostered the first big spontaneous migration from Portugal. This period, until the mid-eighteenth century, was known as the gold cycle or the Brazilian Gold Rush.

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. Income was more equally distributed in the sense that the basic dichotomy of the sugar production areas, that of landlord and slave, was absent. 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. This influx of wealth led the Portuguese Crown to rapidly establish a bureaucratic apparatus to avoid tax evasion.[83] However, Denis (1911, p. 61) notes that "the maintenance of law was in reality an impossible task."

Like the externality effects of the sugar economy, the gold cycle also had important linkage effects. The increased demand for food fostered agricultural production in Minas Gerais, São Paulo, further south and even in the Northeast. The prices for pack animals also increased,

[83] Examples of important administrative controls by the Portuguese Crown are the payment of one-fifth of the production (and their associated careful supervision through all stages of the mining activity), prohibition on individual sailings, establishment of special trading monopolies, and tight control on local manufacturing.

which was an important incentive for the supply from the South region. Moreover, higher revenues derived from exports financed the import of consumer goods and mining supplies. Nevertheless, there were several bureaucratic impediments to the development of a manufacturing sector. Moreover, education was extremely limited and transportation infrastructure was also kept primitive.[84] The consequence was that the internal market remained stunted for a considerable period (Furtado 2006 [1959]; Prado Jr. 1956 [1945]).

The exploitation of gold was very intense and very short-lived. The organization of the mining economy was shaped by uncertainty and the consequent mobility of the enterprise and its high profitability (Furtado 2006 [1959]). "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" (Denis 1911, p. 61). Minas Gerais would soon become the colony's most important cattle farming center (Prado Jr. 1956 [1945]).

However, the gold cycle shifted the economic center of the colony towards the southeast and attracted a considerable portion of the population. As already mentioned, in 1763, the capital changed from Salvador (capital of the state of Bahia) to Rio de Janeiro. Also, in order to provide supplies for this population there was a strong upsurge in agriculture that affected not only Minas Gerais and Rio de Janeiro, but São Paulo as well.

Gold exports increased throughout the first half of the eighteenth century. The heyday of the Brazilian Gold Rush was in the 1750s, when exports reached 2.5 million British pounds (Furtado 2006 [1959]).[85] Also according to Furtado (2006 [1959]), the average income in the gold economy was significantly inferior to the average income at the apogee of the sugar economy. However, the market possibilities generated by the gold economy were much higher. Income was more broadly distributed and the percentage of free people was higher. As a consequence, the propensity for the development of a relatively dynamic internal market was also higher. However, due mainly to the lack of similar activities in Portugal, the gold region failed to develop even inferior manufacture production in its urban centers (Furtado

[84] Education was practically non-existent prior to 1776 (despite efforts by the Jesuits, who were expelled in 1759). And even after 1776, schools had little impact on the overall cultural and technical levels of the population.
[85] In 1780 the value of gold exports was less than 1 million British pounds (Furtado 2006 [1959]).

2006 [1959]). The absence of permanent economic activities led, naturally, to the decay in the regions as soon as gold extraction decreased. According to Furtado (2006 [1959]), a few decades were sufficient to disrupt the gold economy and for the atrophy of the urban centers to set in, leading, once more in the Portuguese colony, to small sparse centers of near-subsistence.

Minas Gerais, having already experienced two significant economic activities, cattle farming and gold mining, was also part of the great coffee fever, especially in the second half of the nineteenth century. Coffee would long be the colony's most important export product, as we explore in greater detail when we discuss the state of São Paulo.

2.1.3 São Paulo

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. However, it is not without history. "At the close of the eighteenth century São Paulo had a history of nearly three centuries: three centuries of constant agricultural and pastoral expansion, during which the Paulistas were practically an independent conquering race. (…) During these three centuries, to sum up the factors bearing the creation of the nation, a large population of whites had concentrated around São Paulo (the city), cultivating the land by means of slave labor, first Indian and then negro (…)" (Denis 1911, pp. 51-52).[86]

Although São Paulo was not completely outside the great sugar enterprise, it was a new product – 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, with the United States being the main market for the Brazilian product (Prado Jr. 1956 [1945]). However, it was only at the beginning of the nineteenth century that Brazilian production became significant in international terms.[87] Figures provided by Furtado (2006 [1959]) show

[86] People from the state of São Paulo are known as *Paulistas*.
[87] See, among others, Prado Jr. (1956 [1945]) and Fishlow (1980). An important related event is the collapse of the Haitian economy at the end of the eighteenth century. Haiti had been the world's greatest producer of coffee.

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.[88]

It is around this time that the labor question became delicate. England's abolition of slavery meant the end of the slave trade across the Atlantic and led to labor issues within the country. However, with the decline of the sugar economy in the northeast and the gold extraction in the country-side, slaves began migrating from there to the coffee producing centers.[89] Furthermore, Furtado (2006 [1959]) highlights the obstacles restricting the recruitment of free labor within the country. The abolition of slavery made the problem worse. It became clear that the country's best option was to import foreign workers. After problematic experiences and with the government's generous intervention, it was possible, for the first time in the country's history, to attract a massive influx of European migrants.[90] The average numbers of non-slave immigration grew steadily from the 1860s to the end of the century. The figures for the annual average numbers of immigrants, by decade, are: (1860-1869): 9,850; (1870-1879): 20,780; (1880-1889): 47,890; (1890-1899): 118,170; (1900-1909): 66,651 (Leff 1972).[91]

According to Furtado (2006 [1959]), coffee, exceeding the contributions of sugar and cotton, was already the most important export product in the country in the first half of the nineteenth century. The share of coffee exports in total exports was almost 50 percent by 1850, rising to over 60 percent between 1880 and 1900. Between 1900 and 1910 the average participation of coffee exports in terms of total exports was 51.5 percent, rising to 52.8 percent between 1910 and 1920, while total exports represented 18.0 percent and 14.8 percent of total GDP, respectively (Aldrighi and Colistete 2013). According to Prado Jr.: "(…) coffee originated, chronologically, the last of the three big aristocracies of the country, hereafter the *senhores de engenho* and the big miners, the coffee farmers became the Brazilian social elite" (Prado Jr. 1956 [1945], p. 171), and after independence, as a consequence, they became the political elite.

[88] One sack was equivalent to 60 kilograms.
[89] According to Furtado (2006 [1959]), at the middle of the nineteenth century, Brazil had approximately 2 million slaves (according to the Census, the figure was around 1.5 million). Also, unlike the United States, slave mortality was higher than the birth rate in Brazilian lands.
[90] For example, after several charges of abuse, Germany prohibited emigration to Brazil in 1859.
[91] A large number of these immigrants were Italians, with a significant boost occurring after the unification of Italy and the relative backwardness of the South in Italy.

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 the Rio de Janeiro, São Paulo, and Minas Gerais regions. Not only were internal conditions conducive towards increasing production; there was also the auspicious external circumstance of supply shortages.[92] 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 decrease in prices. The response of the coffee-planters and the government (tightly connected) to these adverse prospects was to implement a new valorization program that consisted in buying and storing the excess coffee so as to control international prices.[93] 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.

2.1.4 Rio Grande do Sul

The present-day South region of the country, comprising the states of Paraná, Santa Catarina and Rio Grande do Sul (especially Rio Grande do Sul), was practically ignored during the first centuries of colonization. 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

[92] Supply constraints in the main production centers, such as Portuguese Ceylon – present-day Sri Lanka – encouraged the Brazilian production.
[93] 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]).

faced a "true revolution", being finally integrated with the rest of the colony (Furtado 2006 [1959], p. 121).

According to Engerman and Sokoloff (1997, 2002) and Prado Jr. (1956 [1945]), a new colonization method was structured. As previously mentioned, 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 the tropical products such as sugar, that had high commercial value in international markets. 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 United States and Canada. Recruitment was made among poor and low middle class Portuguese families and peasants and considerable advantages were offered to those willing to emigrate to the New World (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 practically non-existent, and the population was rather homogeneous (Prado Jr. 1956 [1945]).

Before 1777, several wars delayed a definitive and stable economic organization in the region. Until 1777, there was the same colonization strategy as there was for the rural areas of the Northeast, with large landholdings concentrated in the hands of a few owners (Prado Jr. 1956 [1945]). According to Prado Jr. (1956 [1945]), the *charque* (or *carne seca*, "dried mean") would be responsible for increasing the significance of the region to a national level due to the necessity of providing food supplies to other regions in the country.[94]

2.2 Political Aspects at End of the Empire

The Empire (1822-1889) can be divided into three phases. The first phase from 1822 to 1831, the reign of Dom Pedro I. The second is the regency, from 1831 to 1840. From 1831 to 1835 the country had a continuous regency with three regents: José da Costa Carvalho (from Bahia), João Bráulio Muniz (from Maranhão), and Francisco de Lima e Silva (from Rio de Janeiro). From 1835 to 1837 there was the regency of Diego Antônio Feijó, followed by an

[94] The increasing production of *charque* coincided with the decline of livestock production in the Northeast and meant that the region was no longer able to meet the country's increased demand (Prado Jr. 1956 [1945]).

acting (1837-1838) and then a "proper" regency (1838-1840) under Araújo Lima. Finally, we have the period in which Dom Pedro II was the emperor (1840-1889).

During the early times of the Empire, there were direct, local elections for Peace Judges, who were responsible for dealing with minor conflicts and maintaining order, and town councilors, who performed administrative duties in villages and towns in the absence of a mayor (Nicolau 2002).[95] Elections for posts on the Provincial Assembly (the legislative power in the provinces), the Chamber of Deputies and the Senate were indirect.

Indirect elections were known as "two-level elections". The electorate was divided into two classes: *votantes* (literally, "voters"), and *eleitores* (literally, "electors"). The *votantes* (those with an income greater than 100 *mil-réis*) would choose the *eleitores* (those with an income greater than 200 *mil-réis*) who, in turn, would elect the candidates of their choice for public service. In 1846, income values were updated to 200 *mil-réis* for *votantes* and 400 *mil-réis* for *eleitores*. Although not explicitly forbidden by the Constitution of 1824, women and slaves did not vote (Nicolau 2002).

Nicolau (2002) highlights several important electoral laws introduced during the Empire. In 1842, for example, suffrage was extended to include illiterate individuals.[96] In 1846, in addition to the update in the income levels for voters, the elections began to be held on the same day across the country. Voting secrecy was introduced only in 1875, the same year that the first voter title was elaborated. Finally, in 1881, the "Saraiva law" abolished the indirect vote, but only the *eleitores* (individuals with income greater than 400 *mil-réis*) were allowed to vote. Despite the introduction of safeguards against fraud by "Saraiva law" (Love 1970), it must be emphasized that voting fraud was very common. Income data were forged, *fósforos* (individuals who would vote more than once) were abundant, and in practice, the emperor's influence was determinant.

Political statistics for this period are scarce. According to Nicolau (2002), available numbers indicate that, until 1880, approximately 5 to 10 percent of the population was registered to vote (the total population was 10,112,061 people in 1872, IBGE 1939). When the "Saraiva

[95] Elections for Peace Judges ended in 1840.

[96] Despite the absence of any legal impediments in the Constitution of 1824, illiterate individuals were, in practice, excluded from the elections because they could not sign the ballot. In 1842, unsigned votes were first permitted.

law" was passed, there was a sharp reduction in the absolute number of voters. Data show that the electorate went from 1.1 million in 1873 to only 142,000 in 1882. However this was mainly due to the high number of *votantes* among those 1.1 million, who might not have had much political influence. If we consider only the *eleitores* before 1881, we see that the number of voters increased significantly: from only 20 thousand to the above mentioned 142 thousand (Nicolau 2002). According to Love (1970), the overall effect of the law was indeed to provide Brazil with more meaningful elections.

The end of the War of Paraguay (1865-1870) signals the beginning of the Empire's decline. Several factors contributed to this. According to Prado Jr. (1956 [1945]), the second half of the nineteenth century was the period with most intense economic changes in the country's history (Prado Jr. 1956 [1945], p. 197). The era saw the establishment of industrial enterprises, financial institutions, navigation and insurance companies, mining and gas enterprises, urban transportation and, last but not least, railroads in the country (Prado Jr. 1956 [1945]). This new effervescence will significantly contribute to the end of the Empire, as it provided more economic and political power for the groups against the monarchy.

The abolitionist campaign would also play an important role in the process of political transition towards a republic. The process was largely supported by coffee growers in the West of the state of São Paulo, the republicans (the Republican Party was created in 1870, by the more radical wing of the Liberal Party), urban public opinion and laborers. The process, which arguably officially began in 1850 with the Law Eusébio de Queirós (outlawing the slave trade), ends in 1888, with Princess Isabel signing the "Lei Áurea", that finally abolishes slavery.[97] Brazil would be the last country in the Western world to end slavery.

Finally, the increasing influence of the Republican Party and public opinion against the Empire, as well as problems with the Church and with the Army (Cardoso 1975) would leave the emperor Dom Pedro II in an untenable situation (supported only by some coffee growers in the Paraíba Valley and sugar planters in the Northeast) and the Republic is proclaimed in 1889.

[97] Important intermediary laws are: Law Visconde do Rio Branco (1871,"Lei do Ventre Livre"), which states that children of slaves would be free; and Law Saraiva-Cotegipe (1885, "Lei dos Sexagenários"), which states that slaves more than 65 years old would be freed (this law became a national joke, since few slaves lived to be 65, and those who did were only seen as a problem in their owners' price).

Discussing the advent of the Republic, Prado Jr. (1956 [1945]) notes that: "It is not like it had any social or political depths; the change in the political regime was no more than a political coup, with the participation of few civilian groups and the complete absence of popular participation" (Prado Jr. 1956 [1945], p. 214). One of the politicians, during the transition, said: "The people (…) were like dumb animals, watching the coup take place, yet without awareness of its significance" (Prado Jr. 1956 [1945], p. 214). Furthermore, "political power was in the hands of the enlightened few, who ruled over the illiterate majority" (Faoro 1977, p. 621).

The result, in terms of effective democratic participation is still debatable. According to Faoro (1977), in the first presidential election in which all states participated (1898), there were 462 thousand voters (approximately 2.7% of the population). The author further notices that the proportion stayed between 2.3 percent and 3.4 percent between 1898 and 1926.[98] Nevertheless, even if we argue that there was, in a sense, an expansion in effective enfranchisement, the facts reveal that the system remained largely captured by a few elite groups (as we will explore in greater detail below). There were no significant movements that would politically empower broader population groups, whether by economic pressure or credible threats of social unrest or revolution (Acemoglu and Robinson 2000b).[99]

2.3 The First Republic: Social, Economic and Political Aspects

In this section, we will explore in greater depth the period known as the First Republic (1889-1930), which is the key period of Brazilian history in our study.

We start by introducing the new Republican regime following Carvalho (1946). The proclamation of the Republic was a victory for the federalist principle. This was largely favored because of its perceived success in the United States. However, in Brazil, the basic elements of the American Federation were reversed. One important difference is that, whereas

[98] An impressive tendency, in Faoro's (1977) view, since the proportion of people who were literate grew from 14.8 percent in 1890 to 24.5 percent in 1920.

[99] Acemoglu and Robinson (2000b) expand on the work of Meltzer and Richard (1981) by providing a possible explanation for the increase in (effective) franchise and, therefore, political participation, that led to the increase in government size. The expansion of franchise empowered new (poorer) groups that favored redistributive policies (therefore increasing the role of the government), likely what the political elites (in the terminology of Acemoglu and Robinson 2000b) at the end of the Empire feared.

the United States were independent states that had united under a single flag, Brazil was a different case: a unitary State, with relative political centralization during the Empire (1822-1889), suddenly transformed its provinces into sovereign states. And there is a long way to go between declaring the sovereignty of the provinces and their actual sovereignty. As noted by Aurelino Leal (in Carvalho 1946), to suddenly "improvise" states, to transform provinces into states when they have never been independent was simply giving something a different name: the essence does not change. According to Carvalho (1946), the consequence was that the states became the center of national life, at the expense of the municipalities.

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 of 1891, all literate males 21 and older could vote. This generated a small but significant increase in comparison to the time of the Empire (e.g., in the elections of the last session of the imperial parliament in 1886, 0.89% of the population voted, while in the presidential elections of 1898 2.70% of the population voted, an increase of almost 300%) (Love 1970). 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 (2012 [1948]) explicit exposition (see also, e.g., Carvalho 1946), 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 new 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).

Elections were fraught with irregularities. Two methods the most common: the *bico de pena* ("feather beak") and the *depuração* ("cleansing"). As stated by Leal (2012 [1948]), the former was the method preferred by election officials, who would forge new names, and count votes from dead voters, among other "techniques" they used. The latter method, usually employed in the legislative sphere, would "legally" put obstacles in the way of unwanted elected individuals.

We will now turn, by relying on Leal (2012 [1948]), perhaps the most important study on the subject, to the most important aspect of Brazilian history for our study, and one of the most important characteristics of the First Republic: the *coronelismo*. Leal (2012 [1948]) defines it as the result of a combination of the representative system of the time and its consequences 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]). In a similar vein, Huntington (1968) explores the political instability which was the consequence of the failure of the policies in question to develop aggregating institutions rapidly enough to keep pace with rapid political mobilization (Love 1970). Therefore, a necessary condition for stability is that, as political participation increases, so must the complexity, autonomy, adaptability, and coherence of the society's political institutions. In other words, "without the requisite social and economic structures, universal suffrage could either produce long-term political stability or strengthen traditional conservative elements against liberal reformers" (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 (as shown in Chapter 3).[100] The vast distances and empty areas within the territory, as well as the scarcity of people, greatly influenced the situation (Carvalho 1946).[101] 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 – as we will explore in greater detail below – is that the local chiefs provide

[100] 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 larger percentage of urban dwellers would vote than their rural counterpart.

[101] Since colonial times, the vast distances had made it impossible for the municipalities to congregate around the central government. The result was a kind of anarchy in the communes, which were essentially ruled by the landowners (Carvalho 1946).

unconditional support to the "official" candidates (in most cases, the incumbent's) in state and federal elections, and in return, the states give the local chiefs a free hand (as long as they are not political opponents) in almost all issues that concern the municipality, including the appointment of state positions at local level (Leal 2012 [1948]).

Irrespective of who the local chief was, the primary element of this kind of leadership was the *coronel* ("colonel"), who determined which way his dependents would vote.[102] Most voters belonged to the rural population that depended on the *coronel*'s lands for their survival. As noted by Leal (2012 [1948]) they lived in the most lamentable state of misery, ignorance and abandonment. However, any favors or benefits that this miserable group of individuals received, however few, came from the *coronel*. It is important to note that the influence of the *coronel* extended to the small landowners, who were usually extremely poor. As a consequence, they were loyal to their *coronel*, especially at the election time.[103] The *coronel*'s electoral power gives him political prestige, a natural consequence of his privileged position as a landowner (Leal 2012 [1948]). Therefore, as we can see, the elements, land, franchise and politics, were well connected in this captured political system. This is the basis of Leal's (2012 [1948]) original characterization of the *coronelismo* phenomena as a system.

An important aspect of Brazilian society under the First Republic, and a characteristic that still largely persists in modern-day Brazil, is the weakness of municipal administration. The lack of "human capital" broadly speaking (training, education, etc.) and infrastructure are only a part of the explanation (Leal 2012 [1948]). The other part of the explanation is the *filhotismo* (a mixture of nepotism and cronyism), the other side of which is the *mandonismo* (manifested in the persecution of opponents and political rivals), and the use of public money, goods and services in "electoral battles".

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,

[102] This term was originally borrowed from the military, but increasingly became a generic term for powerful people in rural areas and although used mainly to describe landowners, the term could also be applied to lawyers, doctors, etc. (Leal 2012 [1948]). Love (1970) also notes that that non-landlord *coronéis* ("colonels") probably increased in numbers as the Republic developed, although most had close connections with big landowners.
[103] These consisted of the notorious *votos de cabresto* ("halter votes"). The *coronel* also used more direct forms of electoral fraud, of which the most common were "voting" illiterates, non-existent and deceased persons, and non-citizens (Love 1970).

churches, health centers, hospitals, soccer fields, and the provision of electricity, sewage, and piped water, 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]). This is a key characteristic for our analysis.

