Land Grants in Colonial Brazil and Long-Term Effects on Development*

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Abstract

Legal access to land in Brazil has been a key political issue for the past century. The concentration of land in large estates that are often unproductive is argued to be a factor in the rural population's low social mobility and inequality. However, restricted land access in Brazil has its roots in colonial times. Large plots of land were granted from 1530-1822 through land grants called *sesmarias*. Through a novel georeferenced dataset on the location of the grants in eight Brazilian states, I estimate the long-term effects of the grants on Brazil's land distribution. Using propensity score matching, an instrumental variable, and exploiting colonial policy variation on where the grants could be assigned, I find consistent positive effects of land concentration in 1995 for municipalities with a *sesmaria*. Land grants are also associated with increased land conflicts and urbanization in modern Brazil.

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1. Introduction

"In the *sesmarialismo*, thus, is the base to all of [Brazil's] land evolution ."

- O Sistema Sesmarial no Brasil, Costa Porto (1979, p. 25)

Brazil has one of the highest levels of land inequality in the world, with the USAID reporting in 2016 that 1% of the population owns 45% of all the land (USAID, 2016). The issue of land inequality is compounded by the fact that large agricultural lands in Brazil are often unproductive. The Brazilian Agrarian Reform Agency (INCRA) reported that in 2010 "72% of all land occupied by large holdings was considered unproductive" (Carlson, 2019). The combination of both land concentration and low levels of utilization has compounding effects on the economy as it depresses rural wages, keeping rural workers away from the consumer markets (Oliveira Andrade, 1980, p. 1). However, land inequality is something that has existed in Brazil ever since its colonization, as most of the more suitable land had been taken in large estates that were not intensely cultivated (Mueller, 1995, p. 53).

In this paper, I analyze the historical colonial causes of land inequality in Brazil by exploiting time and geographical variation in the request for land grants, called *sesmarias*.[1] These land grants were often given to people with direct financial means and were large. I exploit the grants' geographical and temporal variation to study their long-term effects on Brazil's economic structure. Given the prominence of land grants in colonial Brazil and the variation on why the land was granted, this paper studies the long-term effects of the role of colonial land assignment in development.

I further expand the models from [add the old literature] studying the relationship between land size and productivity.

I first describe how the grants themselves were distributed and describe the process of their geographical expansion. Earlier grants were mostly located along the coast, and a push westward did not occur until the 1700s. Geographically, the grants were also often clustered near the capitals of each state. Timewise, the distribution of the grants increased during the 18^{th} and 19^{th} centuries.

I use a standard OLS and a propensity score matching procedure to estimate the long-term effect of the grants on land concentration. Both methods reveal an association that municipalities

[1] Throughout the paper, I will use land grants, grants, and *sesmarias* interchangeably.

with a colonial land grant within their boundary see an increase in the percentage of farms above 2,000 hectares. The estimates indicate that the presence of a *sesmaria* is associated with an increase of 3% in the share of large farms in a municipality. Estimates on land inequality are also higher for grants pre-1700, with estimated effects of 4%, while post-1700 grants are only associated with a 2.3% increase in the share of farms over 2,000 ha. Similar results hold if considering different cutoffs, such as 5,000 or 10,0000 ha.

To further address the issue of endogeneity, I use an instrumental variable approach, similar to Duranton et al. (2011). I use the explorer routes of the *Bandeira Paulistas* as an exogenous determinant of the grant locations. The *bandeirantes*, in their explorations, were mostly occupied with the search for indigenous slaves and minerals, then looking for suitable land for farming. However, once the area had been explored and cleared of possible indigenous threats, they would settle and claim the land. Given their historical context on how the *bandeirates* further expanded Brazil's territory to the West, and historically how they would often they would later request land grants in the areas they have claimed to discover, that gives a possible exogenous determinant of the land grant locations in the Southeast. Consistent with the previous results, I find that the effects of land concentration remain in the Southeast on those municipalities that had a colonial land grant.

Further, I exploit variation in two sets of policies in colonial Brazil to test historical predictions about the grants' impacts. First, I consider a 1701 ban on livestock grazing within 80km of the coast. This policy generated both a time and geographical variation in the assignment of grants. When considering the coastal ban on livestock, the results indicate that only in areas farther than 80km from the coast **and** that received a land grant, there is an increase in the presence of livestock land usage and land inequality. The results are present when considering either pre-1700 or post-1700 grants.

Second, I consider the Tordesillas Treaty, which split Brazil between Spain and Portugal until 1750. Using the geographical variation on the assignment of Spanish and Portuguese Brazil, I test whether the exposure to Portuguese colonization is the sufficient driver of the results of land inequality or if there are compounding effects of the grants themselves. I find that while municipalities on the Portuguese side do have a higher share of large estates **but** the presence of grants exacerbates these effects. Moreover, grants on the Spanish side are also associated with increased land inequality. The results indicate that differential institutions, as measured by the Portuguese

and Spanish sides, are insufficient to explain present-day variation in land inequality. Instead, the presence of the land grants is a key factor associated with land distribution.

I also test whether there are heterogeneous effects on land concentration between Brazil's Northeast and Southeast regions. Given the regional disparity in development in the present, with the Northeast being considerably poorer and less developed than the Southeast, it could be argued that the land grants had a stronger effect in the Northeast. The results indicate that the land grants are associated with increased land concentration in both regions. Pre-1700 increase the land concentration only in the Northeast, where they are associated with an increase of 5% in the share of farms over 2,000 ha. Post-1700 grants, however, affect both regions similarly, being associated with an increase of 3% in the share of farms over 2,000 ha. These results indicate that the grants themselves did not only have a regional impact but are also pervasive in both regions.