Leal's (2012 [1948]) analysis stressed the importance of the reciprocity in this 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, that controlled the budget, the jobs, the favors and the police force. This dependence of the state on the *coronel* was a direct consequence of the twisted agrarian structure of the country that made a significant part of the population dependent on the *coronéis*, making it difficult for the political information (and knowledge on political parties) to reach them and enable them to think by themselves. The weakness of the municipalities was therefore a deciding factor in maintaining the *coronelismo* (Leal 2012 [1948]).

This leads us to another essential aspect of the First Republic. This is the style of rule known as the *política dos governadores* ("governors' policy"). 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 presidential policies in congress (which favored export agriculture) and electoral support of the president's successor" (Love 1970, p. 9). Just as *coronelismo* ruled relations between municipalities and states, the *política dos governadores* ruled relations between the states and the federal government. 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*.[104] 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. Therefore, federalism in Brazil has developed at the expense of municipal autonomy (Leal

[104] 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 (which were much broader in the former) (Leal 2012 [1948]).

2012 [1948]). A complementary analysis suggests that, at state level, there were political incentives to invest in education in order to acquire more votes (Martínez-Fritscher, Musacchio, and Viarengo 2010). Martínez-Fritscher, Musacchio, and Viarengo (2010) provide quantitative evidence that the increase in public expenditure was mainly driven by the states' funds, obtained as a consequence of the decentralization of taxes revenues – especially export taxes – introduced by the Constitution of 1891.

This analysis proves to be even more consistent if we look at the state of municipality revenues.[105] In colonial times (1500-1822) and throughout the time of the Empire, municipalities had scarce resources (Leal 2012 [1948]). There was little change in the situation under the First Republic (and it is more or less still so today, in fact). Under the new regime defined by the Constitution of 1891, the resources of the municipalities were defined entirely by the ones of their respective state: in other words, the municipalities did not have their revenues set out in the Constitution. The states, in turn, have always complained of the lack of sufficient revenues to fulfill their obligations, which led several politicians (Alcântara Machado, among others) to attribute to this the poverty of the municipalities.[106] According to Rafael Xavier (in Leal 2012 [1948]) the distribution of the total collected revenues in the country in 1942 were as follows: 48.39% to the Union, 39.86% to the states, and 11.75% to the municipalities. If we exclude the capitals and the Federal District (42.4% of total municipality revenues according to Rafael Xavier), only 6.9% of the collected revenues were available for the remaining municipalities of the country. The situation is even more dramatic if we separate the rural from the urban and suburban areas. Again according to Rafael Xavier, the population in the country-side corresponded to 86.4% of the total population of the country, yet received only 6.9% of the tax revenues of the country. This figure was probably less favorable to the municipalities during the First Republic.

If we look more closely at how the revenue was allocated, we see that, even in rural municipalities, the revenue is basically directed towards the (mostly small) urban centers. The highest share of the municipalities' resources goes towards providing essentially urban benefits such as piped water, sewage systems, gardens and electricity (Leal 2012 [1948]). An interesting question is how the governments managed to remain in favor with the electorate

[105] Note that customs taxes were 56.8% of the National Government Revenue in Brazil, while income and wealth taxes were negligible. The past figures for customs taxes are 71.9% for 1870, 66.7% for 1888, and 65.5% for 1900 (Sokoloff and Zolt 2006, p. 224, Table 3).
[106] According to Leal (2012 [1948]), it was normal for the states to have budgetary deficits.

(which was mostly rural) when they paid relatively little attention to them. According to Leal (2012 [1948]), from a purely political perspective, this can be explained by the falsification of votes and by the complete submission of rural life to the public power of the states, which meant that political opposition was virtually non-existent. Although financial difficulties were a reality in the three spheres of the public sector (Union, states and municipalities), it was the municipalities who suffered most, and, without resources for even basic attributions, political autonomy was practically impossible.

Almost inevitably, police forces were also deeply involved in this system of compromise. Under the federalist system of 1891, the states had the power to coordinate police functions, which made it possible to use the police forces as political instruments. According to Leal (2012 [1948]), the difference was that instead of being used as political instruments by the central government, as was the case under the Empire, the police forces were now politically at the service of the states, strengthening the *coronelismo* and the *política dos governadores*. Therefore, the weaknesses of the police and judicial organizations resulted from the "isolation, the country's poverty, the scarcity of public rents, the human fragility, and, in a significant way, of those political interests of the state" (Leal 2012 [1948], p. 205).

2.4 Recent Years

According to the World Bank, Brazil's population was approximately 175 million people in 2000, i.e. the fifth largest country in the world in terms of population, after China (1,263 million), India (1,042 million), the United States (282 million), and Indonesia (209 million).[107] This number is almost six times higher than in 1920, when Brazil had a population of approximately 31 million. If we consider the respective area of the states, the population is divided throughout the five Brazilian regions disproportionally. According to the *IPEA*, in 2000, the most populous regions were the Southeast and Northeast, with approximately 42.6 and 28.1 percent of the population, respectively. In the same year, the South region had 14.8 percent of the population while the North and Center-West regions had 7.6 and 6.9 percent, respectively. These numbers are roughly the same as the figures for 1920.

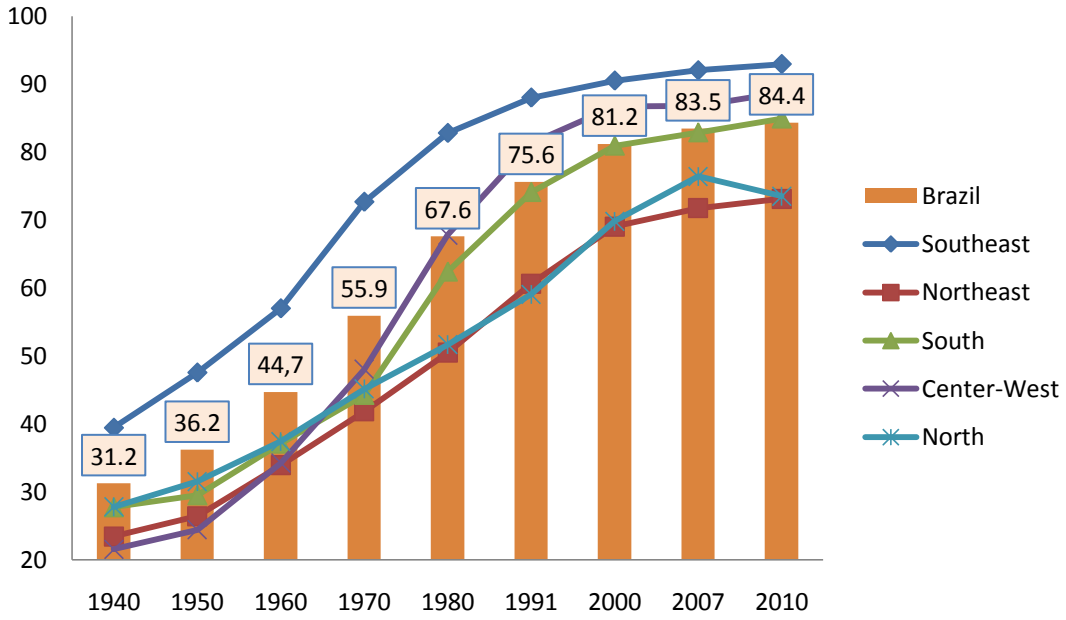
[107] The last official data available from the *World Bank*, for 2012, reveals a population of approximately 199 million (it is now probably over 200 million). For 2012, the ranking of the five most populous countries is the same as in 2000.

The most significant change was a reduction in the Northeast's share (from 37 percent in 1920 to 28.1 percent in 2000) whereas there was an increase in the share of the Center-West and North shares (which were 2 and 5 percent, respectively, in 1920). In 1920, the Southeast's share was 42 percent, while the South region's share of the population was 14 percent.

Of the 26 states and the Federal District, the three most populous states in 2000 were São Paulo, Minas Gerais, and Rio de Janeiro (all in the Southeast region), comprising approximately 21.8 percent (approximately 37 million people), 11 percent (approximately 18 million people) and 9 percent (approximatelty14 million people) of the country's total population, respectively.[108] Rio Grande do Sul, with approximately 6 percent (approximately 10 million people) of the total population of the country, was the fifth most populous state, while Pernambuco was the seventh, with approximately 5 percent (approximately 8 million people). Therefore, the states investigated in this study made up 43 percent of Brazil's population in 2000.

Widely acknowledged, and justification for the view that Brazil is "a country with many countries within", are the significant disparities among Brazilian regions. Despite rapid convergence in the past decades, urbanization data is still clarifying for the understanding of the above-mentioned disparities. In the year of 2000, Brazil had an urbanization rate of 81.2 percent. Graph 1 shows the historical evolution of the urbanization rate in Brazil. We can see that it was only during the 1960s that the majority of the population began to move to urban areas, although for the Southeast, this happened earlier, during the 1950s. And the Southeast, as expected, is the most urbanized region, with 90.5 percent of its population living in urban areas in 2000. However, there are also significant differences within the region. On one hand, the state of São Paulo has 93.4 percent urban population, and on the other, Minas Gerais, the most rural state in the region, has 82 percent urban population. The South region has 80.9 percent of its population living in urban areas, and the figure for Rio Grande do Sul is 81.6 percent. Northeast, the most rural region in the country, has 69.1 percent urban population. Pernambuco, the most urbanized state in the region, has 76.5 percent of its population living in urban areas. The remaining regional figures show an urbanization rate of 86.7 percent for the Center-West and 69.9 for the North.

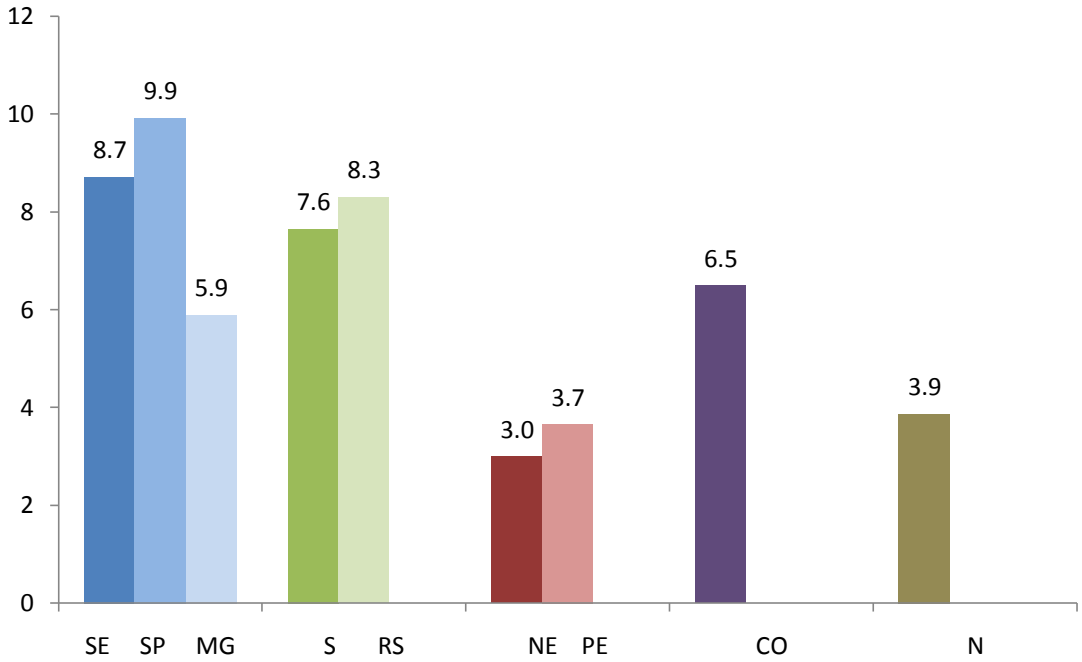
[108] The capital of the state of São Paulo, also called São Paulo, alone has a population of approximately 11 million, which makes it one of the most populous cities in the world.



Graph 1 - Urbanization rates: Brazilian regions
Source: *IPEA*

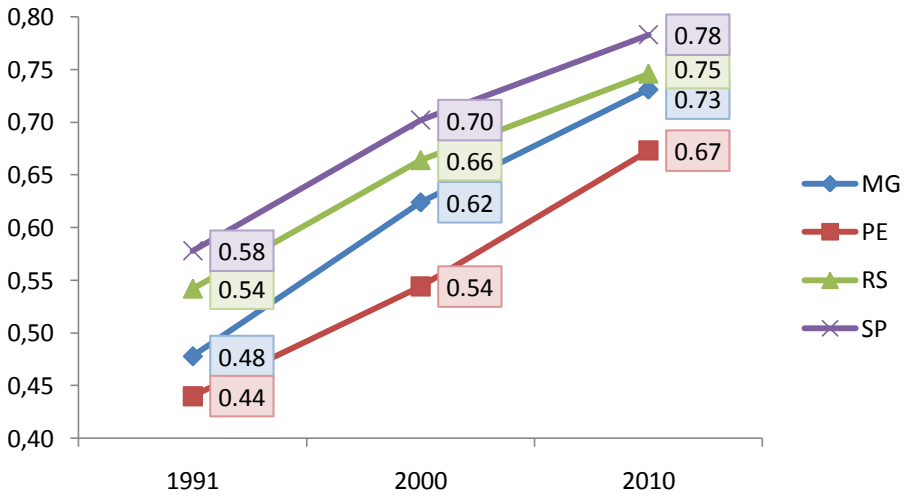
Development indicators present an impressive heterogeneity within the territory. Graph 2 presents data from the *IBGE* on GDP *per capita* for the five Brazilian regions and the four states which are the focus of this study. Figures are shown in thousands *reais* in 2000. Southeast is the richest region, and São Paulo the richest state, with an average GDP *per capita* of 9.9 thousand *reais* in 2000.[109] For Minas Gerais, the figure is 5.9 thousand *reais*. In the country's second richest region (the South region), Rio Grande do Sul had a GDP *per capita* of 8.3 thousand *reais*, being the third richest state. Finally, Northeast is the poorest Brazilian region, with an average GDP *per capita* of 3 thousand *reais* in 2000. Pernambuco's GDP *per capita* was 3.7 thousand.

[109] Richer than São Paulo, the Federal District had an average GDP *per capita* of approximately, 14 thousand *reais*.



Graph 2 – GDP *per capita*: Brazilian regions and states
Source: *IBGE*
Note: SE: Southeast region; SP: São Paulo; MG: Minas Gerais; S: South region; RS: Rio Grande do Sul; NE: Northeast; PE: Pernambuco; CO: Center-West region; N: North region.

Naturally, these differences extend to other spheres. According to *IPEA*, the average municipality's HDI in 2000 was 0.70 for São Paulo, smaller only than the figure for the Federal District, of 0.73. The values for Minas Gerais and Rio Grande do Sul, in the same year, were 0.62 and 0.66, respectively. Pernambuco's figure was much lower, at 0.54. Graph 3 shows the evolution of the municipalities' HDI for the studied states.



Graph 3 – Average municipalities' HDI: Brazilian states
Source: *IPEA*

2.4.1 Inequality

Brazil is one of the most unequal countries in the world.[110] According to the World Bank, Brazil's income Gini coefficient was approximately 0.60 in 1999. Table 1 presents an inequality ranking, derived from the available data from the World Bank. The result is impressive. First of all, only Sub-Saharan and Central and South American countries are on the list. Second, sixteen of these countries are from the American continent. Third, practically all South American countries are included.[111] Finally, according to the available data, Brazil was the second most unequal country in the world in 2000.

Table 1 – Countries' Gini coefficient, 2000

	Country	Gini Index (%), 2000
1	Bolivia	62.8
2	Brazil	59.8*
3	Haiti	59.2**
4	Colombia	58.7
5	Angola	58.6
6	South Africa	57.8
7	Panama	57.3**
8	Paraguay	57.0*
9	Ecuador	56.6
10	Honduras	55.4*
11	Chile	55.3
12	Guatemala	54.3
13	Belize	53.1*
14	Suriname	52.9*
15	El Salvador	52.2*
16	Dominican Republic	52.0
17	Mexico	51.9
18	Rwanda	51.5
19	Argentina	51.1
20	Sao Tome and Principe	50.8**

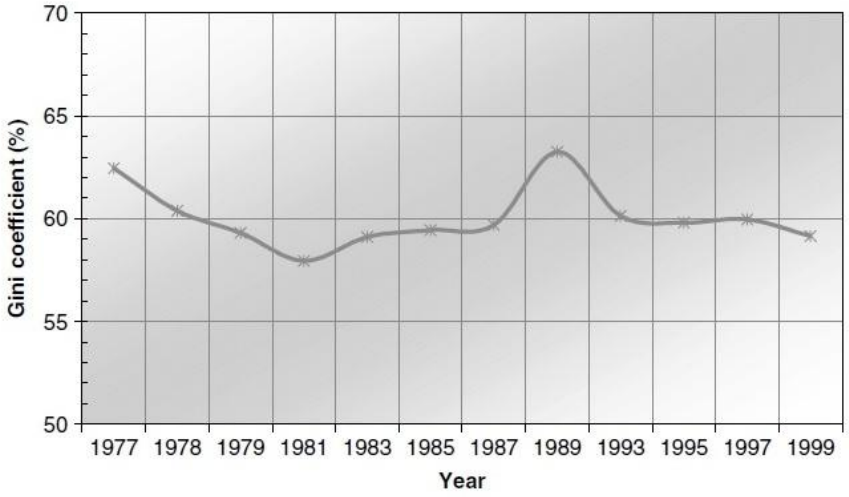
* Data for 1999; ** Data for 2001.

Source: World Bank

As we can see from Graph 4, Brazil's inequality has remained remarkably stable over time.

[110] For a perspective of inequality through Latin America, see Frankema (2009).

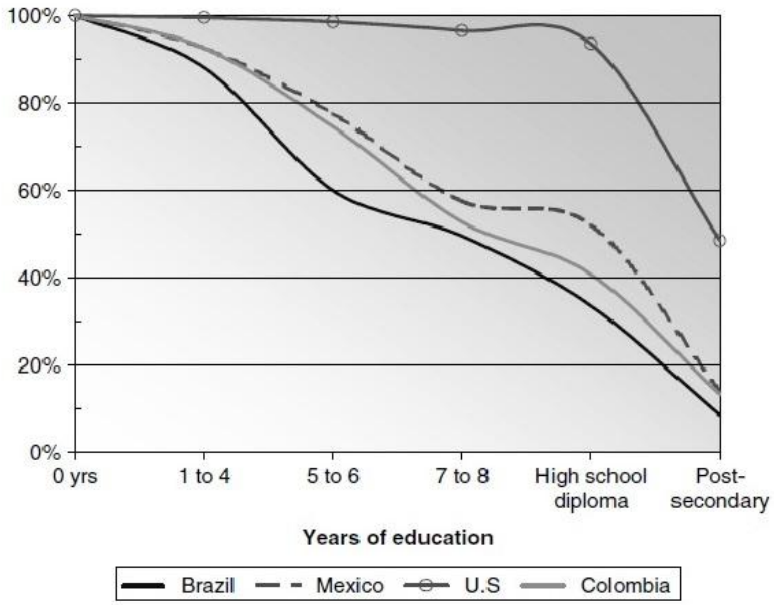
[111] There are eleven countries in South America. The four countries not included in the table are: Peru (ranked 21), Venezuela (ranked 23), Uruguay (ranked 26), and Guyana (no available data).



Graph 4 – The evolution of Brazil's Gini coefficient over time
Source: World Bank (2004, p. 13)

The World Bank's report (2004) sets out four main causes for Brazil's high inequality: (i) the underlying distribution of assets across the population might be more unequal than in other countries; (ii) price differentials of these assets – notably education – might be steeper in Brazil than elsewhere; (iii) behavioral differences or differential patterns of use of those assets; and (iv) the distribution of claims and entitlements to state transfers might be less progressive than in other countries.