I then turn to understand the mechanisms that drive the results. First, I test through satellite data whether the grants are associated with urbanization and whether there are effects on land tenure and security. I find that grants pre-1700 are associated with an increase in urbanization and are not associated with land squatting or misuse of land. I also test the relationship between the land grants and land conflict. I find that the presence of a grant, whether pre-1700 or post-1700, is associated with an increase in land-related conflicts between 2014 and 2018. Lastly, I measure the effects of the grants in the presence of slavery in 1872 through a novel georeferenced dataset at the parish level. The results indicate that only the earlier grants, pre-1700, were associated with a lower presence of slavery.

This paper contributes to the literature in several ways. First, the paper provides a novel georeferenced dataset of colonial grants in Brazil for eight states in the Northeast and Southeast. Through archival work and collaboration with Brazilian researchers, over 4,000 land grants were successfully georeferenced, providing a novel dataset that allows researchers to study and understand the patterns of colonization in Brazil. Further, these states analyzed in this paper were also historically where colonization began, making the study of the colonial past especially relevant.[2] I further contribute by providing the first georeferenced dataset for 1872 parishes, which allows for more precisely geographical measures

Second, this paper contributes to the further understanding of colonial institutions and their

[2]Further work must be done to collect and georeference data for the rest of Brazil.

long-term effects on development (Engerman et al., 2002; Acemoglu et al., 2005). Previous studies in Latin America have studied the institutions of the *mita*, *haciendas*, and *concertaje* in Spanish America, such as Dell (2010), Faguet et al. (2022) and Rivadeneira (2024). While the *sesmarias* are similar to the *haciendas*, their size and the fact that they were often freely distributed to wealthy people in colonial Brazil gives a different contrast on how they could affect long-term development. This paper adds to the literature by studying a key institution that prevailed in Brazil for over 200 years, the *sesmarias*.

Third, there are no empirical papers studying the direct causes of colonial land distribution in Brazil. Previous literature has found negative long-term effects of colonial land usage in Africa and South America (Dell, 2010; Lowes et al., 2021; Montero, 2022). However, there exists evidence that not all colonial land regimes led to negative effects and instead led to economic development, with examples in India and Indonesia (Banerjee et al., 2005; Dell and Olken, 2020; Ratnoo, 2023). Other studies have analyzed the effect of land grants in the United States (Akee et al., 2014; Allen, 2019; C. Smith, 2023). Other works have analyzed land distribution and reforms in Europe (Reed et al., 2012; Goñi, 2022). By studying Brazil, one of the countries with the highest levels of land inequality in the world, I conduct the first empirical study analyzing the historical roots of land inequality in the country.

This paper also contributes to the understanding of Brazil's historical economic development by explaining the diverging paths in development in each region. The land regime and size in each region, as measured by the land grants, could have differential impacts on development. Wigton-Jones (2020) studies the effects of 1920 agricultural census land inequality and how it still has persisted to the present. The literature has analyzed how different economic cycles and how immigration led to differential educational outcomes in Brazil (Musacchio et al., 2014; Rocha et al., 2017; Carvalho Filho et al., 2012). Ehrl et al. (2019) further studies the persistence of occupations from 1872 to the present. Related literature has also analyzed the effect of the Spanish-Portuguese borders in South America, the role of sugarcane, and gold mining in Brazil (Laudares et al., 2023; Naritomi et al., 2012). This paper adds to the literature by focusing on a specific Portuguese institution, the *sesmarias*, to study how it affects present-day Brazil.

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The paper is divided as follows. In Section 2 I briefly describe the history of land in Brazil,

from its colonial times to the present-day system. In Section 3 I describe the land grant dataset, its collection, and the other datasets used. In Section 4, I provide a theoretical framework discussing the effects of land size and productivity. In Section 5, I quickly describe the evidence of the geographical selection of the land grants in Brazil. In Section 6, I discuss the four main identification methods used in the paper.[3] In Section 7, I discuss the main concerns in studying the long-term effect of land grants in Brazil. In Section 8, I discuss the results of all the empirical approaches. Section 9 discusses potential mechanisms and other channels through which there are persistence effects. I discuss a few robustness checks in Section 10. Lastly, Section 11 concludes the paper.

2. Historical Background

2.1. Land Grant Implementation in Brazil

Tem que falar sobre as Capitanias Hereditarias e como as sesmarias tinham que ser doadas ja nessa epoca.

Portuguese presence in Brazil began in 1500, when Brazil was first colonized. Early on, to deal with the costs of managing an overseas empire, the Portuguese Crown decided to split the country into fifteen tracts of land called *capitanias*, each given to a set of individuals. One of the key aspects, however, was that each captain was supposed to distribute the land as *sesmarias* as a form of settlement. When Portugal abolished the system of the *capitanias* it kept the distribution of the land grants.[4]

The Portuguese Government tried to implement in Brazil a similar system of land distribution they had successfully done in the Azores and Portugal.

[Add here that it was established in 1375 in Portugal because of the Black Death and the need to repopulate the countryside (Nozoe, 2006)]

According to T. L. Smith (1944), the only way Portugal knew how to distribute the lands in Brazil was through the large *sesmarias*. However, while the legislation for granting the land was

[3] In Subsection 6.1, I show both OLS and matching estimates of the long-term effects. In Subsection 6.3 and Subsection 6.4, I exploit two sources of variation to study the differential effect of the grants. In Subsection 6.2 I discuss the instrumental variable and discuss its results.

[4] Some municipalities were directly created and first settled because of the land grants. For example, the municipality of Taipu in the state of Rio Grande do Norte is described as being "first settled because of a land grant in 1608". In total, 17 grants were given to this municipality, which was a primary cause of its creation. More information is available at https://www.taipu.rn.leg.br/a-cidade/.

the same, two main issues differentiated how it was applied in Portugal and Brazil. Portugal, as a smaller state, the *sesmarias* led to small properties. Meanwhile, in Brazil, by the need of colonization and the large area of the country, the implementation of the *sesmaria* system led to the creation of larger estates than the ones seen in Portugal (Costa Porto, 1979, p. 58-59; Diffie, 1987, p. 28; Panini, 1990, p. 23-24).