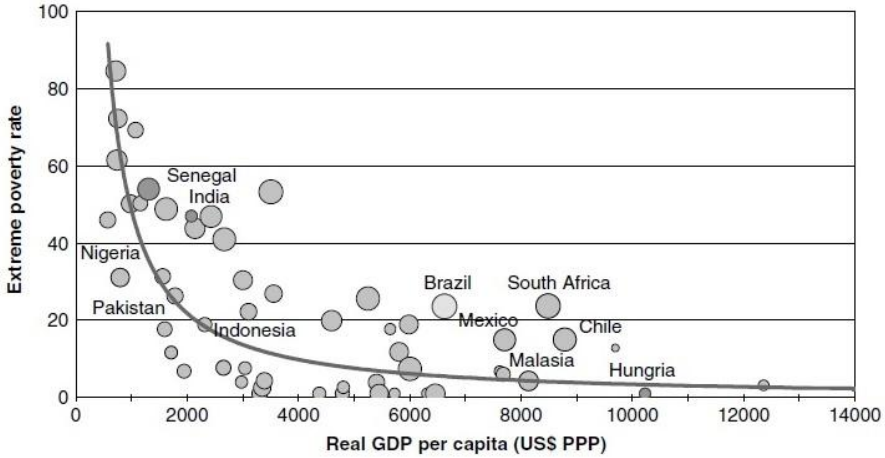
The report identifies important disparities in the distribution of two essential assets: education and agricultural land. As we can see from Graph 5, among the population of working age, the educational levels distribution is much more unequal than in Colombia, Mexico, or the United States. Furthermore, the report mentions that, despite high levels of land inequality, Brazil is not an international outlier (although there are significant regional disparities).



Graph 5 – School attainment of the working-age population: Brazil, Colombia, Mexico, and the United States, 1999
Source: World Bank (2004, p. 20)

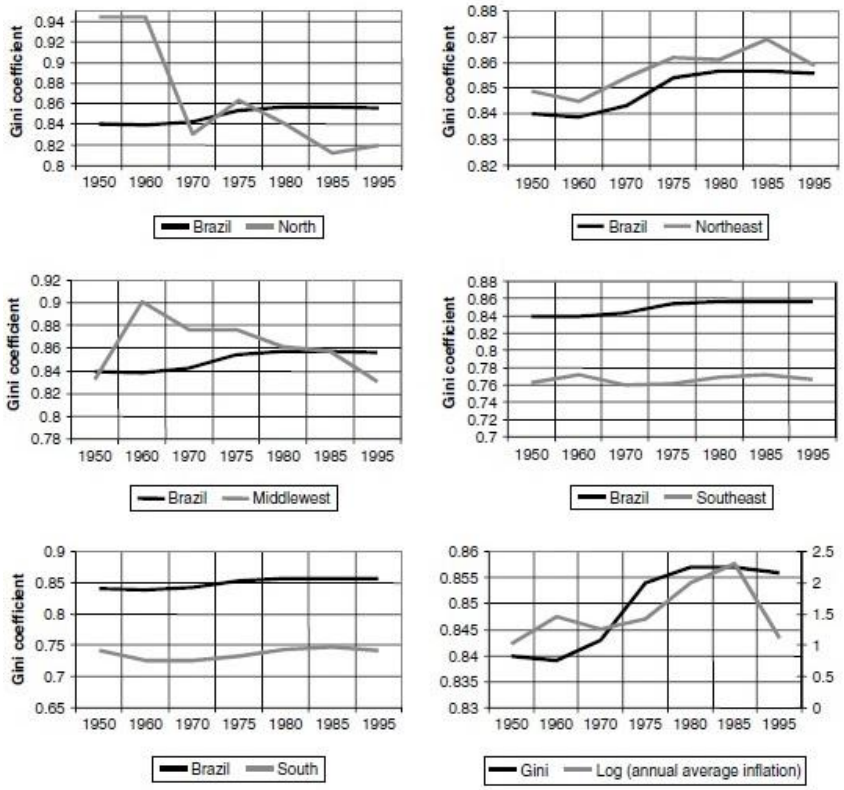
The report also highlights the higher wage differentials to additional schooling years in Brazil. Therefore, "an already unequal asset distribution is projected into an even more unequal distribution of market incomes" (World Bank 2004, p. 22). The reduction of the skill premium would be an important change towards the reduction of inequality. Historical, political, and social factors are also mentioned, especially differences in productivity determinants across national territory, such as infrastructure, the quality of government services, and so forth. Total taxation is also identified as regressive, despite "direct taxation being mildly progressive" (World Bank 2004, p. 34). Furthermore, the report states that some of the "Brazilian public transfers – chiefly retirement and pensions – are also highly regressive when compared with those of the United States" (World Bank 2004, p. 26).

Furthermore, Brazil's high inequality is likely related in a causal way to its poverty indicators. Graph 6 presents the cross-country relationship between the extreme poverty ratio and real GDP *per capita*. As we can see, the higher poverty ratio in Brazil for its given real GDP *per capita* is associated with its high inequality.



Graph 6 – Extreme poverty rate and development cross-country
Source: World Bank (2004, p. 9)

Finally, and especially relevant for our study, Brazil's land distribution is also highly heterogeneous within the country. Despite a high absolute land Gini coefficient, "the country is not as much an international outlier in terms of the distribution of land as it is in terms of income" (World Bank, 2004, p. 21). As we can see from Graph 7, in 1995 the Northeast was the region with the most unequal distribution of land in the country, a tendency which has been increasing since 1950. South and Southeast, with similar land Gini coefficients, had the most equal (relatively) land distribution within the country.



Graph 7 – Inequality of land distribution within Brazilian regions, 1950-1995
Source: World Bank (2004, p. 22)

3 THE DATA

In this chapter we explain and investigate the data in greater detail. First, we explore the Census of 1920, our major source of data. The available statistics allow us to calculate economic and political inequality indicators at the municipal level for Brazil in 1920. Second, we introduce the main development indicators considered, which will be the dependant variable in our econometric analysis. Third, we deal with the construction of the Comparable Territorial Units (CTU), a fundamental issue for this study. Finally, we investigate the statistics and correlations considered.

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 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 Paulo, and Rio Grande do Sul.[112] 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.

[112] 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.

The number of rural properties surveyed throughout the country is 648,153, with a total area of 175,104,675 hectares (Table 2), 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 2 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).

Table 2 – 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.

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 3, 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.

Table 3 – 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.

As expected due to its large area and economic importance (as discussed in Chapter 2), Minas Gerais is the most populous state in 1920, 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.

3.1.1 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 landholdings (as discussed in Chapter 2). 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 4 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.

Table 4 – 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.

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):[113]

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

[113] The calculation is made using the Stata program *ineqdec* and *ineqdec0*.

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) (see Section 3.3) 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 5).

Table 5 – Descriptive statistics

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

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 percent of the individuals of a given society, while the other 90 percent 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 estimated number of families that do not have land holdings.[114] The average overall land Gini

[114] 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,

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 5).

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.[115] 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 5). 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.

3.2 Contemporaneous (Dependent) Variables

We explored a variety of contemporaneous variables in order to improve our understanding of the relationship between inequality and development as a concept broader than simply GDP *per capita*. In this sense, our first reference is the systematic analysis made by the United Nations, with important contributions from Amartya Sen and Mahbub ul Haq, which led to the construction of the Human Development Index (HDI).[116]

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.

[115] The Constitution of 1891 was in force from 1891 to 1934.

[116] See Sen (2000) and Ul Haq (1995).

We collected data for GDP and total population for each municipality in the year 2000 from the Institute for Applied Economic Research (*Instituto de Pesquisa Econômica Aplicada* – IPEA) in order to construct our variable of municipality GDP *per capita*. From IPEA we also collected data for educational and health indicators: for educational attainments we analyzed the average years of study for individuals 25 and older and we took infant mortality as a health indicator. In addition, we collected data (also from IPEA) for the percentage of households with access to electricity and piped water, and a poverty index.

Like Acemoglu *et al.* (2008), we use a variety of exogenous control variables in the regressions in order to ensure that the results were not driven by omitted factors, such as quality of land. We have three different groups of control variables. First, we have geographical variables (collected from the IPEA), which include altitude, geographical area, latitude, average rainfall for each season (a total of four variables), as well as average temperature for each season (four more variables). Our second group includes demographic variables (from the IPEA and the Census of 1920). Our demographical controls include variables for 1920 (total population) and for 2000 (total population, rural population, and urban population). Finally, our third group, for reasons which will become clearer later, includes educational controls for 1920 (collected from the Census of 1920). These are the percentage of teachers, the percentage of individuals dedicated to "science, letters, and arts", the percentage of literate women, and the number of schools.

3.3 Comparable Territorial Units (CTU)

Since the mid-nineteenth century, the Brazilian territory has undergone significant changes, both in the number and in the geographical limits of its politico-administrative units. Examples of these changes include: transfers of territories within municipalities, the creation of new municipalities and transfers of territories within states, among others. This means that direct intertemporal comparisons of municipalities over relatively long time spans is not possible.

Therefore, the construction of the comparable territorial units (CTU) became a necessary step for the comparable study of different years in the Brazilian context, especially since

comparisons were even more difficult at the municipal level due to the rapid increase in the number of municipalities and the changes in their geographical limits.[117] The CTU are simply the aggregation of the minimum number of municipalities possible in order to allow the intertemporal comparison of the data. In 1920, 1,304 municipalities were surveyed in the Census. By 1950, this number had grown to 1890, to 3,952 in 1970, and 5,507 municipalities in 2000. Today, there are officially 5,570 municipalities within Brazilian territory.

Using information in the work of Reis, Pimentel and Alvarenga (2010), we were able to divide the territories of Minas Gerais, Pernambuco, São Paulo, and Rio Grande do Sul into 157, 52, 172, and 27 CTU, respectively.

These CTU will, therefore, be our unit of analysis. All data have therefore been consistently unified to present their respective information for each of the CTU.

3.4 Descriptive Statistics and Correlations

Tables 3, 4, and 5 present descriptive statistics for each of the four states – Minas Gerais, Pernambuco, São Paulo, and Rio Grande do Sul – and for all the CTU together. We now analyze more closely the features of these tables.

According to our constructed (standard) land Gini coefficient, São Paulo and Rio Grande do Sul are the states with the most unequal distribution of landholdings among landowners, while Pernambuco appears to be the most egalitarian one in this respect. This is somewhat surprising, for the Northeast region of Brazil, where Pernambuco is located, is widely regarded to be a particularly unequal one (even by Brazilian standards), while the South region, where Rio Grande do Sul is located, is a relatively equal one. So what could explain these unexpected results? Part of this difference can be explained by stating that high (low) inequality among landowners does not necessarily imply high (low) inequality throughout the whole population. The South region is a relatively equal region if we consider the population as a whole. We can see that by checking the constructed overall land Gini coefficients. Rio Grande do Sul is considerably more equal. In addition, when we analyze the overall land Gini,

[117] The ease of interpretation of these CTU, simply the smallest comparable amount of territory comparable over time, is inversely proportional to the difficulties involved in constructing them.

we see that Pernambuco was not more unequal than São Paulo or Minas Gerais – something which no longer holds today, as Pernambuco is a more unequal state (see the contemporaneous income Gini coefficient in Table 5). This might indicate the positive effect of growth inequality in a dynamic relation through time, since the Southeast, the region where Minas Gerais and São Paulo are located, was the fastest-growing Brazilian region in that period, while Northeast remained a largely poor region.

Table 5 also shows that the average of the GDP *per capita* across CTU reveals the basic picture of Brazil: São Paulo and Minas Gerais, located in the Southeast, the richest region in the country, are relatively rich (much above the Brazilian average) with São Paulo being the wealthiest state in the country. Rio Grande do Sul has an average GDP *per capita* which is higher than Minas Gerais but lower than São Paulo. Pernambuco, located in the Northeast, which is a poor and very unequal region in the country, has the smallest GDP *per capita* across CTU. The average years of schooling presents an interesting fact: there is a change in the ranking related to GDP *per capita*, with Rio Grande do Sul having the highest average according to the CTU. This presents another interesting picture of Brazil: although the South is not the richest region in Brazil, it is often considered the most developed if we use a broader set of development indicators such as average years of schooling and inequality. The HDI presents a similar picture: both São Paulo and Rio Grande do Sul have the highest average values (0.79), while Pernambuco has the smallest (0.64). Poverty, as expected, follows the distribution reflected by GDP *per capita*. Standard deviations show that there are considerable variations within these figures.

Table 6 describes the data for all CTU further, by showing the correlation matrix among the main historical variables: the land Gini, the overall land Gini, and the political inequality variable at the beginning of the twentieth century, the contemporary income Gini, our main outcome variables (GDP *per capita*, average years of schooling, and infant mortality), and the geographical variable latitude. This table presents many interesting features. First, there is only a small correlation between the land Gini and the percentage of eligible voters (0.07). This result is in contrast with both main results in the literature: while there is a positive (significant) correlation for the nineteenth-century United States, we have a negative (significant) correlation within Colombia (Acemoglu *et al.* 2008). Second, the correlation between the land Gini and the main outcome variables (GDP *per capita*, average years of schooling, and infant mortality) is strong with a *positive* sign (e.g., the correlation with

average years of schooling is 0.53). This indicates that more *unequal* CTU have today better development outcomes.[118] Another interesting feature is that the land Gini in 1920, likely a good proxy for wealth inequality in early twentieth-century Brazil, has a *negative* correlation with the income Gini today (-0.21). This is quite an unexpected result, considering the largely accepted view of a persistent and structural inequality in Brazil. Yet, the land Gini and the overall land Gini in 1920 have a strong positive correlation (0.41). Another feature worth noticing is the high correlation between the percentage of eligible voters and the average years of schooling (the correlation coefficient is 0.38). One possible explanation could be that one of the criteria for eligibility to vote is literacy. This might cause our political inequality variable to capture some effects of a more highly educated CTU. This is why we set up several educational controls for the CTU in 1920, to strip our political variable from educational effects. This reasoning applies to all subsamples (for each state individually). We see also that the correlation between the percentage of eligible voters and the other main outcome variables is much lower (e.g., the correlation coefficient is 0.15 with GDP *per capita*). As expected, the main outcome variables, proxying income, education, and health status, are all positively correlated with the expected sign. However, this is a far from perfect correlation, indicating that there is independent information within these variables.

Table 6 – Correlation matrix: all comparable territorial units

	Land Gini (1920)	Overall Land Gini (1920)	Income Gini (2000)	Voters (%, 1920)	GDP per capita (log, 2000)	Average Years of Schooling (2000)	Infant Mortality (2000)	Latitude
Land Gini (1920)	1.00							
Overall Land Gini (1920; 15)	0.41	1.00						
Income Gini (2000)	-0.21	-0.10	1.00					
Voters (%, 1920)	0.07	0.08	0.03	1.00				
GDP *per capita* (log, 2000)	0.50	0.16	-0.35	0.15	1.00			
Average Years of Schooling (2000)	0.53	0.21	-0.28	0.38	0.75	1.00		
Infant Mortality (2000)	-0.57	-0.06	0.46	-0.19	-0.68	-0.74	1.00	
Latitude	0.52	-0.03	-0.37	0.28	0.56	0.60	-0.83	1.00

Source: Own calculations.
Note: Correlation coefficient between the considered variables.

Table 7 presents a similar correlation matrix for the state of Minas Gerais alone. The basic results are maintained. There is only a small correlation between economic inequality proxy (the land Gini) and political inequality (percentage of eligible voters) proxy (-0.05). The correlation between the land Gini and the main outcome variables is also strong and positive

[118] As expected, this relationship is maintained when we see the correlation between the land Gini and the HDI and the poverty index.

(e.g., the correlation coefficient between the land Gini and GDP *per capita* is 0.40). In contrast, the correlation between the land Gini in 1920 and the contemporary income Gini today is much smaller (0.07), which is also an interesting feature, given the previously-mentioned idea of a persistent and structural inequality within Brazil. The land Gini and the overall land Gini in early twentieth-century Brazil are also positively and strongly correlated (0.37). Similarly, there is a strong positive correlation between the percentage of eligible voters and average years of schooling (0.49), for which we must use the educational controls (for the year 1920). Another interesting feature is that latitude is strongly correlated with some contemporaneous outcome variables such as average years of schooling (0.39) and infant mortality (-0.44), a pattern which has also often been documented in a cross-country framework.

Table 7 – Correlation matrix: Minas Gerais

	Land Gini (1920)	Overall Land Gini (1920; 15)	Income Gini (2000)	Voters (%, 1920)	GDP per capita (log, 2000)	Average Years of Schooling (2000)	Infant Mortality (2000)	Latitude
Land Gini (1920)	1.00							
Overall Land Gini (1920; 15)	0.37	1.00						
Income Gini (2000)	0.07	0.09	1.00					
Voters (%, 1920)	-0.05	0.14	-0.14	1.00				
GDP *per capita* (log, 2000)	0.40	0.05	-0.22	0.21	1.00			
Average Years of Schooling (2000)	0.35	0.18	-0.18	0.49	0.65	1.00		
Infant Mortality (2000)	-0.34	0.06	0.28	-0.16	-0.57	-0.63	1.00	
Latitude	-0.10	-0.24	-0.39	0.27	0.22	0.39	-0.44	1.00

Source: Own calculations.
Note: Correlation coefficient between the considered variables.

Table 8 presents the correlation results for Pernambuco. And we have different results, both from the analysis of all CTU together and in comparison to Minas Gerais. First, the relationship between the land Gini and the percentage of eligible voters is negative and stronger (-0.14). Second, the correlation between the land Gini in 1920 and the main outcome variables is much weaker, sometimes even negative (e.g., the correlation with GDP *per capita* is -0.08 while the correlation with average years of schooling is 0.09). The correlation between the land Gini, in other words economic inequality in early-twentieth century Pernambuco, and the income Gini in 2000 is positive and stronger, but not very high (0.14). The correlation of the land Gini and the overall land Gini, both in 1920, is weaker in comparison with Minas Gerais (the coefficient is 0.20). Once again we see a strong positive correlation for our variable of political inequality with that for average years of schooling

(0.66), while this relationship is much weaker for other development outcomes, such as GDP *per capita* (0.21).

Table 8 – Correlation matrix: Pernambuco

	Land Gini (1920)	Overall Land Gini (1920; 15)	Income Gini (2000)	Voters (%, 1920)	GDP per capita (log, 2000)	Average Years of Schooling (2000)	Infant Mortality (2000)	Latitude
Land Gini (1920)	1.00							
Overall Land Gini (1920; 15)	0.20	1.00						
Income Gini (2000)	0.14	-0.10	1.00					
Voters (%, 1920)	-0.14	-0.16	0.37	1.00				
GDP *per capita* (log, 2000)	-0.08	0.35	-0.10	0.21	1.00			
Average Years of Schooling (2000)	0.09	0.14	0.14	0.66	0.57	1.00		
Infant Mortality (2000)	0.00	0.03	0.09	-0.38	-0.45	-0.72	1.00	
Latitude	-0.21	0.21	0.10	-0.03	0.04	-0.21	0.35	1.00

Source: Own calculations.
Note: Correlation coefficient between the considered variables.

Table 9 presents the correlation matrix with the same variables for São Paulo. The results are similar to the ones for Minas Gerais (a relevant fact, since these states are located in the same Brazilian region, the Southeast). There is practically no correlation between economic inequality (land Gini) and political inequality (percentage of eligible voters) in 1920. The correlation between the land Gini and our main income variables is weaker (relatively speaking) compared to Minas Gerais, but with the same positive sign and significant (e.g., the correlation coefficient with GDP *per capita* 0.24). The correlation with economic inequality 1920, measured by the land Gini, and income inequality today, measured by the income Gini, is, as for Minas Gerais, very weak (-0.06), albeit a negative correlation. The correlation of the land Gini and the overall land Gini, both for 1920, is very strong and positive (0.64). There is also a positive relationship between the political inequality variable and average years of schooling, as for Minas Gerais, Pernambuco, and when all CTU are included.

Table 9 – Correlation matrix: São Paulo

	Land Gini (1920)	Overall Land Gini (1920; 15)	Income Gini (2000)	Voters (%, 1920)	GDP per capita (log, 2000)	Average Years of Schooling (2000)	Infant Mortality (2000)	Latitude
Land Gini (1920)	1.00							
Overall Land Gini (1920; 15)	0.64	1.00						
Income Gini (2000)	-0.06	-0.17	1.00					
Voters (%, 1920)	0.00	0.17	0.25	1.00				
GDP *per capita* (log, 2000)	0.24	0.21	-0.12	0.00	1.00			
Average Years of Schooling (2000)	0.28	0.34	-0.03	0.31	0.58	1.00		
Infant Mortality (2000)	-0.22	-0.30	0.54	0.24	-0.33	-0.34	1.00	
Latitude	-0.26	-0.30	0.33	0.32	-0.12	-0.08	0.46	1.00

Source: Own calculations.
Note: Correlation coefficient between the considered variables.

Finally, Table 10 presents the analogous results for Rio Grande do Sul. Interestingly, in the South region, many other features changed. First, there is a strong positive relationship between the land Gini and the percentage of eligible voters (0.54). This is a unique result within our sample. There are also differences in the relationship between economic inequality in 1920 and our main outcome variables in 2000. The correlation of the land Gini and GDP *per capita* is now negative and significant (-0.23) while strongly positive, for example, for infant mortality (0.57). Therefore, we have mixed evidence when comparing economic inequality in early twentieth-century Rio Grande do Sul with development indicators for the state in 2000. The correlation of the land Gini in 1920 with both the overall land Gini (also in 1920) and the contemporaneous income Gini is highly positive (0.89 and 0.58 respectively). This might indicate a more persistent inequality compared to the other states. Last, but not least, there is a strong relationship between latitude and both measures of economic inequality at the beginning of the twentieth century: the correlation coefficient for the land Gini and the overall land Gini are strong and positive (0.45 and 0.39 respectively), as well as for economic inequality in 2000 (0.63), and with the percentage of eligible voters in 1920 (0.34). The interesting feature of this last correlation is that there is no corresponding relationship with average years of schooling (in fact, the correlation between the percentage of eligible voters and average years of schooling is 0.35, while the correlation of average years of schooling and latitude is negative, -0.02) suggesting that the correlation is from a political via. The correlation of latitude and contemporaneous development indicators is consistently negative.

Table 10 – Correlation matrix: Rio Grande do Sul

	Land Gini (1920)	Overall Land Gini (1920; 15)	Income Gini (2000)	Voters (%, 1920)	GDP per capita (log, 2000)	Average Years of Schooling (2000)	Infant Mortality (2000)	Latitude
Land Gini (1920)	1.00							
Overall Land Gini (1920; 15)	0.89	1.00						
Income Gini (2000)	0.58	0.50	1.00					
Voters (%, 1920)	0.54	0.60	0.32	1.00				
GDP *per capita* (log, 2000)	-0.23	-0.10	-0.09	0.19	1.00			
Average Years of Schooling (2000)	0.11	0.18	0.11	0.35	0.05	1.00		
Infant Mortality (2000)	0.57	0.45	0.43	0.47	-0.07	-0.10	1.00	
Latitude	0.45	0.39	0.63	0.34	-0.16	-0.02	0.59	1.00

Source: Own calculations.
Note: Correlation coefficient between the considered variables.

As we can see, there is a clear picture when all CTU are explored together, but the picture hides an exciting diversity within its data. Each state, with its particular region and with its

own colonial experiences that, as we try to argue, had a potentially different path when considering the *de facto* political and economic environment, presents its own particularities, its own story. In the next chapter, we will discuss the econometric analyses.

4 QUANTITATIVE ANALYSIS

This chapter comprises our quantitative analysis of the possible effects of economic and political inequality on Brazilian long-term development. First, we introduce our basic econometric framework. Second, we investigate the results for the main outcome variables (GDP *per capita*, average years of schooling, and infant mortality), and for secondary dependent variables (such as the HDI and indicators of the provision of public goods). Third, we include the overall land Gini in the econometric analysis. Fourth, we investigate the relationship between inequality in 1920 and contemporary inequality. Furthermore, we investigate the relationship between inequality and long-term development in Brazil controlling for structural elements (such as urbanization and industrialization) and for immigration. Finally, we present the main conclusions.

4.1 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), the only work, as already mentioned, with this approach, we first estimate cross-sectional ordinary least squares (OLS) regressions of the following form:

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

where y_i^{2000} is a measure of development for the CTU i for the year 2000, $\boldsymbol{x}_i$ is a vector of control covariates, and ε_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 α and β.

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 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 2.1.1), 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 (see Section 2.1.2). 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 (see Section 2.1.3). 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 (see Section 2.1.4).

The main econometric concern with this specification is the possible endogeneity bias generated by omitted variables.[119] In other words, if omitted factors in ε_i are correlated with

[119] 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: $E(\varepsilon/\boldsymbol{x}) = 0$, 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: $L(q|1,x_1,\ldots,x_k,z) = L(q|1,z)$, where $L(.)$ represents a linear projection (Wooldridge 2010).

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 1.4), 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 $\boldsymbol{x}_i$).

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 multiple regression, including both inequality variables. As dependent variables we will use our "main outcome variables", namely GDP *per capita*, average years of schooling, and infant mortality. We provide results for multiple samples: (i) all CTU; (ii) Minas Gerais; (iii) Pernambuco; (iv) São Paulo; and (v) Rio Grande do Sul. Results are summarized in Table 11.

Table 11 – Ordinary Least Squares regressions without controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A	**All Comparable Territorial Units**								
	Log GDP per capita			*Average Years of Schooling*			*Infant Mortality*		
Land Gini (1920)	2.27***		2.19***	4.58***		4.17***	-62.60***		-60.49***
Eligible Voters (%, 1920)		0.05***	0.03**		0.19***	0.16***		-1.21***	-0.80***
Observations	408	408	408	408	408	408	408	408	408
R^2	0.20	0.03	0.21	0.25	0.17	0.37	0.28	0.04	0.30
Panel B	**Minas Gerais**								
	Log GDP per capita			*Log Average Years of Schooling*			*Infant Mortality*		
Land Gini (1920)	2.45***		2.51***	3.83***		4.09***	-29.13***		-29.83***
Eligible Voters (%, 1920)		0.04**	0.05***		0.18***	0.19***		-0.46*	-0.50**
Observations	157	157	157	157	157	157	157	157	157
R^2	0.16	0.04	0.21	0.12	0.24	0.38	0.11	0.03	0.14
Panel C	**Pernambuco**								
	Log GDP per capita			*Log Average Years of Schooling*			*Infant Mortality*		
Land Gini (1920)	-0.36		-0.23	0.75		1.61	-0.54		-7.17
Eligible Voters (%, 1920)		0.06	0.06		0.37***	0.38***		-2.87***	-2.93***
Observations	52	52	52	52	52	52	52	52	52
R^2	0.01	0.04	0.05	0.01	0.44	0.47	0.00	0.14	0.15
Panel D	**São Paulo**								
	Log GDP per capita			*Log Average Years of Schooling*			*Infant Mortality*		
Land Gini (1920)	1.13***		1.13***	2.25***		2.25***	-9.37**		-9.38**
Eligible Voters (%, 1920)		0.00	0.00		0.14***	0.14***		0.59***	0.59***
Observations	172	172	172	172	172	172	172	172	172
R^2	0.06	0.00	0.06	0.08	0.10	0.18	0.05	0.06	0.10
Panel E	**Rio Grande do Sul**								
	Log GDP per capita			*Log Average Years of Schooling*			*Infant Mortality*		
Land Gini (1920)	-0.96**		-1.97***	0.52		-0.60	14.91***		11.60***
Eligible Voters (%, 1920)		0.06	0.14**		0.13*	0.15*		0.90***	0.44
Observations	27	27	27	27	27	27	27	27	27
R^2	0.05	0.04	0.19	0.01	0.12	0.13	0.32	0.22	0.36

Source: Own calculations.
Note: (i) ***p<0.01, **p<0.05, *p<0.10.

Panel A (Table 11) presents the results for the sample with all possible observations (the CTU from all the four states considered). We have three regressions for each of the three dependent variables. Columns 1 to 3 present the results for the (natural logarithm of) GDP *per capita*, columns 4 to 6 present the results for the average years of schooling, and columns 7 to 9 present the results for infant mortality. Panels B, C, D, and E present the analogous results for Minas Gerais, Pernambuco, São Paulo, and Rio Grande do Sul, respectively.

We start by analyzing Panel A. Column 1 shows a strong, positive, and highly significant association between the land Gini in 1920 and GDP *per capita* in 2000 (the estimated coefficient is 2.27) when considering all CTU. Column 2 presents the bivariate relationship between GDP *per* capita and the franchise variable. Although also highly significant, the estimated coefficient is of relatively small magnitude (0.05). Column 3 regresses the (natural logarithm of) GDP *per capita* against both variables. The results are similar: both estimated coefficients are positive and significant, with a much stronger relationship with the land Gini. Columns 4 and 7 present the bivariate relationship between average years of schooling and infant mortality, respectively, and the land Gini in 1920. The estimates also show a positive and highly significant relationship of economic inequality at the beginning of the twentieth century and development today, therefore a positive estimated coefficient for average years of schooling (4.58) and a negative estimated coefficient for infant mortality (-62.60). Columns 5 and 8 present the bivariate relationship between average years of schooling and infant mortality, respectively, and the percentage of eligible voters in 1920. The coefficient indicates a positive relationship – also highly significant – between political *equality* in 1920 and development today: more specifically, a positive coefficient for educational attainments (0.19) and a negative estimated coefficient for infant mortality (-1.21). Finally, columns 6 and 9 present the results for the multiple regressions (including both variables of economic and political inequality) for average years of schooling and infant mortality respectively. The results are very similar to the ones for GDP *per capita*. For both regressions, both estimated coefficients are positively related to development, with economic inequality having a much stronger relationship with development indicators. In other words, these results present a clear picture: economic inequality is positively (and strongly) correlated with long-term development, while political inequality is negatively (much weaker) correlated with long-term development.

We now move to Panel B, which presents information for the regressions in Minas Gerais. The results are strikingly similar to the ones for the sample as a whole. Column 1 shows the estimated coefficient for land inequality in a simple regression with the (natural logarithm of) GDP *per capita* as the dependent variable. The estimated coefficient is positive, of great magnitude, and highly significant (2.45). Column 2 presents the result for the franchise indicator, a proxy for political inequality. The estimated coefficient (0.04) is positive and highly significant, though small. Column 3 presents the regression of GDP *per capita* against both inequality variables. The results from columns 1 and 2 are maintained. We see, through simple regression evidence, that economic inequality in 1920 is also positively associated with other development outcomes. Column 4 shows the positive relationship with average years of schooling and column 7 shows the negative relationship with infant mortality, both highly significant. Columns 5 and 8, presenting the results for the regressions with the percentage of eligible voters as the only independent variable, indicate that political equality has a positive association with average years of schooling and a negative association (although only significant at a 10% level) with infant mortality. Columns 6 and 9 of Panel B, presenting the results of the regressions with both inequality variables as independent variables for education and health attainments, respectively, show that the results of columns 4, 5, 7, and 8 are maintained. In summary, the picture for Minas Gerais is the same as for the sample as a whole: economic inequality is positively, strongly and highly significantly associated with development outcomes in the long-term, while political inequality is negatively related with the same outcomes. It is worth remembering that, as shown in Table 7, there is almost no correlation between the inequality variables across the CTU of Minas Gerais.

Panel C presents the results for Pernambuco, which show a different picture. As we can see from columns 1, 4, and 7, economic inequality in 1920, measured by the land Gini, is insignificant in simple regressions with the (natural logarithm of) GDP *per capita*, average years of schooling, and infant mortality as dependent variables, respectively. Simple regressions with our proxy for political inequality, the percentage of eligible voters, indicate mixed relationships. While the franchise variable is insignificant for GDP *per capita* (column 2), it is highly significant for average years of schooling (column 5) and infant mortality (column 8), although of small magnitude. Including both inequality variables as independent variables for the regressions with each contemporaneous development indicator as dependent variables does not change the results of previous regressions: economic inequality is broadly

insignificant while political equality is associated with positive effects development indicators associated with education and health (columns 3, 6, and 9 of Panel C).

Panel D presents the results for São Paulo. Once again (as for Minas Gerais), the results are very similar to the broad patterns shown in Panel A (with all observations included). For all specifications, economic inequality has a positive highly significant association with development outcomes. Simple regressions give a positive (and highly significant) estimated coefficients when considering GDP *per capita* (column 1) and average years of schooling (column 4) as dependent variables, and negative results when infant mortality is the dependent variable (column 7). Political inequality, proxied by our franchise indicator, although significant in some specifications (when educational and health-related outcomes are considered – columns 5 and 8), has broadly small magnitudes, suggesting no relationship with development aspects. Once again, the results including both the land Gini and the percentage of eligible voters as independent variables maintain the general picture provided by the simple regressions: an expected result, given the absence of correlation between these two variables (Table 9). Therefore, the conclusions for both the sample as a whole and Minas Gerais apply to São Paulo as well.

Finally, Panel E presents the results for Rio Grande do Sul. Results are different for this region. The first noteworthy difference is that economic inequality is negatively associated with GDP *per capita* in the long term (column 1 presents the significant estimated coefficient, -0.96). This result is similar to the one for infant mortality: higher land Gini in 1920 is associated with higher infant mortality in 2000 for CTU in Rio Grande do Sul (column 7). Interestingly, in the simple regression, the land Gini is positively related to average years of schooling (column 4). Our political inequality variable has the expected sign in all simple regressions, although of small estimated magnitude and not always significant (columns 2, 5, and 8). When we include both inequality variables from 1920 (the land Gini and the percentage of eligible voters), we have results which are similar to the simple regressions for GDP *per capita* and for infant mortality. An interesting feature of this multiple regression is that the sign of the estimated coefficient for the land Gini changes (becomes negative) in the regression for average years of schooling (although it is no longer significant). Thus, a new picture emerges when we explore a state from the South region: both economic and political inequality are negatively associated with development outcomes in the long run. One possible

problem with the results from Rio Grande do Sul is the small number of observations. In order to deal with this problem we use a dummy interaction strategy with the whole sample.

Although important in their own right, the results presented in Table 11 reveal 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 franchise 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 already discussed.

The extended results for all the CTU from the four states considered in this study are presented in Table 12. This table also includes the results for the CTU from Minas Gerais, Pernambuco, and São Paulo (i.e, excluding Rio Grande do Sul). The analogous results for Minas Gerais and Pernambuco separately are presented in Table 13, while the results for São Paulo and Rio Grande do Sul are shown in Table 14. Therefore, each table presents the results for two sets of samples (columns 1 to 5 for the first set of samples and columns 6 to 10 for the second set). For each sample, we have the extended results for our three main outcome variables. Results for GDP *per capita* are in Panel A, while Panel B and Panel C present the results for average years of schooling and infant mortality, respectively. Finally, we note that all discussed results are confirmed by regressions including the whole sample with a dummy strategy for computing the differential effects within the states, unless explicitly stated otherwise.

As already mentioned, the first five columns of Table 12 present the results for all the CTU constructed. The first column indicates that the positive association between economic inequality in 1920 and GDP *per capita* (Panel A) and average years of schooling (Panel B) in 2000 is robust. Controlling for a rich set of geographical covariates, the estimated coefficients remain positive and significant. This strong robustness is lacking when we use a health indicator (infant mortality) as the dependent variable (column 1 of Panel C). In Table 11, we had a constant, and highly significant and positive association between our political inequality variable and development. The inclusion of control variables alters this result in mixed ways.

For GDP *per capita* we still have a positive relationship when only geographical controls are included (column 2), but this relationship becomes negative when the educational controls in 1920 are introduced (column 3). Therefore, we have evidence that the percentage of eligible voters indeed provides information on the educational environment of the respective CTU. The coefficient turning out to be negative is surprising. It indicates that a larger number of eligible voters is associated with lower GDP *per capita* in the long term. Although this is the opposite of what is stated in most theoretical and empirical literature, the coefficient is very small, indicating that the relationship might not be relevant. Results from columns 1 and 2 are maintained when including both inequality variables without the educational controls (column 4). Another surprising result is that, with the inclusion of the educational controls, the land Gini coefficient becomes insignificant (column 5). For attainments (Panel B) we find results similar to those for GDP *per capita* (Panel A). There are, however, two important differences. The first is that economic inequality is always significant and positively associated with development, even when we include educational controls for the beginning of the twentieth century (column 5). The other is that the political inequality coefficient does not change its sign, but loses it significance with the introduction of the educational controls (column 3). Results for infant mortality (Panel C) are somewhat unexpected. Economic inequality is never significant whereas, when we include the complete set of controls (both geographical and educational ones), political inequality becomes positive and highly significant. In other words, consistent with the results in Panel A, there is evidence of a negative association (although of small magnitude) between political inequality and some aspects of development (income and health).

Table 12 – Ordinary Least Square regressions with controls: all CTU and Minas Gerais, Pernambuco, and São Paulo

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	**Log GDP *per capita***									
	All CTU					*Minas Gerais, Pernambuco and São Paulo*				
Land Gini (1920)	0.61**			0.60**	0.25	0.89***			0.89***	0.48*
Eligible Voters (%, 1920)		0.02*	-0.03*	0.02*	-0.03*		0.03**	-0.03**	0.03**	-0.02*
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	408	408	408	408	408	381	381	381	381	381
R^2	0.46	0.45	0.51	0.46	0.52	0.50	0.49	0.55	0.51	0.56
Panel B	**Average Years of Schooling**									
	All CTU					*Minas Gerais, Pernambuco and São Paulo*				
Land Gini (1920)	2.03***			1.95***	0.99**	2.48***			2.48***	1.21***
Eligible Voters (%, 1920)		0.12***	-0.02	0.12***	-0.02		0.14***	-0.02	0.14***	-0.01
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	408	408	408	408	408	381	381	381	381	381
R^2	0.51	0.53	0.69	0.56	0.69	0.53	0.54	0.70	0.58	0.71
Panel C	**Infant Mortality**									
	All CTU					*Minas Gerais, Pernambuco and São Paulo*				
Land Gini (1920)	-3.77			-3.96	-0.36	-7.96*			-7.96*	-3.65
Eligible Voters (%, 1920)		0.25	0.64***	0.26	0.63***		0.02	0.50***	0.02	0.47**
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	408	408	408	408	408	381	381	381	381	381
R^2	0.80	0.80	0.81	0.80	0.81	0.81	0.81	0.82	0.81	0.82

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 12 also presents the results for the sample considering only the CTU from Minas Gerais, Pernambuco, and São Paulo. We exclude the state of Rio Grande do Sul for a number of reasons. First, the state presents unique features when exploring the relationship between inequality and development. Therefore, examining the sample with and without it may

provide useful insights on this relationship. Second, the state was the one that presented the most difficulty regarding the construction of the CTU, since it had only 27 observations, so this exercise can also be seen as a robustness check. The results turn out to be almost identical to those for the sample as a whole. The only relevant difference is the significance of economic inequality when geographical and educational controls are both introduced in the regression that has GDP *per capita* as the dependent variable (Panel A, column 10). There is also a significant (at 10% level) relationship between economic inequality and infant mortality when the geographical controls are included (Panel C, columns 6 and 9).

We now turn to Table 13, which presents the extended results for Minas Gerais (columns 1 to 5) and for Pernambuco (columns 6 to 10). We first discuss the results for Minas Gerais. Panel A shows that the result of economic inequality in 1920 being positively correlated to GDP *per capita* in the year 2000 is robust (significantly) for all sets of control variables (columns 1, 4 and 5). However, we can see that the significance of political inequality when using GDP *per capita* as the dependent variable is not robust when both geographical and educational controls are included (columns 3 and 5). Results for average years of schooling (Panel B) are very similar. The land Gini coefficient remains positive and significant in all specifications while the percentage of eligible voters is not significant when educational controls are included. However, regressions including the whole sample and state dummies indicate that there might be a robust positive relationship between the number of eligible voters and average years of schooling (see Appendix 2). Nevertheless, the estimated coefficient is very small (0.07), which provides further evidence that our political variable might also indicate educational attainments. Finally, Panel C presents the results for infant mortality. None of the inequality variables is significant in any specification.[120] The general picture for Minas Gerais is that economic inequality is consistently positively associated to a higher GDP *per capita* and higher average years of schooling in the long run, but not with lower infant mortality, while political inequality, measured by the percentage of eligible voters, appears to be of little relevance to developmental aspects in the long run.

[120] Regressions including the sample as a whole and dummy interactions for the states show that the land Gini is significant at a 10 percent level when only the geographic controls are included (see Appendix 2).