While technically, anyone could apply to get a land grant, the requirement to develop the land often led people of great wealth to apply. In practice, that led to the applications being done only by a select few who had the money or political connections (Diffie, 1987, p 434). In the letter descriptions, the applicants would boast about their wealth and connections in order to be able to get a grant (Lima, 1954, p. 36). Those applicants that had the financial means to get a land grant would often get large estates, "customarily one to three leagues in extent (16.7 to 50.1 square miles)" (Dean, 1971).

Given that the grants were distributed to only a few people with sufficient capital, it would generate the first division of wealth in Brazil's colonial society. Lima (1954, p. 36) indicates how those people would become the "future sugar engine owners and farmers that would create the economic aristocracy of the colonial society".[5] Further, those who did not have the means to get a land grant would often be marginalized in colonial society (Simonsen, 2005). Contemporary evidence from the French botanist Augustin Saint-Hilaire describes how "the poor that couldn't have titles, establish themselves in the land that they don't know if it is owned; they plant, build small houses, raise chickens, and when the least expected, a rich man appears with a title, expels them and enjoys the fruits of their labor" (Costa Porto, 1979, p. 143).[6] The presence of the grants land led to land concentration through the consolidation of land in the hands of owners that successfully developed their land (Manchester, 1931).

Need more in-depth discussion of the history here

"As a result, cattle raising shifted to the countryside of the Northeastern region. This activity was radically different from the sugar industry, occupying extensive areas of land, and the impact

[5]Additionally, Lima (1954, p. 47) states that the "The *sesmaria* is the large estate, inaccessible to the farmer without resources."

[6]More evidence from the issues of squatting is further described in the letter by two grantees em 1702, who requested land alongside a river but claims people were living there without a *sesmaria* grant (Costa Porto, 1979, p. 142). In the interior of the Northeast when the land was full of squatters or bandits, they would often grant them away (Poppino, 1968, p. 88).

of the dry seasons was reflected in the absence of permanent occupation. Not only was there no need for large initial capital investments, but also the large amount of land available hindered productivity increases."(Bértola et al., 2017, p. 117)

Political Effects: (Leal, 2012).

History of land inequality being bad in 1920 (Bértola et al., 2017, p. 124)

2.2. End of the *Sesmarias* and the 1850 Land Act

On the brink of Brazil's independence in 1822, land concentration in Brazil was high due to the land grants throughout its colonial period (T. L. Smith, 1972). Contemporaries describe that a key issue of the *sesmaria* system was a lot of the land had already been given, which led to a lot of poor families who were not able to claim land (Lima, 1954, p. 42-43). As a push against the grants and the issues they were causing, in 1822, the Emperor of Brazil banned the system of *sesmarias* in Brazil.[7] What followed was 50 years of confusion, during which time there was no legal way to obtain land. As a result, squatting became a common practice during this time.

To solve this issue, the Brazilian government passed the Land Law in 1850, which officially established rules for how land would be distributed in Brazil from then on. Land squatting would be limited but would be allowed to become private property if it was being developed. Also, all former land grants would need to be revalidated with evidence that the land was being used appropriately. However, the enforcement of the Land Law did not happen, and it had the opposite consequences. Instead, large landowners started to squat land themselves and claim it as part of their own.

2.3. Long-Term Effects

Many historians have discussed the impact of the colonial land grants on Brazil's current land inequality issues. Andrade (1980, p. 18) describes the actual system of land ownership in Brazil as "continuation of the colonial system, with the *sesmaria* becoming the [large private estates]". Oliveira Andrade (1980, p. 36) states how in the Northeast "The concentration of landholdings [...] is a consequence of the essentially commercial character of agriculture there. This character has

[7] Surprisingly, in the dataset, I still observe grants being given post-1822, possibly indicating that the law was not immediately binding.

manifested itself since the start of colonization".[8]

Cruz et al. (2023) argues that the lack of a strict law on the grant distribution, alongside the lack of boundaries and enforcements that combined with the 1850 Land Act, allowed the concentration of land by the elites and dissuaded smallholders from obtaining land legally in Brazil .[9] Baer (2014, p. 16) describes largely negative effects of the sugar economy, especially in the Northeast, which led to the region's concentration of wealth and economic backwardness.

Some of the same issues of large estates and poor land utilization persist to the present. Carlson (2019) based on INCRA data indicates how even up to 2010 "more than 50 percent of all large landholdings and 72 percent of all land occupied by large holdings was considered 'unproductive' according to agency parameters".

Add here how some of the legislation is still applied today, the fight between the natives in Maranhao and how they got their land through one of those old land grants, etc.

3. Data

3.1. Land Grant Dataset

Given the nature of the grant application and the requirement that a letter be sent to the governor and approved, many of the letters were stored in archives throughout Brazil. The letters, or transcribed versions of them, kept by state archives, are the main source of information available on the location of the land grants.

The main source of historical data comes from both a collaboration with the *Sesmarias of the Luso-Brazilian Empire Database*.[10] For the states of São Paulo and Minas Gerais, I use archival

[8] Oliveira Andrade (1980, p. 34-35) further argues that "one of the causes that most aggravate the problem [the considerable increase in population, without a corresponding increase in possibilities for employment, is much more a swelling than an orderly growth] is the land tenure system, dominant since colonization. It tends to contribute to the concentration of property and the lack of guarantees, of written and respected contracts, that would give greater stability to the sharecroppers in the Agreste and the Sertao and to the agricultural workers in the Zona da Mata."