Table 13 – Ordinary Least Squares regressions with controls: Minas Gerais and Pernambuco

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	**Log GDP *per capita***									
	Minas Gerais					*Pernambuco*				
Land Gini (1920)	1.40***			1.37***	1.29**	-0.32			-0.20	-0.42
Eligible Voters (%, 1920)		0.04*	-0.01	0.03*	0.00		0.04	0.02	0.04	-0.01
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	157	157	157	157	157	52	52	52	52	52
R^2	0.47	0.46	0.47	0.49	0.50	0.35	0.37	0.38	0.37	0.38
Panel B	**Average Years of Schooling**									
	Minas Gerais					*Pernambuco*				
Land Gini (1920)	3.35***			3.21***	2.53***	0.04			1.05	0.55
Eligible Voters (%, 1920)		0.15***	-0.01	0.14***	0.01		0.35***	0.15	0.36***	0.18
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	157	157	157	157	157	52	52	52	52	52
R^2	0.45	0.48	0.55	0.54	0.58	0.38	0.71	0.73	0.72	0.73
Panel C	**Infant Mortality**									
	Minas Gerais					*Pernambuco*				
Land Gini (1920)	-7.93			-7.83	-5.08	6.14			1.02	4.65
Eligible Voters (%, 1920)		-0.11	0.14	-0.11	0.09		-1.84**	-2.05	-1.83**	-1.79
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	157	157	157	157	157	52	52	52	52	52
R^2	0.56	0.55	0.57	0.56	0.57	0.58	0.62	0.63	0.62	0.63

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Columns 6 to 10 of Table 13 present the results for Pernambuco. The Northeastern state show different results, the most interesting of which are that (as already found in the simple regressions), economic inequality appears to be non-correlated with any aspect of development in the long run. The estimated coefficients (columns 6, 9 and 10) are

insignificant for GDP *per capita* (Panel A), average years of schooling (Panel B), and infant mortality (Panel C). Political inequality is also insignificant when both geographical and educational controls for all three dependent variables are included, although it is significant when only geographical controls are included (Panels B and C). Notwithstanding these estimations, regressions considering the sample as a whole and dummy interactions for the states provide a different picture. The percentage of eligible voters is highly significant in all specifications for average years of schooling and infant mortality, with a positive sign and a non-negligible magnitude (see Appendix 2). We therefore find no significant relationship between economic inequality and variables capturing income, educational and health characteristics for the CTU of Pernambuco in the long run, although finding mixed results when considering our proxy for political concentration and both geographic and educational controls. We highlight the impressive explanation power of geographical variables for the state of Pernambuco, shown by the R^2 statistics.

Finally, Table 14 presents the results for the two remaining states: São Paulo and Rio Grande do Sul. We first analyze the estimated coefficients for São Paulo (columns 1 to 5). Similar to Minas Gerais, economic inequality is positively associated with GDP *per capita* in the long run when controlling for the geographical set of variables. The coefficients are large and significant (Panel A, columns 1 and 4). Political inequality becomes significant when controls are included.[121] For average years of schooling (Panel B) and infant mortality (Panel C), our franchise indicator is insignificant when the complete set of controls is included.[122] Economic inequality remains positively significant with the inclusion of geographical controls when using average years of schooling as the dependent variable (Panel B, columns 1 and 4). Like the results for Minas Gerais and Pernambuco, regressions with infant mortality as a dependent variable show no significance for economic or political inequality when the control variables are included. Moreover, there is an intriguing evidence that land inequality might affect long-term development through its impacts on education, when considering the state of São Paulo.[123]

[121] However, we do not find any significance when estimating the coefficients in regressions including the sample as a whole and dummy interactions for the states (see Appendix 2).
[122] Regressions including the whole sample and dummy interactions for the states show a significant relationship between the percentage of eligible voters and infant mortality (Appendix B). Notwithstanding, the estimated coefficient has a very small magnitude.
[123] The estimated coefficient for the land Gini becomes insignificant only when adding the educational controls (in order to correct the estimation of the voters coefficient), suggesting that the effects of land inequality might affect long-term development through education. In this sense, the effects would be in an opposite direction of

Table 14 – Ordinary Least Squares regressions with controls: São Paulo and Rio Grande do Sul

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	**Log GDP *per capita***									
	São Paulo					*Rio Grande do Sul*				
Land Gini (1920)	0.99**			0.92**	0.54	-0.31			-0.69	-1.22
Eligible Voters (%, 1920)		0.04*	-0.05*	0.03	-0.04*		0.18***	0.21***	0.19***	0.26***
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	172	172	172	172	172	27	27	27	27	27
R^2	0.21	0.18	0.31	0.22	0.31	0.71	0.88	0.91	0.88	0.92
Panel B	**Average Years of Schooling**									
	São Paulo					*Rio Grande do Sul*				
Land Gini (1920)	2.01***			1.69***	0.81	-1.51			-1.79	1.42
Eligible Voters (%, 1920)		0.18***	-0.02	0.16***	-0.02		0.12	-0.15	0.14*	-0.21
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	172	172	172	172	172	27	27	27	27	27
R^2	0.27	0.33	0.56	0.37	0.57	0.37	0.40	0.72	0.44	0.74
Panel C	**Infant Mortality**									
	São Paulo					*Rio Grande do Sul*				
Land Gini (1920)	-3.81			-3.99	-2.60	18.08***			16.39***	18.93***
Eligible Voters (%, 1920)		0.06	0.38	0.09	0.37		0.58	0.98**	0.31	0.13
Geographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational controls	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Observations	172	172	172	172	172	27	27	27	27	27
R^2	0.32	0.32	0.34	0.32	0.34	0.72	0.62	0.66	0.74	0.75

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

what was proposed by Lindert (2003), likely because we are dealing with a constant *de jure* institutional environment. We deal with this issue with greater details in the conclusion.

Analogous results for Rio Grande do Sul are presented in columns 6 to 10. It is for the state of Rio Grande do Sul that the results presented in this chapter show greater divergences with the results for regressions including the sample as a whole and dummy variables, likely due to fact that we only have 27 observations. While Panel A shows no significant relationship between economic inequality and GDP *per capita*, estimated coefficients in the Appendix 2 (using the sample as whole and dummy interactions) show a negative, significant and robust relationship between these two variables. We have a similar result when considering the average years of schooling as the dependent variable. However, for infant mortality (Panel C), the estimated land Gini coefficient is largely significant and positive.[124] These results are unique and due mainly to two features. First, we find no significant relationship between economic inequality and infant mortality in any other sample, as we can see from Panel C in Tables 12 and 13, as well as this table, which presents the results for São Paulo. Second, economic inequality is *negatively* associated with the development indicators. It is the first time in this study that we find a negative relationship between economic inequality and a development aspect. Moreover, political inequality is only significant (with the control variables) when considering GDP *per capita* (Panel A).[125] The estimated coefficient, in addition to being highly significant, is also positive. Political inequality is therefore negatively correlated with GDP *per capita* in the long run for Rio Grande do Sul. Although the sample for Rio Grande do Sul is small, its analysis presents unique features compared to the other samples. These results are even more interesting considering the unique colonization history of Rio Grande do Sul.

In summary, the first robust results linking inequality and long-term development within Brazilian regions (Table 12) 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.

[124] Estimated coefficients when considering the sample as a whole and dummy variables are not always significant (Appendix 2).
[125] Appendix 2 show that, when considering the sample as a whole and dummy variables, there are some other specifications in which the estimated coefficient for political concentration is significant.

4.3 Other Contemporaneous Dependent Development Variables

Although our main outcome variables provide important information on several development aspects of the municipalities studied, we should not be restricted to those aspects. In this section, we extend the previous analysis, by focusing on the following four variables: the HDI, a poverty indicator, the percentage of houses with access to piped water, and the percentage of houses with access to electricity. These last two variables are interpreted as a proxy for the provision of public goods.

Exploring these variables, we find a very strong correlation between the HDI and the poverty indicator (the correlation coefficient for the whole sample is -0.95) and between the percentage of houses with access to piped water and the percentage of houses with access to electricity (the correlation coefficient for the sample as a whole is 0.72). These high correlations imply that the regression results do not differ in a significant way when one or the other variable of these two groups is included. We will therefore present the results for the HDI and the percentage of houses with access to piped water, which are very similar to the ones for the percentage of poor individuals and the percentage of houses with access to electricity, respectively.

Table 15 presents the results mentioned above. Panel A provides the results considering the sample as a whole in the estimations while Panel B excludes (as done previously) the state of Rio Grande do Sul. Results for Minas Gerais, Pernambuco, São Paulo and Rio Grande do Sul individually are presented in Panels C, D, E and F, respectively. Columns 1 to 5 show the results for the HDI while the results for access to piped water are in columns 6 to 10. Columns 1 and 6 present the results for the simple regression including only the land Gini while columns 2 and 7 include the geographical controls. Results for the simple regressions including the franchise variable are in columns 3 and 8 and we include both geographical and educational variables in columns 4 and 9. Columns 5 and 10 include both inequality variables and the two sets of controls.

We begin by analyzing the results for the whole sample in Panel A. Economic inequality is significantly correlated (and is, again, positive) with the HDI even with the inclusion of the geographical controls (columns 1 and 2). Although there is also statistical significance for the political inequality variable, the coefficient is very small (columns 3 and 4). Where both

inequality variables and geographical and educational controls are included, there appears to be no significant relationship. These results change when access to piped water is the dependent variable. Economic inequality's positive correlation with the dependent variable is no longer robust to the inclusion of the set of geographical controls. The other difference is that political inequality is significant in every specification. The positive significant correlations provide evidence that a higher percentage of eligible voters in 1920 is associated with a higher provision of public goods in the long term, proxied by access to piped water in 2000.

Table 15 – Ordinary Least Squares regression: HDI and public goods provision

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	**All Comparable Territorial Units**									
	IDH					*Public Goods*				
Land Gini (1920)	0.27***	0.06**			0.02	64.04***	5.10			2.66
Eligible Voters (%, 1920)			0.01***	-0.00**	-0.00**			2.36***	0.61***	0.62***
Geographic controls	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Educational controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Observations	408	408	408	408	408	408	408	408	408	408
R^2	0.30	0.73	0.10	0.79	0.79	0.25	0.81	0.13	0.83	0.83
Panel B	**Minas Gerais, Pernambuco, and São Paulo**									
	IDH					*Public Goods*				
Land Gini (1920)	0.31***	0.08***			0.04**	72.88***	7.91			6.04
Eligible Voters (%, 1920)			0.01***	-0.00*	-0.00			2.61***	0.80***	0.85***
Geographic controls	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Educational controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Observations	381	381	381	381	381	381	381	381	381	381
R^2	0.35	0.75	0.09	0.80	0.81	0.28	0.82	0.14	0.84	0.84
Panel C	**Minas Gerais**									
	IDH					*Public Goods*				
Land Gini (1920)	0.20***	0.11***			0.08**	28.90*	21.20***			23.02***
Eligible Voters (%, 1920)			0.01***	-0.00	0.00			2.24***	1.28***	1.47***
Geographic controls	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Educational controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Observations	157	157	157	157	157	157	157	157	157	157
R^2	0.15	0.63	0.13	0.66	0.68	0.04	0.82	0.21	0.83	0.85

(cont.) Table 15 – Ordinary Least Squares Regression: HDI and Public Goods Provision

Panel D	**Pernambuco**									
	IDH					*Public Goods*				
Land Gini (1920)	0.02	-0.02			-0.00	-8.92	-17.73			-11.13
Eligible Voters (%, 1920)			0.02***	0.01	0.01			3.50***	4.73**	4.10
Geographic controls	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Educational controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Observations	52	52	52	52	52	52	52	52	52	52
R^2	0.00	0.48	0.31	0.68	0.68	0.01	0.31	0.24	0.53	0.54
Panel E	**São Paulo**									
	IDH					*Public Goods*				
Land Gini (1920)	0.09***	0.07***			0.03	12.97***	6.47**			3.81
Eligible Voters (%, 1920)			0.00	-0.00*	-0.00*			-0.23	-0.14	-0.12
Geographic controls	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Educational controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Observations	172	172	172	172	172	172	172	172	172	172
R^2	0.10	0.34	0.00	0.50	0.51	0.11	0.49	0.01	0.54	0.55
Panel F	**Rio Grande do Sul**									
	IDH					*Public Goods*				
Land Gini (1920)	-0.09***	-0.12**			-0.03	-12.31***	-10.08			4.40
Eligible Voters (%, 1920)			-0.00	-0.01**	-0.01*			-0.13	-1.26***	-1.45***
Geographic controls	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Educational controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Observations	27	27	27	27	27	27	27	27	27	27
R^2	0.30	0.53	0.01	0.83	0.84	0.27	0.49	0.01	0.72	0.73

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Panel B presents the results for the sample including the CTU for Minas Gerais, Pernambuco, and São Paulo only. These results are very similar to the ones in Panel A. The only difference is that economic inequality remains significant even when both sets of control variables and the political inequality variable are included (column 5). This is further evidence of the unique correlations within Rio Grande do Sul (which we will explore when we discuss Panel F).

We now turn to the results for each of the states individually. The results for Minas Gerais appear in Panel C. Economic inequality is positively associated with these other development outcomes, maintaining its significance throughout every specification (columns 1, 2 and 5 for the HDI and columns 6, 7 and 10 for the percentage of houses with access to piped water). Once more, we have empirical evidence that economic inequality within Minas Gerais is robustly associated with better development outcomes in the long run. The percentage of eligible voters does not seem to be relevant when considering the relationship with development outcomes in the long run: although significant in some specifications, the estimated coefficient is of small magnitude.

Panel D of Table 15 presents the results for Pernambuco. The basic results from Table 13 are maintained. The estimated land Gini coefficient is not significantly related to either of the development outcomes considered in any specification. The percentage of eligible voters is significant with the inclusion of the control variables only in the regressions using the percentage of houses with access to piped water as the dependent variable (column 9). However, this significance is not maintained when the land Gini is included as one of the independent variables (column 10). However, it is always significant and positively correlated with the development outcomes in regressions including the whole sample and dummy interactions (Appendix 2).

Results for São Paulo are presented in Panel E. The results of the regressions with the HDI as dependent variable are in columns 1 to 5. The estimated coefficient of the land Gini is significantly positive in the simple regression (column 1). This result is robust when the geographical controls are included (column 2). In regressions including the sample as a whole and dummy interactions for the states, the estimated coefficient for the land Gini is always highly significant, even after educational controls are included (Appendix 2). Considering access to piped water as a dependent variable does not alter these results. The estimated coefficient for the percentage of eligible voters is zero or of no statistical significance. Therefore, this is further evidence that economic inequality is positively correlated with better development outcomes in the long run, while political inequality produces no effect.

Finally, Panel F presents the results for Rio Grande do Sul. It presents a number of unique features. First, through regressions with the HDI as the dependent variable, we have a

negative relationship between this variable and economic inequality. The estimated coefficient is significant even when geographical controls are included (column 2). When using access to piped water as a dependent variable, this result changes. The inclusion of geographical controls makes the estimated coefficient for the land Gini lose its significance, although it maintains its negative sign (column 7). However, the estimated coefficient is highly significant in all specifications when considering the sample as a whole and a dummy interaction strategy (Appendix 2). Once more, political inequality is either insignificant or of small magnitude when either the HDI or access to piped water is considered as the dependent variable.

In summary, the presented results are in line with the previous section.

4.4 Overall Land Gini

We now expand our analysis by introducing the overall land Gini calculated index. This coefficient, 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. The following results are from regressions using (the natural logarithm of) GDP *per capita* as the dependent variable (extended results with a different specification, using the sample as a whole and dummy interactions to capture the differential effects between the states, can be found in Appendix 3).

Table 16 presents the regression results for the sample as a whole (columns 1 to 6) and for the subsample of CTU excluding those from Rio Grande do Sul. Several noteworthy aspects emerge. First, when considering the sample as a whole, the overall land Gini constructed by assuming 10 individuals per property is never significant. Our second measure of the overall land Gini is significant (at a 10% level) in the simple regression (column 2) and when the geographical controls are included (column 4). However, when we include the previous inequality variables (the standard land Gini and the percentage of eligible voters) with the educational controls, we see that no estimated inequality coefficient is significant (columns 5 and 6).

Table 16 – Ordinary Least Square regressions including the Overall Land Gini: all CTU and Minas Gerais, Pernambuco, and São Paulo

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Log GDP *per capita*											
	All CTU						*Minas Gerais, Pernambuco, and São Paulo*					
Overall Land Gini (10)	0.39		0.33		-0.30		1.01**		0.77**		-0.07	
Overall Land Gini (15)		0.54*		0.39*		-0.18		1.01***		0.71***		-0.01
Land Gini (1920)					0.47	0.43					0.62*	0.60*
Eligible Voters (%, 1920)					-0.00	-0.00					0.00	0.00
Geographic controls	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Educational controls	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Observations	408	408	408	408	408	408	381	381	381	381	381	381
R^2	0.00	0.01	0.45	0.45	0.51	0.51	0.02	0.03	0.49	0.49	0.54	0.54

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude, temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

When we consider the subsample without the CTU from Rio Grande do Sul, the results once again differ, in a interesting way. Both overall land Gini measures are (highly) significant in the simple regressions and in the regressions which include the geographical controls (columns 7 to 10). However, when the previous inequality variables are included, it is the standard land Gini that remains significant (at 10 percent), while the overall measures lose their significance. Therefore, empirical evidence from Brazil indicates that is inequality among landowners that has a significant impact on GDP *per capita* in the long run. The percentage of eligible voters remains insignificant throughout all specifications.

Table 17 presents the results for Minas Gerais and Pernambuco. For Minas Gerais (columns 1 to 6) the overall land Gini coefficients are never significant (even in the simple regressions shown in columns 1 and 2). When previous economic and political inequality are included, the significance of economic inequality among landowners remains significant and positive. For Pernambuco, although the estimated overall land Gini coefficients are significant in the simple regressions (columns 7 and 8), they become statistically insignificant when the geographical controls are included (columns 9 and 10). For Pernambuco, regressions including the overall land Gini, the standard land Gini and the percentage of eligible voters with the two sets of controls show no statistical significance of any inequality variable.

Table 17 – Ordinary Least Squares regressions including the Overall Land Gini: Minas Gerais and Pernambuco

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Log GDP *per capita*											
	MG						*PE*					
Overall Land Gini (10)	0.58		1.09		0.09		2.25***		0.27		0.50	
Overall Land Gini (15)		0.39		0.73		0.06		1.50***		0.18		0.34
Land Gini (1920)					1.28**	1.28**					-0.59	-0.59
Eligible Voters (%, 1920)					0.03	0.03					-0.01	-0.01
Geographic controls	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Educational controls	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Observations	157	157	157	157	157	157	52	52	52	52	52	52
R^2	0.00	0.00	0.45	0.45	0.49	0.49	0.12	0.12	0.36	0.36	0.40	0.40

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude, temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Finally, Table 18 presents the results for the remaining two states, São Paulo and Rio Grande do Sul. For São Paulo (columns 1 to 6) both overall land Gini measures are significant in the simple regressions (columns 1 and 2) and when the geographical controls are included (columns 3 and 4). Like the previous results, these measures of economic inequality for the beginning of the twentieth century are positively correlated with GDP *per capita* in the long run. When the standard land Gini and the percentage of eligible voters are included with the control variables, none of the estimated coefficients for inequality remains significant (columns 5 and 6).

Table 18 – Ordinary Least Squares regressions including the Overall Land Gini: São Paulo and Rio Grande do Sul

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Log GDP *per capita*											
	SP						*Rio Grande do Sul*					
Overall Land Gini (10)	0.87***		0.79**		0.03		-0.44		1.20		2.36*	
Overall Land Gini (15)		0.84***		0.77***		0.09		-0.34		1.11		2.08*
Land Gini (1920)					0.77	0.73					-1.70	-1.86
Eligible Voters (%, 1920)					-0.00	-0.00					0.12*	0.13**
Geographic controls	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Educational controls	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Observations	172	172	172	172	172	172	27	27	27	27	27	27
R^2	0.03	0.04	0.19	0.20	0.26	0.26	0.01	0.01	0.73	0.73	0.91	0.91

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude, temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Yet again, Rio Grande do Sul presents unique features. Both overall land Gini measures are insignificant when included in simple regressions against GDP *per capita* (columns 7 and 8) and when the geographical controls are included (columns 9 and 10). However, when we include the standard land Gini and the percentage of eligible voters (with both geographical and educational controls), the estimated coefficients for both overall land Gini measures become significant (at a 10% level) with a positive sign. When investigating this relationship with dummy interactions within the sample as a whole, none of the estimated coefficients for economic inequality are significant.

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.

4.5 Inequality Yesterday and Today

A natural extension of our analysis is to investigate the relationship between inequality in 1920 and contemporaneous inequality. 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. Table 19 presents the results for different samples. For each sample, we have two kinds of regressions. The first does not include any control variables, leaving as the independent variables only the land Gini and the percentage of eligible voters. The second one includes both the geographical and the educational controls to check for the robustness of the results.[126]

Table 19 – Ordinary Least Squares Regressions with the contemporaneous Gini coefficient as dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Gini 2000									
	All		*MG*		*PE*		*SP*		*RS*	
Land Gini (1920)	-0.05***	0.05**	0.03	0.04	0.06*	0.11**	-0.03	0.02	0.20***	0.23*
Eligible Voters (%, 1920)	0.00*	0.00***	-0.00*	-0.00	0.01***	0.01**	0.01***	0.00	0.00	0.00
Geographic controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Educational controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	408	408	157	157	52	52	172	172	27	27
R^2	0.02	0.27	0.02	0.28	0.17	0.58	0.07	0.33	0.33	0.84

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude, temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Columns 1 and 2 present the results for the whole sample. Without controls, we find a small but significant relationship between the land Gini in 1920 and the income Gini in 2000. The inclusion of control variables does not alter the small magnitude of the estimated coefficient, but does alter its sign: the relationship is now positive. The estimated coefficient for our political inequality variable is practically zero. Therefore, we find no strong evidence of a relationship between economic or political inequality at the beginning of the twentieth century and economic inequality today. This is an interesting result, which leads us to reconsider the (historical) nature of structural inequality in Brazil.

[126] Appendix 4 includes the analogous results when considering the sample as a whole and dummy interactions to capture the differential relationships between land distribution in 1920 and economic inequality in 2000 across the states.

The results for Minas Gerais are presented in columns 3 and 4. We find no significant relationship between economic or political inequality in the early twentieth century and economic inequality today. The coefficients for the land Gini have a positive sign (the correlation between these variables is positive) although they are not significant.[127] These results are very similar to the ones for São Paulo (columns 7 and 8). The land Gini estimated coefficient is negative without the control variables, becomes positive when they are introduced, but 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 in both 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.

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 (Tables 13 and 17), we now find a positive and significant relationship between economic inequality in 1920 and economic inequality in 2000 (column 5), a result which remain robust (at a lower significance) when geographical and educational results are included (column 6). The estimated coefficient for political inequality, although significant, is again of very small magnitude. We find an even stronger relationship in the regressions for Rio Grande do Sul. The estimated coefficient for the land Gini is positive and highly significant both in the simple regression (column 9) and in the regressions where the geographical and the educational controls are included (column 10). The estimated coefficient for the percentage of eligible voters is not significant for Rio Grande do Sul.

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.

[127] When investigating the same relationship through a different strategy (considering the whole sample and dummy interactions), the estimated coefficients are positive and significant at a 10 percent level.

4.6 *De facto* Institutional Environments, Structural Change and Further Results

This section presents the estimated inequality coefficients when controlling for different occupations. 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 need to control for the industrialization process in the various municipalities.

Fortunately, the Census of 1920 provides detailed data on the number of individuals working in particular occupations. We carefully sorted the occupational data for each municipality and constructed the share of the population dedicated to each particular occupation. Our main control variables are: (i) the share of individuals working in land use activities (such as agriculture and fishing); (ii) the share of individuals working in industry (such as textiles, metallurgy and construction); and (iii) the share of individuals working in the liberal professions (such as doctors, lawyers and teachers).

The econometric approach is the same as in previous exercises. Table 20 presents the estimated coefficients using the (logarithmic) GDP *per capita* as the dependent variable. The table is divided into three panels (one for each of the mentioned control variables: land use, industry, and liberal professions) and ten columns (two for each sample: all CTU, Minas Gerais, Pernambuco, São Paulo, and Rio Grande do Sul).[128]

[128] Appendix 5 contains the following extensions: (i) regressions including further controls (the share of individuals working in agricultural activities, commerce activities, and in public administration); (ii) regressions (with all the mentioned controls) for average years of schooling and infant mortality; (iii) the analogous investigation, but considering the whole sample and dummy interactions.

Table 20 – Ordinary Least Square regressions with occupational controls: GDP *per capita*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	**Log GDP *per capita***									
	All CTU		*Minas Gerais*		*Pernambuco*		*São Paulo*		*Rio Grande do Sul*	
Land Gini (1920)	2.15***	0.53**	2.51***	1.35**	-0.03	-0.23	1.02***	0.88**	-1.99***	-0.26
Eligible Voters (1920, %)	0.02*	0.01	0.04***	0.04**	0.09*	0.03	-0.02	0.01	0.13*	0.17***
Land use activities (%, 1920)	-0.00*	-0.00***	-0.00	0.00	0.00	-0.00	-0.00***	-0.00**	-0.00	-0.00
Geographic controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	408	408	157	157	52	52	172	172	27	27
R^2	0.21	0.47	0.21	0.49	0.07	0.37	0.12	0.24	0.20	0.89
Panel B	**Log GDP *per capita***									
	All CTU		*Minas Gerais*		*Pernambuco*		*São Paulo*		*Rio Grande do Sul*	
Land Gini (1920)	2.05***	0.41*	2.60***	1.27**	-0.23	-0.21	0.80**	0.75*	-1.96***	-0.59
Eligible Voters (1920, %)	0.01	-0.00	0.05***	0.02	-0.04	0.01	-0.03*	-0.01	0.14	0.19***
Industrial sector (%, 1920)	0.01***	0.01***	-0.00	0.00	0.01**	0.00	0.01***	0.01***	-0.00	0.00
Geographic controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	408	408	157	157	52	52	172	172	27	27
R^2	0.25	0.49	0.21	0.49	0.28	0.37	0.19	0.30	0.19	0.88
Panel C	**Log GDP *per capita***									
	All CTU		*Minas Gerais*		*Pernambuco*		*São Paulo*		*Rio Grande do Sul*	
Land Gini (1920)	1.66***	0.28	2.14***	1.09**	-0.25	-0.20	0.80**	0.66*	-1.97***	-0.67
Eligible Voters (1920, %)	-0.01	-0.01	0.01	0.01	-0.03	0.06	-0.04**	-0.01	0.14	0.21***
Liberal professions (%, 1920)	0.08***	0.06***	0.06***	0.04**	0.10**	-0.02	0.06***	0.06***	-0.00	-0.02
Geographic controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	408	408	157	157	52	52	172	172	27	27
R^2	0.31	0.52	0.25	0.50	0.13	0.37	0.18	0.30	0.19	0.88

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude, temperature (one variable for each season), rainfall (one variable for each season), area.

Results in Panel A reveal a similar picture to others already discussed. In other words, when controlling for the share of individuals working in land use activities, we still have a positive and significant relationship between economic (land) inequality and GDP *per capita* in the long run for the sample as a whole (columns 1 and 2) as well as when considering Minas Gerais (columns 3 and 4) and São Paulo (columns 7 and 8) separately. Moreover, estimated coefficients for Pernambuco remain largely insignificant (columns 5 and 6). Although the estimated coefficients for economic (land) inequality for Rio Grande do Sul are only

significant in the absence of geographical controls (column 9) through this identification strategy, when considering the sample as a whole, dummy interactions for the Southern state are highly significant and negative, which indicates the robustness of the relationship (suggesting that the significance problems are due to the small number of observations), as shown in Appendix 5.

In Panel B, we have the results when controlling for the share of individuals working in industrial activities. Once again, the results are broadly consistent with previous analyses. Economic (land) inequality remains positively and significantly correlated with long-term GDP *per capita* even when controlling for a set of geographical characteristics (columns 1 and 2 for the whole sample, columns 3 and 4 for Minas Gerais, and columns 7 and 8 for São Paulo). Estimated coefficients for the land Gini are not significant for Pernambuco. For Rio Grande do Sul, the estimated coefficients through the dummies strategy are negative and highly significant. However, the estimated coefficients for the share of individuals working in industrial activities present some interesting points. The estimated coefficients are largely insignificant, except for the sample as a whole (columns 1 and 2) and for São Paulo (columns 7 and 8), which in any case present values very close to zero.

Finally, Panel C presents the results when controlling for the share of individuals working in the liberal professions. Regressions using the whole sample show no significant relationship between economic (land) inequality and long-term GDP *per capita* after controlling for the geographical characteristics. However, for Minas Gerais and São Paulo, results remain positive and significant. Pernambuco and Rio Grande do Sul reveal a similar pattern to the other panels. Moreover, we highlight the significance of the estimated coefficient for the share of individuals working in the liberal professions. Estimated coefficients are positive and highly significant for the sample as a whole and for Minas Gerais and São Paulo. However, the coefficient is not significant for Rio Grande do Sul or for Pernambuco after controlling for the geographical variables.

Table 21 presents the analogous results using the average years of schooling as the dependent variable. The table is edifying for a number of reasons. First, it reveals the consistency of the results discussed in Table 20. In other words, the heterogeneous relationships between economic (land) inequality and long-term development are maintained. Second, estimated coefficients are more significant. We can see, especially in columns 2, 4, and 8, that the

estimated coefficients remain largely significant even when we control for a large set of geographical characteristics. Finally, the estimated coefficient for the share of individuals working in the liberal professions is almost always positive and highly significant (except for Pernambuco when the geographical controls are included).

Table 21 – Ordinary Least Square regressions with occupational controls: average years of schooling

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	**Average Years of Schooling**									
	All CTU		*Minas Gerais*		*Pernambuco*		*São Paulo*		*Rio Grande do Sul*	
Land Gini (1920)	3.97***	1.70***	4.14***	3.33***	1.57	0.72	1.96***	1.58***	-0.71	0.23
Eligible Voters (1920, %)	0.12***	0.08***	0.17***	0.12***	0.37***	0.32***	0.07**	0.11***	0.09	0.11
Land use activities (%, 1920)	-0.01***	-0.01***	-0.01***	-0.01***	-0.00	-0.00	-0.01***	-0.01***	-0.01*	-0.01
Geographic controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	408	408	157	157	52	52	172	172	27	27
R^2	0.41	0.61	0.41	0.56	0.47	0.71	0.33	0.44	0.26	0.49
Panel B	**Average Years of Schooling**									
	All CTU		*Minas Gerais*		*Pernambuco*		*São Paulo*		*Rio Grande do Sul*	
Land Gini (1920)	3.75***	1.34***	3.63***	2.57***	1.61	0.87	1.48***	1.30***	-0.86	0.12
Eligible Voters (1920, %)	0.09***	0.04**	0.15***	0.08**	0.20***	0.21***	0.06*	0.07**	0.04	0.04
Industrial sector (%, 1920)	0.02***	0.02***	0.01*	0.02***	0.02***	0.02*	0.02***	0.02***	0.02**	0.02
Geographic controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	408	408	157	157	52	52	172	172	27	27
R^2	0.48	0.65	0.4	0.57	0.69	0.76	0.43	0.53	0.38	0.55
Panel A	**Average Years of Schooling**									
	All CTU		*Minas Gerais*		*Pernambuco*		*São Paulo*		*Rio Grande do Sul*	
Land Gini (1920)	2.85***	1.07***	3.08***	2.21**	1.57	0.95	1.41***	1.09**	-0.94	-0.09
Eligible Voters (1920, %)	0.05***	0.03	0.09**	0.06*	0.19***	0.30***	0.03	0.07**	0.02	-0.02
Liberal professions (%, 1920)	0.21***	0.18***	0.17***	0.14***	0.22***	0.07	0.16***	0.13***	0.18***	0.26***
Geographic controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	408	408	157	157	52	52	172	172	27	27
R^2	0.57	0.68	0.49	0.59	0.59	0.71	0.44	0.53	0.37	0.67

Source: Own calculations.
Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude, temperature (one variable for each season), rainfall (one variable for each season), area.

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 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. 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.

4.7 Final Remarks

This section briefly summarizes the findings above. Concerning the relationship between inequality and long-term development, the main findings are: (i) a positive relationship between economic (land) inequality and long-term development indicators when considering the set of observations as a whole; (ii) furthermore, we present evidence of substantial heterogeneity in these results: while Minas Gerais and São Paulo present a strong positive relationship between economic (land) inequality and long-term development, we find no significant relationship for Pernambuco (the most equal state, according to these criteria) and we find a negative relationship for Rio Grande do Sul; (iii) controlling for a rich set of covariates in order to compensate for a possible omitted variable bias, we have a clearer picture: we find a robust and positive relationship between economic (land) inequality and long-term development indicators (particularly GDP *per capita* and average years of

schooling) when considering the sample as whole and when excluding Rio Grande do Sul. Once again, we investigate the possible heterogeneities, and find that the relationship is robust for Minas Gerais and São Paulo, there is still no significant relationship for Pernambuco, and Rio Grande do Sul presents a robust negative relationship; (iv) considering other dependent variables (the HDI and access to piped water – a proxy for public goods provision) we have analogous results.

We also include our constructed overall land Gini to control for inequality through all segments of the population and find that the land Gini remains significant and results are consistent with previous ones, while there is no robust relationship between the overall land Gini and our development indicators. In addition, in a country often characterized by structural inequality, we find no robust relationship between the land Gini in 1920 and the present Gini coefficient.

Moreover, when controlling for proxies for structural changes, such as the share of individuals working in land use activities, industrial activities, in the liberal professions, and immigrants, regression results are in line with our previous results, i.e., that the heterogeneous relationships between inequality and long-term development indicators in Brazil reflect the different *de facto* institutional environments rooted in differing colonial experiences.

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 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.

Our first contribution was to construct 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.

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, but 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.

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 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 *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.[129]

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.[130] 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.

[129] See, for example, Robinson (2006).
[130] In our view, another fruitful investigation of this kind would be the effects of slavery.

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APPENDICES

APPENDIX 1 – Inequality Data
APPENDIX 2 – Regressions for the Main Dependent Variables Including the Sample as a Whole and Dummy Variables
APPENDIX 3 – Regressions for the Overall Land Gini Including the Sample as a Whole and Dummy Variables
APPENDIX 4 – Regressions for the Contemporaneous Gini Coefficient Including the Sample as a Whole and Dummy Variables
APPENDIX 5 – Additional Regressions Considering the Structural Controls and Immigration
APPENDIX 6 – Quantile Regressions Including the Sample as a Whole and Dummy Variables

APPENDIX 1 – INEQUALITY DATA

Table 22 – **Inequality Data: Minas Gerais**

Minas Gerais		
Municipalities (1920)	*Land Gini (1920)*	*Eligible Voters (%, 1920)*
Abaeté	0.67	6.5
Abbadia do Bom Sucesso	0.62	9.0
Abre Campo	0.51	12.2
Aguas Virtuosas	0.56	9.7
Alfenas	0.61	9.2
Alto Rio Doce	0.45	6.1
Alvinópolis	0.51	10.9
Antonio Dias	0.44	6.3
Apparecida do Claudio	0.59	9.2
Araguary	0.61	9.6
Arassuahy	0.56	6.2
Araxá	0.72	8.3
Arceburgo	0.66	6.8
Areado	0.56	7.0
Aymorés	0.42	7.6
Ayuruoca	0.51	6.6
Baependy	0.62	9.5
Bambuhy	0.64	4.5
Barbacena	0.61	9.3
Bello Horizonte	0.71	16.5
Bôa Vista do Tremedal	0.43	3.8
Bocayuva	0.86	5.0
Bom Despacho	0.65	8.0
Bomfim	0.52	10.8
Bom Sucesso	0.58	10.4
Cabo Verde	0.58	6.4
Caethé	0.65	10.9
Caldas	0.63	8.6
Cambuhy	0.52	5.8
Campanha	0.57	10.4
Campestre	0.73	5.6
Campo Bello	0.61	8.5
Campos Geraes	0.66	6.8
Capellinha	0.53	3.9
Caracol	0.64	5.1
Carangola	0.54	9.7
Caratinga	0.46	8.4
Carmo do Paranahyba	0.62	8.4
Carmo do Rio Claro	0.70	7.9
Cassia	0.52	8.4

Table 22 – Inequality Data: Minas Gerais		
Cataguazes	0.59	10.0
Caxambú	0.59	9.4
Christina	0.55	6.2
Conceição do Rio Verde	0.65	7.6
Conceição do Serro	0.52	7.9
Conquista	0.66	5.7
Contagem	0.60	12.3
Curvello	0.77	6.7
Diamantina	0.77	9.2
Divinopolis	0.63	10.4
Dôres da Bôa Esperança	0.74	8.8
Dôres do Indayá	0.69	7.6
Eloy Mendes	0.71	5.6
Entre Rios	0.61	10.0
Estrella do Sul	0.57	7.3
Extrema	0.49	5.3
Formiga	0.64	8.6
Fortaleza	0.58	4.2
Fructal	0.69	6.0
Grão Mogol	0.50	3.7
Guaranesia	0.64	6.0
Guarany	0.55	8.7
Guarará	0.61	9.2
Guaxupé	0.67	7.0
Inconfidencia	0.66	3.8
Itabira	0.46	9.9
Itajubá	0.64	6.4
Itapecerica	0.52	6.7
Itaúna	0.64	10.1
Ituyutaba	0.69	8.6
Jacuhy	0.55	7.1
Jacutinga	0.56	7.7
Jaguary	0.65	4.1
Januaria	0.71	5.7
João Pinheiro	0.79	4.3
Juiz de Fóra	0.63	9.6
Lagôa Dourada	0.48	11.4
Lavras	0.58	9.7
Leopoldina	0.60	9.1
Lima Duarte	0.54	11.1
Manbuassú	0.47	10.5
Mar de Hespanha	0.61	8.4
Maria da Fé	0.53	7.9
Marianna	0.64	13.6

Table 22 – **Inequality**
Data: Minas Gerais

Mercês	0.52	6.5
Minas Novas	0.53	4.2
Monte Alegre	0.70	7.3
Monte Carmello	0.62	7.1
Monte Santo	0.61	7.3
Montes Claros	0.64	5.2
Muzambinho	0.60	7.8
Oliveira	0.62	9.8
Ouro Fino	0.57	5.4
Ouro Preto	0.64	14.6
Palma	0.57	8.3
Palmyra	0.58	10.2
Pará	0.57	10.2
Paracatú	0.68	4.3
Paraguassú	0.68	6.7
Paraisopolis	0.62	4.0
Paraopeba	0.81	9.2
Passa Quatro	0.65	10.7
Passa Tempo	0.61	9.8
Passos	0.59	11.0
Patos	0.75	6.4
Patrocinio	0.63	8.6
Peçanha	0.50	4.7
Pedra Branca	0.57	6.9
Pequy	0.65	11.0
Perdões	0.50	10.8
Piranga	0.44	10.4
Pirapora	0.81	10.1
Pitanguy	0.69	8.9
Piumhy	0.59	8.2
Poços de Caldas	0.64	11.5
Pomba	0.55	9.1
Ponte Nova	0.60	12.1
Pouso Alegre	0.59	6.1
Pouso Alto	0.62	8.9
Prados	0.50	14.5
Prata	0.66	6.8
Queluz	0.48	12.0
Rio Branco	0.56	10.9
Rio Casca	0.58	12.2
Rio José Pedro	0.54	7.7
Rio Novo	0.61	9.8
Rio Pardo	0.41	4.2
Rio Piracicaba	0.51	13.6

Table 22 – Inequality Data: Minas Gerais		
Rio Preto	0.56	8.8
Sabará	0.65	13.8
Sacramento	0.70	7.4
Salinas	0.46	3.2
Sant'Anna dos Ferros	0.54	7.5
Santa Barbara	0.68	13.7
Santa Luzia do Rio das Velhas	0.72	10.2
Santa Quiteria	0.72	11.5
Santa Rita do Sapucahy	0.54	5.0
Santo Antonio do Machado	0.66	8.7
Santo Antonio do Monte	0.60	8.0
São Domingos do Prata	0.54	12.1
São Francisco	0.63	6.2
São Gonçalo do Sapucahy	0.58	9.0
São Gothardo	0.67	8.1
São João Baptista	0.53	4.5
São João d'El-Rey	0.57	12.7
São João Evangelista	0.48	7.5
São João Nepomuceno	0.58	9.0
São José d'Além Parahyba	0.63	7.8
São José dos Botelhos	0.61	7.4
São Manoel	0.57	8.2
São Manoel do Mutum	0.47	7.9
São Miguel de Guanhães	0.52	5.8
São Paulo do Muriahé	0.55	9.2
São Sebastião do Paraiso	0.66	9.8
Serro	0.54	6.0
Sete Lagôas	0.69	9.9
Sylvestre Ferraz	0.62	7.7
Silvianopolis	0.55	3.6
Theophilo Ottoni	0.44	3.9
Tiradentes	0.47	11.1
Tres Corações do Rio Verde	0.61	10.9
Tres Pontas	0.69	6.7
Turvo	0.55	8.0
Ubá	0.55	9.5
Uberaba	0.68	10.2
Uberabinha	0.73	10.6
Varginha	0.71	6.1
Viçosa	0.52	10.0
Villa Braz	0.54	6.3
Villa Brazilia	0.48	4.9
Villa de Cambuquira	0.53	7.9

Table 22 – **Inequality** **Data: Minas Gerais**		
Villa do Rio Espera	0.45	9.3
Villa Jequitinhonha	0.52	4.3
Villa Nepomuceno	0.59	6.6
Villa Nova de Lima	0.80	14.6
Villa Nova de Rezende	0.56	7.1
Villa Rezende Costa	0.33	12.0
Virginia	0.54	6.4

Source: Own calculations.
Note: Municipality names are as they appear in the Census of 1920.