[9] A report to the Minister of Agriculture in 1873 already stated major complaints about the issues of land inequality. The report states that "The major part of the land in our province is divided into great properties, remains of the ancient *sesmarias*, of which few have been subdivided. The proprietor or the renter occupies a part of them and abandons, for a small payment, the right to live on and cultivate the other portions to one hundred, two hundred and sometimes to four hundred families of free mulattoes or blacks, of whom he becomes the protector but from whom he demands complete obedience and over whom he exercises the most complete despotism"(T. L. Smith, 1972, p. 325)

[10] Information on the content of the letters is available at http://plataformasilb.cchla.ufrn.br/. The georeferencing process was done in collaboration but as a separate project for this paper.

data published by each state's public archive to get access to either the letters themselves or the inventory summaries.[11] For the states in the Northeast, I collaborated with the *Sesmarias of the Luso-Brazilian Empire Database* in order to get access to digitized information on the grants.[12] The database uses archival data from state records, original manuscripts, and other historical data sources to obtain textual information on the historical concession of land grants in Brazil.[13]

When available in the text, information such as the petitioner's name, year, and the reason for the request are coded.[14] The land grants are then georeferenced based on the geographical information present in the text, allowing me to trace them approximately to a geographical point measured as a latitude and longitude coordinate, or at least within a certain municipality boundary.[15,16]

For this paper, I consider the land grants in the states of Paraiba, Rio Grande do Norte, Pernambuco, Alagoas, Bahia, São Paulo, and Minas Gerais. These states, located alongside the Northeast and the Southeast, are the most suitable places to study the long-term effect of the land grants in colonial Brazil. Given their proximity to the coast, all of them were settled early and consequently received earlier grants, unlike other states in the Center-West and the South. Additionally, those states were historically more dependent on agriculture during their colonial time, unlike the states in the North.

I show the period and geographical variation of the grants in two ways. First, in Figure 1, I show a histogram of the number of grants distributed by decade. Overall, there are only a few grants that happened pre-1700; however, after 1700, there is a quick increase in the number of grants being distibuted.[17] Second, in Figure 2, I show the geographical distribution of the land grants across the states from which I gathered information.[18,19]

[11] An example of a transcribed manuscript published by the state of São Paulo is available at Figure A.1. An example of the grants being described by name and location, as it is in the case of Minas Gerais, is available in Figure A.2

[12] The *Sesmarias of the Luso-Brazilian Empire Database* is currently digitizing and inputting information of other states into their website.

[13] An example of an original manuscript can be found in Figure A.3.

[14] The reason for request information is only missing for the state of Minas Gerais since the land grants located there were described in a tabulated format.

[15] More information on the sources used for this project is available in Appendix B.

[16] A more in-depth description of how the sources of the letters and how the land grants were georeferenced is available in Appendix C

[17] It is important to note that while the grants effectively began being distributed by 1522, in my available data the earliest grant I have access to is during the 1590s. While that could be a concern,

[18] Due to data limitations, I do not have information on the grants in the states of Rio de Janeiro, Espirito Santo, and Sergipe which are the three coastal states without grants. Therefore, they are not considered in this version of this paper.

[19] Some of the grants located in other states either occurred because, at one point, the states were a single one

3.2. Agricultural Census data

The 1995 Brazilian Agricultural Census is the main dataset used to study the long-term effects of the grants on land inequality. It provides information at the municipality level on the distribution of the size of agricultural holdings, their usage, and their tenure type in Brazil.[20] I estimate land inequality as the percentage of all agricultural properties that exceed 2,000 hectares.[21]

3.3. Census Data

I use the 1872 Brazilian Imperial census, which occurred only 50 years after the formal ban on land grants in Brazil, to study the medium-term effects of the grants at an earlier period. Census data for 1872 is obtained from the Nucleus of Research in Economic and Geographic History from the Federal University of Minas Gerais.[22] The 1872 Imperial Census contains demographic data at the municipality and parish level and was the last census taken before the abolition of slavery in Brazil.[23]

Additional work was done to get a novel database at a finer geographical level for the 1872 census. At that time, the lowest geographical unit at which the census was taken was at the parish level, and each municipality included at least one parish. I then georeference the parishes, allowing me to study the effects with the 1872 census at a smaller geographical unit, allowing for better precision of the estimates.[24,25] Figure A.8 shows the geographical distribution of the parishes alongside their municipality boundaries.

I use data from other censuses to study the persistence of these effects. Censuses from 1970-2010 are obtained from the Brazilian Institute of Geography and Statistics (IBGE).[26]

(e.g., São Paulo and Parana), or due to mix-ups on where the letters themselves were stored.

[20] Earlier agricultural censuses such as 1920, 1940, and 1960 existed; however, to the best of my knowledge, they have either not been digitized or made available online.

[21] I later show that results are robust to different cutoffs.

[22] Available at http://www.nphed.cedeplar.ufmg.br/

[23] It is important to note that the 1872 census does not measure land distribution nor agricultural output.

[24] Distribution of the 1872 parishes alongside the municipality boundaries is available at Figure A.8. For the sample used, I have 469 municipalities and 1,115 parishes. Information on how the parishes were georeferenced alongside how their borders were constructed are available at Appendix D

[25] More information on the construction of the variables based on the 1872 census data is available on Appendix E

[26] Microcensus is available through the IBGE, but the data downloaded through the R package *censobr* from Pereira and Barbosa (2023)

3.4. Geographical Boundaries and Controls

In addition, I obtain geographical characteristics and shapefiles at the municipality level from various sources. Shapefiles for the coast of Brazil, municipality seats, and municipality boundaries from 1872-2010 are obtained from IBGE through Pereira and Goncalves (2023).[27] Information on the slope comes from the European Environment Agency [28], and elevation comes from Amatulli et al. (2018). Data on the maximum amount of calories based on pre-Columbian and post-Columbian crops are obtained from Galor et al. (2016). Soil types in Brazil are obtained from EMBRAPA (Brazilian Agricultural Research Corporation). Rivers and streams were also obtained from IBGE.[29]

To study the effect of land usage and tenure, I combine satellite data alongside Brazilian Agricultural Censuses. Land usage from 1985-2010 is obtained from Mapbiomas (Souza et al., 2020)[30]. Data for current land tenure in 2021 in Brazil is obtained from Sparovek et al. (2019).[31] To study the effects on land conflict in Brazil, I obtain data from yearly reports from the CPT (Comissão Pastoral das Terras) from the years 2014-2018.[32,33]

4. Theoretical Model

[add here some stuff based on the older literature, (Carter, 1984) ,(Benjamin, 1995), (Benjamin, 1992)]

In the end, it should have a U-shaped curve of land size to productivity.

5. Historical Selection of the Land Grants Location

Using the 1995 census municipality boundaries for the selection of states, I conduct a balance test on the geographical observables to see whether municipalities that received a land grant are different from those that did not. Table 1 shows evidence of the non-random placement of the

[27] I would like to thank Luis Claudio Barbosa for helping collect the 1995 Census boundaries, which are not available online.

[28] Available at https://www.eea.europa.eu/data-and-maps/data/world-digital-elevation-model-etopo5

[29] https://metadados.snirh.gov.br/geonetwork/srv/api/records/a01764d3-4742-4f7d-b867-01bf544dde6d

[30] Available at https://brasil.mapbiomas.org/en/

[31] Available at https://atlasagropecuario.imaflora.org/.

[32] Annual reports from 2015-2022 are available to download at https://www.cptnacional.org.br/downlods/category/4-areas-em-conflito.

[33] Geographical distribution of the conflicts on the selected states is Figure A.4.

grants. Overall, we can see that municipalities that received a land grant were located near a coast, have a lower average slope, are located in places with less elevation, and have a lower potential for sugarcane.[34]

Further, based on the geographical spread of the grants as seen in Figure 2, the grants were geographically concentrated on the coast in both the Southeast and the Northeast. Grants were also often centered around the capitals of each state and did not go further into the interior until the 1700s.

6. Identification

Throughout all the following subsections, $Y_{m,s}$ is a variable that measures the percentage of total farmland in a municipality m in farms that exceed 2,000 ha.

6.1. OLS + Matching

To first study the effects of the land grants I use a propensity score matching procedure to select control municipalities with similar geographical characteristics to those that received at least one land grant. The propensity score matching consists of two steps. In the first step, I estimate the following:

$$AnyGrants_m = X_{m,s} + \mu_s + \epsilon_{m,s} \tag{1}$$

Where $AnyGrants_{m,s}$ is a binary variable that takes the value of 1 if the municipality had any land grants and 0 otherwise. X_m is a set of geographical variables that include: latitude, longitude, mean elevation, mean slope, soil quality for food crops (Galor et al., 2016), potential sugarcane output from the FAO, the distance to the coast, distance to the nearest river, and the presence of four types of soil (latosol, argosol, cambisol, and spondosol).[35] These variables are selected because they are proxies for potential agricultural output, geographical location, market access, and Brazil's main export during colonial times, which was sugarcane. Given the coefficients on the geographical

[34] I further breakdown the grants in earlier vs. later using 1700 as the cutoff. In Table A.1, I show that pre-1700 grants were more likely to be located closer to the coast than municipalities that never got a grant or those that received a grant post-1700. This follows the historical settlement pattern of Brazil, as colonization began along the coast and was later expanded towards the West.

[35] The choice of these soils comes from Rocha et al. (2017); they are chosen because they are the soil types that are most suitable for coffee.

set of variables estimated, I use them to calculate the predicted probability that a municipality received a land grant. For each treated municipality, I select one untreated municipality to be its control, which generates the matched sample.

For both the matched and unmatched samples, I then estimate the following equation:

$$Y_{m,s} = \beta_1 \cdot AnyGrants_m + X_m + \mu_s + \epsilon_{m,s} \tag{2}$$

The assumption for the matched sample is that conditional on the set of controls, the municipalities that received a land grant are ***as good as random*** since the control municipalities had similar geographical characteristics. The estimator β_1 indicates the long-term effects of the land-grant presence in a municipality. If the land grants are expected to have a long-term impact on the land distribution, it is expected that $\beta_1 > 0$.

I further break the effects by the time that the grants were allocated, pre-1700 and post-1700, by estimating the following equation for both the matched and unmatched samples:

$$Y_{m,s} = \gamma_1 \cdot GrantsPre1700_m + \gamma_2 \cdot GrantsPost1700_m + X_m + \mu_s + \epsilon_{m,s} \tag{3}$$

In this case, $GrantsPre1700_m$ is a binary variable that takes the value of 1 if the municipality had a grant pre-1700 and 0 otherwise, while $GrantsPost1700_m$ is defined similarly, but for post-1700 grants. The choice of the 1700 cutoff is based on a major historical reason. In 1698, a limit was imposed on the size of the grants: they could not exceed three squared leagues. Beforehand, the grants did not have a proper limit in the law. If the law was truly effective, it would be expected that the land concentration would be stronger in grants pre-1700, which would imply that $\gamma_1 > \gamma_2$.[36]

6.2. Instrumental Variable - Bandeirantes Exploration

To further address the concerns on the endogeneity of the estimators, I propose an instrumental variable approach that uses the exploration routes of the *bandeirantes* in Southeastern Brazil.[37] The *bandeirantes* explorations were one of the key events in the 17$^{\text{th}}$ and 18$^{\text{th}}$ century in the Southeast

[36] While it is observed that post-1698, the letters do state that the grant size is limited, in practice, that was often not the case due to the lack of enforcement.

[37] A similar exploration route instrumental variable has been used previously in the United States by Duranton et al. (2011).

(Fausto, 2014, p. 46-47). These explorations were often motivated by the search for minerals or indigenous slaves.[38] They would often start from the city of São Paulo and spread towards the interior of Brazil, which at the time was still unexplored.