Table 23 – **Inequality**
Data: Pernambuco

Pernambuco		
Municipalities (1920)	*Land Gini (1920)*	*Eligible Voters (%, 1920)*
Agua Preta	0.39	4.1
Aguas Bellas	0.57	4.4
Alagôa de Baixo	0.40	7.0
Altinho	0.37	4.8
Amaragy	0.29	4.5
Barreiros	0.51	7.1
Belmonte	0.30	7.4
Bezerros	0.22	6.4
Bôa Vista	0.47	6.7
Bom Conselho	0.35	5.4
Bom Jardim	0.52	2.3
Bonito	0.55	4.0
Brejo da Madre de Deus	0.56	5.0
Buique	0.28	4.6
Cabo	0.14	6.2
Cabrobó	0.45	5.2
Canhotinho	0.51	3.9
Caruarú	0.20	5.7
Cimbres	0.49	6.6
Correntes	0.39	3.7
Escada	0.21	6.2
Exú	0.57	4.1
Flôres	0.46	4.8
Floresta	0.52	7.6
Gamelleira	0.25	6.8
Garanhuns	0.47	4.8
Gloria de Goytá	0.62	2.6
Goyanna	0.60	5.1
Granito	0.46	5.1
Gravatá	0.57	4.3
Iguarassú	0.65	4.5
Ingazeira	0.40	7.3
Ipojuca	0.39	3.5
Itambé	0.50	3.3
Jaboatão	0.67	7.0
Leopoldina	0.39	4.2
Limoeiro	0.54	4.4
Nazareth	0.52	3.5
Olinda	0.46	9.9
Ouricury	0.44	4.5
Palmares	0.48	6.4
Panellas	0.53	2.5

Table 23 – **Inequality**
Data: Pernambuco

Pau d'Alho	0.54	5.0
Pedra	0.34	7.3
Petrolina	0.28	7.9
Quipapá	0.57	4.7
Recife	0.61	14.4
Rio Formoso	0.41	5.2
Salgueiro	0.37	5.4
São Bento	0.58	6.1
São José do Egypto	0.40	7.8
São Lourenço da Matta	0.23	4.8
Serinhaem	0.32	3.0
Tacaratú	0.41	6.1
Taquaretinga	0.44	5.0
Timbaúba	0.38	3.7
Triumpho	0.44	4.5
Victoria	0.54	4.7
Villa Bella	0.41	6.1

Source: Own calculations.
Note: Municipality names are as they appear in the Census of 1920.

Table 24 – **Inequality**
Data: São Paulo

São Paulo		
Municipalities (1920)	*Land Gini (1920)*	*Eligible Voters (%, 1920)*
Agudos	0.67	6.0
Albuquerque Lins	0.80	9.2
Altinopolis	0.67	6.5
Amparo	0.64	6.7
Angatuba	0.86	5.2
Anhemby	0.76	7.0
Annapolis	0.71	1.7
Apialiy	0.38	12.8
Araçariguana	0.53	4.8
Araraquara	0.79	6.0
Araras	0.78	5.6
Areias	0.60	6.8
Ariranha	0.62	5.6
Assis	0.84	10.6
Atibaia	0.58	6.4
Avahy	0.70	7.8
Avaré	0.78	6.9
Bananal	0.63	8.3
Bariry	0.63	6.0
Barra Bonita	0.78	3.9
Barretos	0.70	9.6
Batataes	0.68	6.8
Baurú	0.79	9.2
Bebedouro	0.74	6.6
Bica de Pedra	0.62	5.0
Bôa Esperança	0.69	5.1
Bom Sucesso	0.58	6.8
Botucatú	0.82	7.2
Bragança	0.59	5.5
Brodowski	0.61	5.1
Brotas	0.64	6.6
Buquira	0.68	3.6
Cabreúva	0.65	7.8
Caçapava	0.68	7.0
Cachoeira	0.53	10.3
Caconde	0.56	6.1
Cajurú	0.67	7.6
Campinas	0.69	8.0
Campo Largo de Sorocaba	0.65	6.1
Campos Novos do Parauapanema	0.91	9.7
Cananéa	0.88	6.0

Table 24 – Inequality Data: São Paulo		
Capão Bonito do Paranapanema	0.81	6.8
Capivary	0.67	6.7
Caraguatatuba	0.90	7.8
Casa Branca	0.73	6.8
Catanduva	0.66	5.9
Cerqueira Cesar	0.69	6.5
Conceição de Monte Alegre	0.79	6.7
Conchas	0.65	6.5
Cravinhos	0.72	3.5
Cruzeiro	0.75	10.6
Cunha	0.65	7.0
Cutia	0.56	8.3
Descalvado	0.74	5.2
Dourado	0.70	5.8
Dous Corregos	0.72	5.3
Espirito Santo do Pinhal	0.57	5.6
Espirito Santo do Turvo	0.68	4.6
Fartura	0.65	5.6
Faxina	0.81	7.3
Franca	0.65	7.6
Guararema	0.44	4.2
Guaratinguetá	0.63	8.1
Guarehy	0.70	10.8
Guariba	0.77	3.7
Guarulhos	0.38	7.5
Ibitinga	0.66	4.9
Igarapava	0.67	7.4
Igaratá	0.59	5.0
Iguape	0.62	5.9
Indaiatuba	0.68	6.9
Ipaussú	0.76	7.1
Itaberá	0.60	8.2
Itajuby	0.57	4.8
Itanhaem	0.50	9.7
Itapecerica	0.47	5.4
Itapetininga	0.79	9.5
Itapira	0.66	5.6
Itapolis	0.63	4.7
Itaporanga	0.52	6.5
Itararé	0.64	10.3
Itatiba	0.62	6.4
Itatinga	0.71	7.4
Ituverava	0.62	7.5
Jaboticabal	0.61	5.4

Table 24 – Inequality Data: São Paulo		
Jacaréhy	0.69	9.6
Jahú	0.63	5.9
Jambeiro	0.73	5.7
Jardinopolis	0.80	5.2
Jatahy	0.48	8.7
Joanopolis	0.55	5.9
Jundiahy	0.72	8.2
Juquery	0.56	4.0
Lagoinha	0.49	4.0
Laranjal	0.59	5.1
Leme	0.78	7.0
Lençóes	0.74	6.0
Limeira	0.70	7.3
Lorena	0.67	12.5
Mattão	0.83	5.2
Mineiros	0.72	6.2
Mococa	0.69	5.4
Mogy das Cruzes	0.48	7.5
Mogy-Guassú	0.74	7.0
Mogy-Mirim	0.68	6.9
Monte Alto	0.54	4.0
Monte Azul	0.62	6.0
Monte Mór	0.61	8.3
Natividade	0.33	5.4
Nazareth	0.41	4.1
Novo Horizonte	0.72	5.9
Oleo	0.80	8.3
Olympia	0.73	6.6
Orlandia	0.75	6.6
Ourinhos	0.66	7.7
Palmeiras	0.71	5.4
Palmital	0.58	6.0
Parahybuna	0.62	8.6
Parnahyba	0.68	9.8
Patrocinio do Sapucahy	0.70	6.9
Pederneiras	0.68	6.0
Pedreira	0.56	6.0
Pennapolis	0.71	6.7
Pereiras	0.48	7.0
Piedade	0.51	5.2
Pilar	0.57	7.3
Pindamonhangaba	0.64	9.4
Pinheiros	0.60	10.2
Piquete	0.64	10.3

Table 24 – Inequality Data: São Paulo		
Piracaia	0.61	5.5
Piracicaba	0.69	7.8
Pirajú	0.66	7.3
Pirajuhy	0.78	5.9
Pirassununga	0.67	5.8
Piratininga	0.70	10.2
Pitangueiras	0.65	5.9
Platina	0.58	6.0
Porto Feliz	0.65	9.0
Porto Ferreira	0.69	5.6
Queluz	0.58	8.7
Redempção	0.53	5.1
Ribeira	0.45	4.9
Ribeirão Bonito	0.58	4.5
Ribeiro Branco	0.65	7.8
Ribeirão Preto	0.79	5.4
Rio Bonito	0.62	6.7
Rio Claro	0.71	7.1
Rio das Pedras	0.65	4.0
Rio Preto	0.74	5.2
Sallesopolis	0.31	5.5
Salto	0.64	8.1
Salto Grande do Paranapanema	0.55	6.5
Santa Adelia	0.61	4.7
Santa Barbara	0.61	7.3
Santa Barbara do Rio Pardo	0.78	5.4
Santa Branca	0.61	5.2
Santa Cruz da Conceição	0.66	5.7
Santa Cruz do Rio Pardo	0.60	6.7
Santa Izabel	0.36	6.3
Santa Rita do Passa Quatro	0.70	4.6
Santa Rosa	0.74	5.1
Santo Amaro	0.46	11.9
Santo Antonio da Alegria	0.58	7.1
Santo Antonio da Bôa Vista	0.85	6.5
Santos	0.83	9.6
São Bento do Sapucahy	0.67	6.5
São Bernardo	0.76	6.8
São Carlos	0.74	5.6
São João da Bôa Vista	0.72	6.4
São João da Bocaina	0.58	4.7
São Joaquim	0.66	7.8
São José do Barreiro	0.84	6.4
São José do Rio Pardo	0.67	5.2

Table 24 – **Inequality** **Data: São Paulo**		
São José dos Campos	0.69	6.8
São Luiz do Parahytinga	0.48	6.5
São Manoel	0.77	4.7
São Miguel Arcanjo	0.46	7.3
São Paulo	0.78	8.9
São Pedro	0.68	6.3
São Pedro do Turvo	0.57	3.7
São Roque	0.63	9.7
São Sebastião	0.50	9.9
São Simão	0.65	5.2
São Vicente	0.54	13.8
Sarapuhy	0.69	8.2
Serra Negra	0.54	6.2
Sertãozinho	0.85	5.5
Silveiras	0.57	5.4
Socorro	0.44	5.4
Sorocaba	0.64	10.2
Tabapuan	0.56	4.8
Tambahú	0.72	7.0
Taquaritinga	0.57	4.4
Tatuhy	0.58	9.5
Taubaté	0.65	8.9
Tieté	0.64	5.8
Tremembé	0.65	6.6
Ubatuba	0.76	6.4
Una	0.38	4.7
Villa Bella	0.72	8.5
Viradouro	0.69	6.3
Xiririca	0.71	5.3
Yporanga	0.54	6.3
Ytú	0.62	9.2

Source: Own calculations.
Note: Municipality names are as they appear in the Census of 1920.

Table 25 **– Inequality**
Data: Rio Grande do Sul

Rio Grande do Sul		
Municipalities (1920)	*Land Gini (1920)*	*Eligible Voters (%, 1920)*
Alegrete	0.77	10.8
Alfredo Chaves	0.21	6.3
Antonio Prado	0.27	5.4
Arroio Grande	0.76	9.7
Bagé	0.71	10.6
Bento Gonçalves	0.24	9.7
Bom Jesus	0.71	12.4
Caçapava	0.74	9.3
Cachoeira	0.73	10.7
Cangussú	0.74	8.6
Caxias	0.23	9.1
Conceição do Arroio	0.74	10.2
Cruz Alta	0.83	14.5
Dom Pedrito	0.74	11.6
Dôres de Camaquam	0.80	9.6
Encantado	0.33	6.5
Encruzilhada	0.76	8.2
Erechim	0.54	6.4
Estrella	0.20	15.2
Garibaldi	0.28	8.6
Gravatahy	0.65	9.6
Guaporé	0.28	5.7
Herval	0.71	9.8
Ijuhy	0.38	9.1
Itaquy	0.67	11.2
Jaguarão	0.70	11.8
Julio de Castilhos	0.77	9.6
Lageado	0.30	13.4
Lagôa Vermelha	0.69	8.6
Lavras	0.84	8.8
Palmeira	0.72	7.9
Passo Fundo	0.76	10.3
Pelotas	0.69	13.5
Pinheiro Machado	0.65	10.6
Piratiny	0.63	9.0
Porto Alegre	0.78	15.2
Quarahy	0.72	7.6
Rio Grande	0.83	15.0
Rio Pardo	0.75	12.2
Rosario	0.81	10.6
Sant'Anna do Livramento	0.69	10.5

Table 25 – **Inequality** **Data: Rio Grande do Sul**		
Santa Cruz	0.39	14.6
Santa Maria da Bocca do Monte	0.74	13.1
Santa Victoria do Palmar	0.70	10.6
Santo Amaro	0.72	14.4
Santo Angelo	0.74	9.2
Santo Antonio da Patrulha	0.49	9.5
São Borja*	0.75	10.4
São Francisco de Assis	0.74	8.1
São Francisco de Paula de Cima da Serra	0.73	10.4
São Gabriel	0.78	12.7
São Jeronymo	0.78	9.6
São João Baptista de Camaquam	0.84	10.7
São João do Montenegro	0.27	15.0
São José do Norte	0.79	10.3
São Leopoldo	0.28	18.6
São Lourenço	0.72	13.7
São Luiz Gonzaga	0.74	9.8
São Sebastião do Cahy	0.39	15.3
São Sepé	0.69	10.2
São Thiago do Boqueirão	0.74	9.3
São Vicente	0.79	9.0
Soledade	0.72	7.9
Taquara do Mundo Novo	0.39	13.7
Taquary	0.46	10.0
Torres	0.43	8.6
Triumpho	0.62	11.5
Uruguayana	0.69	11.2
Vaccaria	0.75	11.2
Venancio Ayres	0.32	13.9
Viamão	0.61	10.6

Source: Own calculations.
Note: Municipality names are as they appear in the Census of 1920.

APPENDIX 2 – REGRESSIONS FOR THE MAIN DEPENDENT VARIABLES INCLUDING THE SAMPLE AS A WHOLE AND DUMMY VARIABLES

Table 26 – Regressions using the sample as a whole and dummy variables for the main dependent variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	All Comparable Territorial Units														
	Log GDP per capita					*Average Years of Schooling*					*Infant Mortality*				
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^2	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

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

APPENDIX 3 – REGRESSIONS FOR THE OVERALL LAND GINI INCLUDING THE SAMPLE AS A WHOLE AND DUMMY VARIABLES

Table 27 – Regressions using the sample as a whole and dummy variables for the overall land Gini

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	All Comparable Territorial Units																	
	Log GDP per capita						*Average Years of Schooling*						*Infant Mortality*					
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^2	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

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

APPENDIX 4 – REGRESSIONS FOR THE CONTEMPORANEOUS GINI COEFFICIENT INCLUDING THE SAMPLE AS A WHOLE AND DUMMY VARIABLES

Table 28 – Gini coefficient as the dependent variables, using the sample as a whole and dummy variables

	(1)	(2)	(3)
	Gini (2000)		
	All		
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^2	1.00	1.00	1.00

APPENDIX 5 – ADDITIONAL REGRESSIONS CONSIDERING THE STRUCTURAL CONTROLS AND IMMIGRATION

Table 29 – Regressions for the GDP *per capita* with each structural control

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Panel A	**Log GDP *per capita***														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
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^2	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
Panel B	**Log GDP *per capita***														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
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^2	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
Panel C	**Log GDP *per capita***														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
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^2	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 29 – cont.)

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^2	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^2	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^2	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

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 30 – Regressions for the average years of schooling with each structural control

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Panel A	**Log Average Years of Schooling**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	3.96***	1.67***	1.11***	4.10***	3.30***	2.87***	1.67	0.76	0.45	1.88***	1.58***	1.22**	-0.67	-0.86	1.58
Eligible Voters (1920, %)	0.12***	0.08***	0.04**	0.17***	0.13***	0.09**	0.39***	0.33***	0.26**	0.08**	0.11***	0.05	0.14*	0.17*	-0.03
Agricultural Sector (%)	-0.00***	-0.01***	-0.00***	-0.01**	-0.00**	-0.00*	0.00	-0.00	-0.00	-0.01***	-0.01***	-0.00**	-0.00	-0.00	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^2	0.40	0.60	0.67	0.41	0.56	0.57	0.47	0.71	0.72	0.34	0.43	0.50	0.14	0.38	0.72
Panel B	**Log Average Years of Schooling**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	3.97***	1.70***	1.15***	4.14***	3.33***	2.92***	1.57	0.72	0.45	1.96***	1.58***	1.22**	-0.71	0.23	1.25
Eligible Voters (1920, %)	0.12***	0.08***	0.04**	0.17***	0.12***	0.09**	0.37***	0.32***	0.26**	0.07**	0.11***	0.05	0.09	0.11	-0.02
Land use activities (%)	-0.01***	-0.01***	-0.00***	-0.01***	-0.01***	-0.00**	-0.00	-0.00	-0.00	-0.01***	-0.01***	-0.00**	-0.01*	-0.01	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^2	0.41	0.61	0.67	0.41	0.56	0.57	0.47	0.71	0.72	0.33	0.44	0.50	0.26	0.49	0.64
Panel C	**Log Average Years of Schooling**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	3.75***	1.34***	1.00***	3.63***	2.57***	2.39***	1.61	0.87	0.55	1.48***	1.30***	1.11**	-0.86	0.12	1.30
Eligible Voters (1920, %)	0.09***	0.04**	0.02	0.15***	0.08**	0.06	0.20***	0.21***	0.14	0.06*	0.07**	0.03	0.04	0.04	-0.04
Industrial sector (%)	0.02***	0.02***	0.01***	0.01*	0.02***	0.01**	0.02***	0.02*	0.02*	0.02***	0.02***	0.01***	0.02**	0.02	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^2	0.48	0.65	0.69	0.40	0.57	0.58	0.69	0.76	0.76	0.43	0.53	0.56	0.38	0.55	0.66

(Table 30 – cont.)