The *bandeirantes* are of historical importance to the region, as they often cleared paths and, by the enslavement of the indigenous people, allowed settlement in the region (T. L. Smith, 1972, p. 320). The settlement, however, would often come in the form of land grants, as the *bandeirantes* would argue that due to their exploration, they were entitled to the land they had discovered. As a result, the *bandeirantes* would often "appropriate [...] large tracts for the purposes of cattle raising" for their entire family (T. L. Smith, 1972, p. 320).

Given their role in the exploration and opening of the Brazilian West and how they were directly associated with the land grant distribution in the region, I use a map from the *Historical Atlas of Brazil* to digitize the location in which the *bandeirantes* first went.[39,40] I then calculate the distance from a municipality to the nearest *Bandeira* and use it as an instrument for the probability that the municipality received a grant. Figure 4 shows the geographical expansion of the Bandeiras, as they expanded from São Paulo, Minas Gerais, and Bahia.

For this analysis, I select only the states of São Paulo and Minas Gerais, which had Bandeirantes explorations.[41] The Bandeirantes I consider, which are the same ones reported on the map, are as follows: Antonio Raposo Tavares, Fernao Dias Pais (who was the father-in-law of the famous Manuel de Borba Gato), Manuel Preto, and Pascoal Moreira Cabral Leme.[42]

Out of the group, the most famous one was Antonio Raposo Tavares. Raposo Tavares was a Bandeirante whose one exploration was aimed to the West of the Treaty of Tordesillas solely on clearing indigenous people and attacking the Jesuit missions in the area (Franco, 1954, p. 406). The expulsion of the Jesuits allowed the subsequent claim of land to the West of Brazil for the states of Parana, Santa Catarina, Rio Grande do Sul, and Mato Grosso (Franco, 1954, p. 405). His

[38] Morse (1965, p. 142) even mentions how "the penetration of the [interior] was frequently motivated more to satisfy a sportive instinct than to answer an economic necessity"

[39] Map can be accessed here: https://atlas.fgv.br/marcos/bandeiras-e-bandeirantes/mapas/bandeiras-e-entradas

[40] Some of the paths were verified using Santos (2022) and Cortesao (1958).

[41] This section focuses on the Bandeiras Paulistas, which radiated from São Paulo. Expansion to the West on the other states was due to other factors, unlike the selected states in the Southeast in which Bandeirantes were looking for gold or indigenous people to slave towards the center of Brazil.

[42] Most of them are described as the most noteworthy Bandeirantes in the history of São Paulo (Prestes Filho, 2012, p. 43)

second most famous exploration started in São Paulo and ended up at the mouth of the Amazon River in the city of Belem. Raposo Tavares' explorations were "essentially aimed at the geographical discovery, and the search for mines" (Cortesao, 1958, p. 395). While Raposo Tavares never claimed any land through his explorations, it is reported that after he attacked the Jesuit missions, since they were located to the west of the Treaty of Tordesillas, many Portuguese settlers started moving into the region and that now it was not under the dominion of the Spanish (Franco, 1954, p. 406).

In order to approximate a causal effect of the grants in Southeast Brazil, I estimate the following first-stage equation:

$$LandGrant_{m,s} = \delta \cdot BandeiraDist_{m,s} + X_{m,s} + \mu_s + \epsilon_{m,s} \tag{4}$$

Where $LandGrant_{m,s}$ is a binary variable that takes the value of 1 if the municipality had a land grant and zero otherwise. $BandeiraDist_m$ is the instrument that measures the distance from a municipality to the closest *bandeirante* route. X_m and μ_s are a set of geographical controls and state fixed-effects, respectively.

The second stage is as follows:

$$Y_{m,s} = \beta \cdot \widehat{LandGrant}_{m,s} + X_{m,s} + \mu_s + \epsilon_{m,s} \tag{5}$$

The exclusion restriction assumes that, conditional on the set of controls and the proximity to the Bandeirantes routes, the Bandeirantes only affect land concentration through the increased presence of land grants. Given the presence of a strong first-stage and the exclusion restriction holding, the estimate β captures the causal effect of the grants in land inequality.

6.2.1. Instrument Validity

To test the validity of the instrument I perform two tests. First, I show that visually, there is a strong negative correlation between the proximity to a *bandeirante* route and the probability of a municipality receiving a land grant. Figure 5 and Figure A.17 show the geographical distribution of the grants alongside the explorer routes and a binscatter graph indicating the probability of a municipality getting a grant based on how close it is to the explorer route.

Second, as a placebo, I test whether there is a first-stage effect on the grants pre-1700. Since most of the explorations took place between the mid-17th century and later, it would be expected that the explorer routes would not be a strong predictor for earlier grants but only for later grants. I show in Table A.7 that the first-stage regression only exists for grants post-1700, further providing evidence that the *bandeirantes* were responsible for the expansion of the land grants in the region.

6.3. Coastal Ban on Livestock

To further test the validity of the previous estimates, I exploit a policy that caused the *sesmarias* to be geographically separated based on their economic activity. In 1701, the Portuguese Crown enacted a ban on cattle ranching from 80km of the coast (10 leagues) (Fausto, 2014, p .40; Simonsen, 2005, p .198; Bethell, 1984, p .460). The law went into effect after local farmers complained that cattle grazing was destroying the sugar plantations in the area. In effect, that led to reserving the coast to be primarily an agricultural area and allowing the expansion of cattle towards the interiors of Brazil (Júnior et al., 1968, p. 216). This split between agriculture and livestock led to "a clear specialization between the two activities" (Ribeiro, 2012).[43]

"The Italian Jesuit André João Antonil (1649–1716), one of the first to describe the cattle farming activity in detail, already indicated, in 1711, that cattle was one of the 'enemies of sugarcane', because 'the oxen and the horses at first eat the eyes and then knock them down and step on them' (Antonil 1923: 111, our translation)." (Ribeiro, 2012)

Another example was Parnaiba in Piaui, https://parnaiba.pi.gov.br/phb/o-municipio/

Historically, the size of landholdings in the interior of Brazil at this time was extensive. As Fausto (2014, p .41) indicates, the need for large lands to allow cattle to roam free led to the creation of large estates in the area, even bigger than those of the coast.[44] Even with restrictions on the sizes of the land grants taking into effect in 1698, due to the lack of government oversight, the "sesmarias on which cattle ranches were established sometimes exceeded hundreds of thousands of acres" (Bethell, 1984).

Given the policy, I estimate the following regression to estimate the heterogeneous effects of the

[43] An example of the effect can be seen in the Municipality of Ruy Barbosa, and the state of Bahia and Caico in the state of Rio Grande do Norte. Both are described as being created by the cattle expansion due to the 1701 Royal Decree. (*IBGE* n.d.)

[44] An example of this would be the d'Avila family, which owned a large estate in the state of Bahia.

grants in two ways. First, I compare the effects only using the pre-1700 grants by estimating the following equation.

$$\begin{aligned} Y_{m,s} =& \beta_1 \cdot (Pre1700Grant_m \times More80km_m) + \beta_2 \cdot (Pre1700Grant_m \times Less80km_m) + \\ & \delta \cdot More80km_m + X_m + \mu_s + \epsilon_{m,s} \end{aligned} \tag{6}$$

I then also estimate:

$$\begin{aligned} Y_{m,s} =& \zeta_1 \cdot (Post1700Grant_m \times More80km_m) + \zeta_2 \cdot (Post1700Grant_m \times Less80km_m) + \\ & \delta \cdot More80km_m + X_m + \mu_s + \epsilon_{m,s} \end{aligned} \tag{7}$$

Where $Pre1700Grant_m$ and $Post1700Grant_m$ indicate whether a municipality received a land grant or not pre- or post-1700, this cutoff is chosen since the year of the law was in 1701, but also because of the size limit established in 1698. $More80km_m$ and $Less80km_m$ are binary variables that take the value 1 if the municipality is more than 80km from the coast and zero otherwise. The base group to which the estimators are being compared are municipalities that did not receive a grant but are located less than 80km from the coast.

The coefficients of β_1 and β_2 give the differential impacts of the grants in municipalities more than 80km from the coast and less than 80km from the coast. If this policy generated variation on the grants being expanded westward, which were aimed towards livestock and, as a result, would often expand the land, it would be expected that $\beta_1 > \beta_2$. The same idea holds for ζ_1 and ζ_2.

The expected results on the grant size, the comparison of the magnitudes between β_1 and ζ_1, could, however, be mixed. While cattle grants were expanding towards the west, which was often associated with increased land sizes, the 1698 law also established a maximum size on the grants. Therefore, these two competing factors do not allow for an ex-ante estimate of the grants.

6.4. Treaty of Tordesillas

Another source of the heterogeneous effects of the grants is the Treaty of Tordesillas, which split Brazil between a Spanish and a Portuguese side. The treaty established *de jure* that the Portuguese would not be allowed to settle west of the line; however, in practice, that was not the

case.[45] The treaty would end in 1750 with the Treaty of Madrid when Brazil's boundaries were officially expanded.

Given the natural geographical assignment of land in Brazil for the Portuguese and Spanish, it offers a natural source of variation for the presence of the grants. Portuguese grants could have only been assigned to the I follow the definition of the Treaty line being at 48.7^o W from Laudares et al. (2023).[46] Therefore, the time of the presence of the grants is going to be located for municipalities to the east of the line. In Figure 3, I show the treaty line alongside the land grants in the states of São Paulo and Minas Gerais.[47]

To estimate the differential effect of the grants on municipalities located in the Portuguese and Spanish side of colonial Brazil, I estimate the following equation:

$$\begin{aligned} Y_{m,s} =& \beta_1 \cdot (Grant_m * Portuguese_m) + \beta_2 \cdot (Grant_m * Spanish_m) + \\ & \delta \cdot Portuguese_m + X_m + \mu_s + \epsilon_{m,s} \end{aligned} \tag{8}$$

Where $Grant_m$ is defined if the municipality had any land grants. $Spanish_m$ is a binary variable that takes a value of 1 if the municipality is located on the Spanish side of Brazil (right of the Treaty of Tordesillas Line) and zero otherwise. $Portuguese_m$ is a binary variable that takes a value of 1 if the municipality is located on the Portuguese side of Brazil (left of the Treaty of Tordesillas Line) and zero otherwise.

In this regression, the control group are municipalities on the Spanish side that did not receive a grant. The coefficient β_1 measures the effect of the grant on the outcome on the Portuguese side. Similarly, the coefficient β_2 measures the effect of the grants on the outcome on the Spanish side. The coefficient δ captures the effect on land inequality for municipalities on the Portuguese side. X_m are the same geographical controls used in the previous equations; however, I also add the distance to the Tordesillas Line. μ_S are state fixed effects.

This historical division of Brazil between Spain and Portugal allows a few hypotheses to be tested. First, if the land grants matter to land inequality, both β_1 and β_2 should be positive. Second, if there are differential effects between Portuguese and Spanish on land inequality $\delta \neq 0$, as

[45] In Figure 3, I show that even before 1750, some land grants were already located in the Spanish side.

[46] The authors of the paper describe this cutoff as the one agreed by most historians.

[47] Those states are selected since out of my sample they are the only ones that have municipalities on both sides of the line.

δ captures the differential effects between the two regions. Third, given that the grants were solely a Portuguese institution, and technically, the grants could not have been assigned in the Spanish area until after 1750, if what matters is the exposure to the *sesmarias* institution it would be expected that $\beta_1 > \beta_2$. If the coefficients are equal, that indicates that it was not just the Portuguese colonization that mattered for land inequality, but instead that the grants are the drivers of the difference.