Panel D	**Log Average Years of Schooling**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	3.31***	1.11**	0.87**	3.38***	2.48***	2.36***	0.43	0.36	0.31	1.55***	1.05**	0.96*	-0.96	-0.51	1.04
Eligible Voters (1920, %)	0.07***	0.04*	0.02	0.12***	0.08**	0.06	0.14**	0.21	0.21	0.04	0.07**	0.04	0.05	0.03	-0.06
Commercial sector (%)	0.06***	0.06***	0.04***	0.05***	0.05**	0.04**	0.08***	0.05	0.04	0.06***	0.06***	0.04***	0.04**	0.05	0.03
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^2	0.50	0.65	0.69	0.48	0.60	0.61	0.66	0.72	0.73	0.36	0.51	0.53	0.31	0.55	0.67
Panel E	**Log Average Years of Schooling**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	4.00***	1.83***	1.15***	3.82***	2.76***	2.49***	0.51	0.14	0.20	2.38***	1.73***	1.23**	-0.70	-0.70	1.10
Eligible Voters (1920, %)	0.12***	0.09***	0.04**	0.15***	0.11***	0.08**	0.09*	0.17	0.18	0.10***	0.15***	0.05	0.11	0.13*	-0.02
Public Administration sector (%)	0.09***	0.08***	0.04***	0.15***	0.15***	0.14***	0.55***	0.35**	0.47**	0.05**	0.02	0.02	0.07	0.15	0.06
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^2	0.42	0.59	0.67	0.44	0.60	0.60	0.64	0.74	0.74	0.22	0.38	0.49	0.19	0.49	0.65
Panel F	**Log Average Years of Schooling**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	2.85***	1.07***	1.01**	3.08***	2.21**	2.22**	1.57	0.95	0.48	1.41***	1.09**	1.07**	-0.94	-0.09	0.57
Eligible Voters (1920, %)	0.05***	0.03	0.03	0.09**	0.06*	0.07	0.19***	0.30***	0.26**	0.03	0.07**	0.06*	0.02	-0.02	-0.04
Liberal Professions (%)	0.21***	0.18***	0.13***	0.17***	0.14***	0.14***	0.22***	0.07	0.01	0.16***	0.13***	0.11***	0.18***	0.26***	0.18
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^2	0.57	0.68	0.69	0.49	0.59	0.59	0.59	0.71	0.72	0.44	0.53	0.53	0.37	0.67	0.68

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 31 – Regressions for the infant mortality with each structural control

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Panel A	**Infant Mortality**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	-60.02***	-2.93	-0.46	-29.88***	-8.22	-5.65	-3.08	6.25	8.58	-8.39**	-3.78	-3.40	8.90***	16.67***	14.64**
Eligible Voters (1920, %)	-0.72**	0.39**	0.58***	-0.43	-0.02	0.20	-2.20**	-1.05	-0.55	0.75***	0.19	0.26	0.31	0.27	0.44
Agricultural Sector (%)	0.01	0.02**	0.01	0.02	0.02	0.01	0.05	0.06	0.05	0.02**	0.01	0.01	-0.02	-0.01	-0.02
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^2	0.30	0.80	0.81	0.15	0.57	0.57	0.17	0.62	0.62	0.14	0.33	0.33	0.41	0.74	0.75
Panel B	**Infant Mortality**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	-59.77***	-3.12	-0.56	-30.06***	-8.34	-5.86	-5.19	4.71	8.31	-8.66**	-3.77	-3.40	11.49***	17.27***	15.48**
Eligible Voters (1920, %)	-0.65**	0.40**	0.58***	-0.41	-0.01	0.20	-2.64**	-1.53	-0.72	0.75***	0.19	0.26	0.38	0.25	0.48
Land use activities (%)	0.02	0.03**	0.01	0.03	0.02	0.02	0.02	0.03	0.02	0.02**	0.01	0.01	-0.01	-0.01	-0.03
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^2	0.31	0.80	0.81	0.15	0.57	0.57	0.15	0.61	0.61	0.14	0.33	0.33	0.37	0.74	0.76
Panel C	**Infant Mortality**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	-60.13***	-1.89	-0.18	-31.58***	-6.51	-4.78	-7.19	3.26	7.45	-8.01*	-3.66	-3.30	11.52***	17.61***	15.21**
Eligible Voters (1920, %)	-0.74***	0.52***	0.62***	-0.65**	0.03	0.21	-1.11	-0.51	0.31	0.74***	0.17	0.24	0.41	0.15	0.33
Industrial sector (%)	-0.02	-0.07***	-0.03	0.05	-0.04	-0.01	-0.24***	-0.20	-0.18	-0.04	-0.02	-0.01	0.01	0.02	0.05
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^2	0.30	0.80	0.81	0.15	0.56	0.57	0.26	0.62	0.63	0.13	0.33	0.33	0.36	0.75	0.76

(Table 31 – cont.)

Panel D	**Infant Mortality**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	-58.06***	-1.04	0.16	-26.94***	-5.20	-3.93	3.82	10.15	10.51	-8.76**	-3.22	-3.09	11.59***	16.24***	15.09**
Eligible Voters (1920, %)	-0.56**	0.53***	0.63***	-0.24	0.13	0.27	-0.72	0.06	0.11	0.68***	0.20	0.24	0.44	0.36	0.43
Commercial sector (%)	-0.18**	-0.20***	-0.09	-0.22***	-0.17***	-0.13***	-0.74***	-0.65	-0.59	-0.05	-0.07	-0.04	0.00	-0.02	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^2	0.31	0.80	0.81	0.17	0.57	0.58	0.23	0.62	0.62	0.11	0.33	0.33	0.36	0.74	0.74
Panel E	**Infant Mortality**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	-59.69***	-3.50	-0.58	-29.83***	-7.14	-4.76	4.42	11.35	10.90	-9.64**	-3.99	-3.33	11.29***	16.31***	15.04**
Eligible Voters (1920, %)	-0.62**	0.36**	0.59***	-0.50*	-0.06	0.20	0.10	0.16	0.11	0.66***	0.09	0.22	0.32	0.33	0.43
Public Administration sector (%)	-0.45***	-0.30***	-0.15**	-0.00	-0.23	-0.10	-5.77***	-3.81*	-4.79	-0.09*	-0.00	0.01	0.21	-0.04	0.02
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^2	0.31	0.80	0.81	0.14	0.56	0.57	0.24	0.62	0.62	0.11	0.32	0.33	0.38	0.74	0.74
Panel F	**Infant Mortality**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
Land Gini (1920)	-53.21***	-0.88	-0.31	-24.15***	-4.57	-4.09	-6.89	2.63	11.69	-7.68*	-3.01	-3.06	10.82***	16.62***	13.04
Eligible Voters (1920, %)	-0.20	0.56***	0.59***	0.06	0.16	0.24	-1.53	-2.07	-1.25	0.82***	0.25	0.22	0.16	0.25	0.37
Liberal Professions (%)	-1.15***	-0.62***	-0.22	-0.96***	-0.45**	-0.25	-1.64*	0.08	1.35	-0.32**	-0.21*	-0.26	0.40	0.07	0.53
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^2	0.34	0.81	0.81	0.20	0.57	0.57	0.18	0.60	0.62	0.14	0.34	0.34	0.40	0.74	0.75

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 32 – Regressions controlling for immigration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Panel A	**Log GDP *per capita***														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
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^2	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
Panel B	**Log Average Years of Shchooling**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
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^2	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
Panel C	**Infant Mortality**														
	All CTU			*Minas Gerais*			*Pernambuco*			*São Paulo*			*Rio Grande do Sul*		
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^2	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

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 33 – Regressions for the GDP *per capita* including the structural controls and immigration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Log GDP *per capita*																	
	Immigration			*Land use*			*Industry*			*Public Administration*			*Liberal Professions*			*Immigration and Structure*		
MG*Gini	2.50***	1.44***	1.19**	2.52***	1.51***	1.21**	2.26***	1.27***	1.14**	2.51***	1.45***	1.18**	2.15***	1.16**	1.13**	2.06***	1.11**	1.09**
PE*Gini	-0.25	-0.05	-0.16	-0.37	-0.20	-0.20	-0.23	-0.02	-0.11	-0.23	-0.03	-0.15	-0.24	-0.05	-0.08	-0.16	-0.00	-0.03
SP*Gini	0.98***	0.76**	0.58	1.07***	0.83**	0.62*	0.87**	0.70*	0.57	1.13***	0.90**	0.60	0.80**	0.56*	0.55	0.75**	0.54	0.52
RS*Gini	1.88***	-1.60**	-1.47**	-1.99***	-1.72***	-1.52**	-2.07***	-1.81***	-1.63***	-1.97***	-1.65**	-1.47**	-2.09***	-1.77***	-1.70***	-2.13***	-1.81***	-1.75***
MG*Voters	0.05***	0.03**	0.02	0.04***	0.03*	0.01	0.02	0.02	0.01	0.05***	0.03**	0.01	0.01	0.01	0.01	0.01	0.01	0.00
PE*Voters	0.05	0.05	0.03	0.04	0.03	0.02	0.00	0.01	0.00	0.06	0.05	0.03	0.00	0.01	0.01	-0.01	-0.00	-0.00
SP*Voters	-0.00	0.02	-0.02	-0.01	0.00	-0.03	-0.03	-0.01	-0.03	-0.00	0.01	-0.02	-0.04**	-0.02	-0.02	-0.04**	-0.02	-0.03
RS*Voters	0.13**	0.11*	0.09	0.12**	0.10*	0.09	0.10	0.08	0.08	0.14**	0.11**	0.09*	0.09	0.08	0.08	0.08	0.07	0.07
Immigration (per 1000 inhabitants)	0.00***	0.00***	0.00*													-0.00	0.00	0.00
Land use activities (%)				-0.00**	-0.00***	-0.00										0.00	0.00	0.00
Industrial sector (%)							0.01***	0.01***	0.00*							0.00*	0.00	0.00
Public Administration sector (%)										0.00	0.00	-0.00						
Liberal Professions (%)													0.06***	0.05***	0.04*	0.05***	0.04**	0.04
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^2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 34 – Regressions for the average years of schooling including the structural controls and immigration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Average Years of Schooling																	
	Immigration			*Land use*			*Industry*			*Public Administration*			*Liberal Professions*			*Immigration and Structure*		
MG*Gini	4.07***	3.22***	2.52***	4.15***	3.43***	2.74***	3.37***	2.67***	2.37***	3.97***	3.11***	2.43***	3.11***	2.44***	2.38***	2.98***	2.36***	2.32***
PE*Gini	1.57	1.63	1.34	1.02	1.08	1.06	1.61	1.70*	1.49	1.48	1.60	1.30	1.58	1.63	1.55	1.54	1.62	1.58
SP*Gini	1.91***	1.81***	1.29**	2.02***	1.90***	1.39***	1.51***	1.50***	1.22**	2.43***	2.19***	1.46***	1.37***	1.22**	1.18**	1.29***	1.21**	1.17**
RS*Gini	-0.38	-0.60	-0.24	-0.68	-0.95	-0.48	-0.88*	-1.21**	-0.81	-0.69	-0.81	-0.35	-0.92	-1.03*	-0.86	-1.09*	-1.29**	-1.17*
MG*Voters	0.19***	0.13***	0.07***	0.16***	0.11***	0.07***	0.12***	0.08***	0.06**	0.17***	0.12***	0.07**	0.09***	0.05**	0.05*	0.08***	0.04	0.04
PE*Voters	0.37***	0.35***	0.29***	0.29***	0.28***	0.25***	0.23***	0.22***	0.21***	0.35***	0.33***	0.27***	0.24***	0.23***	0.23***	0.18***	0.18***	0.18***
SP*Voters	0.13***	0.14***	0.04	0.09***	0.10***	0.03	0.06**	0.07***	0.02	0.08**	0.10***	0.01	0.02	0.05	0.03	0.00	0.03	0.02
RS*Voters	0.13**	0.13*	0.08	0.10	0.10	0.07	0.04	0.03	0.03	0.11	0.12*	0.07	0.03	0.05	0.05	0.00	0.02	0.02
Immigration (per 1000 inhabitants)	0.00**	0.00**	0.00													-0.00	-0.00	-0.00
Land use activities (%)				-0.01***	-0.01***	-0.00***										-0.00	-0.00	-0.00
Industrial sector (%)							0.02***	0.02***	0.01***							0.01***	0.01***	0.01***
Public Administration sector (%)										0.07***	0.05**	0.04***						
Liberal Professions (%)													0.17***	0.15***	0.12***	0.12***	0.10***	0.09***
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^2	0.98	0.98	0.99	0.98	0.99	0.99	0.98	0.99	0.99	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.99

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 35 – Regressions for the infant mortality including the structural controls and immigration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Infant Mortality																	
	Immigration			*Land use*			*Industry*			*Public Administration*			*Liberal Professions*			*Immigration and Structure*		
MG*Gini	-29.84***	-11.59*	-9.17	-30.01***	-11.97**	-9.90	-27.83***	-10.18*	-9.17	-29.61***	-11.34*	-9.36	-26.86***	-9.57	-9.21	-26.01***	-8.95	-8.63
PE*Gini	-7.19	-9.81	-8.80	-5.32	-8.31	-8.24	-7.17	-9.81	-9.11	-6.93	-9.65	-8.77	-7.09	-9.63	-9.18	-6.85	-9.75	-9.43
SP*Gini	-9.53**	-4.17	-2.37	-8.66**	-3.44	-1.91	-7.32*	-2.51	-1.56	-9.73**	-4.06	-1.94	-6.71*	-1.77	-1.51	-7.31*	-2.27	-2.06
RS*Gini	11.69***	16.11***	14.88***	11.86***	16.64***	15.24***	12.40***	17.22***	15.90***	11.78***	16.19***	14.86***	12.57***	16.82***	15.88***	14.24***	18.27***	17.45***
MG*Voters	-0.50**	0.13	0.31	-0.43*	0.16	0.28	-0.33	0.24	0.31	-0.47*	0.14	0.29	-0.21	0.30	0.32	-0.11	0.39*	0.40*
PE*Voters	-2.94***	-2.44***	-2.20***	-2.66***	-2.24***	-2.16***	-2.51***	-2.10***	-2.07***	-2.87***	-2.40***	-2.21***	-2.50***	-2.12***	-2.13***	-2.24***	-1.90***	-1.92***
SP*Voters	0.59***	0.20	0.55**	0.75***	0.32	0.53**	0.81***	0.38*	0.54**	0.69***	0.27	0.53**	0.95***	0.45**	0.51**	1.07***	0.56**	0.61***
RS*Voters	0.43	0.45	0.61*	0.59*	0.59	0.68*	0.76**	0.74*	0.76*	0.51*	0.51	0.65*	0.80**	0.70*	0.70*	0.89**	0.80*	0.80*
Immigration (per 1000 inhabitants)	0.00	0.00	0.00***													0.00***	0.00***	0.00***
Land use activities (%)				0.02**	0.02*	0.01										0.01	0.00	0.00
Industrial sector (%)							-0.06**	-0.04**	-0.03							-0.04	-0.03	-0.03
Public Administration sector (%)										-0.12*	-0.08	-0.03						
Liberal Professions (%)													-0.50***	-0.36***	-0.22	-0.45***	-0.33**	-0.22
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^2	0.94	0.96	0.96	0.94	0.96	0.96	0.94	0.96	0.96	0.94	0.96	0.96	0.94	0.96	0.96	0.94	0.96	0.96

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

APPENDIX 6 – QUANTILE REGRESSIONS USING THE SAMPLE AS A WHOLE AND DUMMY VARIABLES

Table 36 – Quantile Regressions for the GDP *per capita*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Log GDP per capita														
	(0.10)			*(0.25)*			*(0.50)*			*(0.75)*			*(0.90)*		
MG*Gini	2.16***	1.49**	1.22**	2.89***	1.62***	1.38***	2.79***	2.06***	1.48***	3.55***	2.43***	1.72**	2.12	0.89	0.74
PE*Gini	0.43**	0.24	0.21	-0.04	0.80	0.42	0.51	0.49	0.35	0.19	0.41	0.25	0.24	-1.11	-1.37
SP*Gini	1.17***	0.69	0.90**	0.93***	0.93**	0.57**	1.15***	0.90**	0.44	1.58***	1.13*	0.64	1.46	0.83	0.28
RS*Gini	-1.01***	-1.31**	-1.88***	-1.70***	-1.51***	-1.37***	-1.48***	-1.10*	-0.74	-1.67***	-0.58	-0.50	-2.54*	-3.51***	-2.92**
MG*Voters	0.09***	0.05**	0.02	0.06***	0.05***	0.03***	0.05***	0.03*	0.01	0.04*	0.05	0.01	0.04	0.07	0.03
PE*Voters	0.06***	0.06**	0.06**	0.04	0.09***	0.06***	0.08**	0.09***	0.04	0.12***	0.07	0.06	0.09	0.01	-0.00
SP*Voters	-0.06***	-0.02	-0.05**	-0.03**	-0.03	-0.05***	-0.02	0.00	-0.03	0.07**	0.06	0.00	0.07	0.06	0.03
RS*Voters	0.08***	0.09***	0.09***	0.06**	0.07**	0.05*	0.06	0.05	0.05	0.11	0.05	0.08	0.14	0.07	0.06
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	408	408	408	408	408	408	408	408	408	408	408	408

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 37 – Quantile Regressions for the average years of schooling

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Log Average Years of Schooling														
	(0.10)			*(0.25)*			*(0.50)*			*(0.75)*			*(0.90)*		
MG*Gini	2.83*	3.19***	2.79***	4.09***	2.01**	1.83**	3.94***	2.56**	2.46	4.01***	4.60***	3.69***	5.74***	7.13***	3.47*
PE*Gini	0.57	1.01	1.20	1.25	2.13**	1.86*	1.64*	2.44**	1.51	2.00	1.95**	1.94	1.92	1.26	0.79
SP*Gini	1.43	1.98***	1.94	2.18***	1.53**	0.57	1.60***	1.49*	1.19	1.79**	1.88***	0.72	3.02**	3.50***	1.68
RS*Gini	-3.85***	-0.70	-0.28	-0.46	-0.44	-1.76**	-0.79	-0.60	-0.63	-0.66	-0.68	0.73	0.40	-0.81	0.04
MG*Voters	0.19***	0.09***	0.05	0.19***	0.13***	0.06	0.20***	0.16***	0.09	0.18***	0.14***	0.10**	0.20***	0.17***	0.09
PE*Voters	0.21***	0.15***	0.22***	0.24***	0.26***	0.20***	0.28***	0.34***	0.23**	0.37***	0.34***	0.31***	0.60***	0.66***	0.59***
SP*Voters	0.04	0.13***	-0.01	0.02	0.07*	0.04	0.19***	0.21***	0.04	0.19***	0.16***	0.07	0.18***	0.17***	0.03
RS*Voters	0.20***	0.38***	0.27***	0.14	0.16**	0.11*	0.11*	0.09	0.06	0.22**	0.19***	0.05	0.20*	0.20*	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	408	408	408	408	408	408	408	408	408	408	408	408

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).

Table 38 – Quantile Regressions for the infant mortality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Infant Mortality														
	(0.10)			*(0.25)*			*(0.50)*			*(0.75)*			*(0.90)*		
MG*Gini	-15.88***	-8.53*	-6.66	-24.99***	-9.27**	-9.05	-29.11***	-11.39	-8.06	-33.77***	-19.80***	-13.48	-32.16*	-14.13	-7.63
PE*Gini	-22.04	-30.81***	-19.00**	3.60	-16.84***	-21.06***	-10.96	-24.82***	-24.00***	9.96	25.37***	19.18**	-0.06	30.39**	41.68***
SP*Gini	-4.76	-4.30	-4.37	-7.76***	-1.31	-1.19	-7.17*	-2.32	1.15	-10.78*	-9.93**	-5.44	-7.36	-2.66	-1.71
RS*Gini	12.14***	17.89***	18.83***	10.20**	15.60***	18.17***	13.35**	16.12**	15.68***	7.52	10.76*	13.18	7.16	12.10	1.36
MG*Voters	-0.30	-0.17	-0.07	-0.17	-0.19	-0.03	-0.35*	-0.21	0.11	-0.82***	0.22	0.38	-0.38	0.39	0.47
PE*Voters	-2.27***	-2.79***	-2.37***	-1.70***	-1.23***	-1.06***	-2.94***	-2.44***	-2.09***	-2.40***	-2.31***	-2.55***	-4.01***	-3.76***	-3.53***
SP*Voters	0.93***	0.42**	0.65***	0.62***	0.35**	0.46*	0.40*	0.17	0.34	0.58*	0.16	0.50	0.71	0.68	1.13*
RS*Voters	-0.49	-0.84***	-0.73**	0.28	-0.02	-0.09	0.39	0.51	0.54	0.81	0.88**	1.05*	1.11	0.74	1.38
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	408	408	408	408	408	408	408	408	408	408	408	408

Source: Own calculations.

Notes: (i) ***p<0.01, **p<0.05, *p<0.10; (ii) Geographic controls: latitude, altitude (insignificant and removed from most of the specifications), temperature (one variable for each season), rainfall (one variable for each season), area; (iii) Educational controls: number of teachers (%), literate females (1920, %).