Have to add here, or maybe an appendix, what I'm estimating and what assumptions I'm technically making.

7. Challenges to Identification

In the descriptives and history of Section 5, we see that the land grants were mainly located along the coast and concentrated along certain areas. The issue of endogeneity of the grants, the main concern on any causal interpretation of the results, is discussed below alongside two potential data concerns:

1. The main concern is the endogenous location of the location of the land grants. Given that the people requesting the grant would want to select the best location possible. For example, historically, it is known that sugarcane plantations, and therefore the grants, were located in areas suitable for it. Farmers would often look for the *terra roxa* in order to decide whether the soil was of quality for sugarcane (Schwartz, 1985). In order to partially deal with this concern, all regressions include a large set of geographical controls that are proxies to what settlers during the colonial period would likely be looking for when requesting a grant. Further, the propensity score matching estimates use the same geographical variables to estimate the control group. I also address the endogeneity concerns with the proposed instrument in Subsection 6.2.

2. The second concern is the selection of the sample that reflects the actual distribution of the land grants. Given the sources used in this paper, for the states chosen, I was able to successfully georeference $\tilde{8}$0-85% of the total land grants found in the archives. Many of the missing ones either lack sufficient geographical information or the letter itself is mostly illegible,

with only fragments left.[48] This would be a major concern if those missing letters correlate with unobservables, making me not assign the correct treatment definition for them. While I cannot fully address the potential for missing data or the possibility that it is non-random, I have to assume that the current land grant dataset is at least a representative sample of their original geographical distribution.

3. The third concern is how precise the georeferencing of the land grants was done. In some cases, the letters themselves give precise information on the location of the grants, which allows precise georeferencing of the grants. However, in some situations, the grants could not have been precisely georeferenced due to the broad definition of the geographical characteristics in the letter. That is a possible concern since the definition of $Treat_m$ could be wrongly assigned per municipality. In those cases, the grants are approximated to the level of the closest municipality. This is done since the definition of the treatment in the specifications is done at the municipality level.

Additionally, any estimates in the following specifications are likely not the full causal estimates of the grants themselves. Given the large period between the grant distribution and the observations in the datasets used, other historical events could have caused the effects. Therefore, any interpretation of the coefficients should be interpreted as the long-term total effect of the grants but not the direct causal effect. However, combining all methods discussed provides, at minimum, evidence of a strong association between the *sesmarias* and present-day land inequality.

8. Results

8.1. Propensity Score Matching

The main results for land inequality come directly from the 1995 Agricultural Census, in which I measure the proportion of agricultural land over a certain area cutoff. Add here the summary statistics tables comparing the unmatched to the matched sample and discuss it further. For the main definition used throughout the paper, I define a large farm with an area exceeding 2,000 hectares. Given the historical context of the land grants, it would be expected that municipalities

[48] Might want to here an example in the appendix figures.

that have received a grant are more likely to have larger farms, implying a higher concentration of land.

Matching with the historical records, the results of Table 2 indicate that municipalities with a grant are associated with a higher share of total agricultural land assigned to farms over 2000 hectares. In Panel A, even without any controls, a colonial land grant in a 1995 municipality is associated with a 3% increase in the share of farms over 2000 hectares. When adding controls or through the propensity score matching, the coefficient is stable and between 2.7 and 2.9.

In Panel B, I break down the effects between the grants pre-1700 and post-1700. When adding geographical controls or through the matching approach, the coefficients indicate that municipalities with grants pre-1700 are associated with a 3 to 4% increase in the share of farms over 2000 hectares in a municipality and post-1700 grants with a 2.3 to 2.8% increase. Consistent with the history that there was an imposed limit of 1698 on the size of the grants, the coefficient on the pre-1700 grants is higher than the post-1700 grants.

All the results in Panel A and Panel B are of economic importance, since the mean of municipalities that did not receive a grant is 9%, indicating that historical land grants are associated with a 33 to 50% increase in the share of large estates in a municipality. The results of this section indicate that the grants are associated with a persistence in land inequality in Brazil.[49]

Results for different cutoffs can be found in. Figure A.5, Figure A.7, Figure A.7

Explain here the shape of the curve, what does it mean, etc.

8.2. Instrumental Variable

The main results for the instrumental variable approach, alongside the matching results on land inequality, can be found in Table 3. Overall, the results seem to indicate that both the matching and OLS estimators are biased towards zero for the Southeastern region of Brazil. The matching estimator indicates that the presence of any land grants in a municipality in the Southeast is associated with an increase of 3.1 percentage points in the share of the farms over 2,000 ha, while the IV estimator indicates an increase of 22 percentage points. The IV results are economically

[49] Table A.2 provides further results by varying the proportion of agricultural land above a certain cutoff. Instead of considering 2000 hectares and the main cutoff, I use cutoffs for both 5,000 and 10,000 hectares. Results are consistent throughout, with municipalities with a grant post-1700 having a higher proportion of lands above each cutoff. The coefficients vary between 1 to 2% depending on the estimation method used. Overall, the results are robust to different definitions of a large agricultural estate.

significant, as it is more than double the control mean of 10.3%. Similar effects are found for the 5,000 ha and 10,000 ha cutoff.

Discuss here the difference between the IV estimator and the OLS. Why they would be different, etc.

8.3. 1701 Livestock Ban

Results for the differential effects on livestock usage can be found in Table A.4. In Panel A, in the first row, relative to municipalities that are less than 80km from the coast, municipalities that are more than 80km have, on average, a lower share of their agricultural area assigned to livestock. This result indicates that there is no overall persistence in the livestock ban as coastal areas have a higher share of their agricultural area allocated to livestock.[50] However, municipalities that are more than 80km from the coast and received a grant pre-1700 have a 6.6 percentage points increase in the total agricultural area assigned to livestock. In contrast, municipalities that received a grant and are less than 80km from the coast are not significantly associated with it. A similar pattern is seen in Panel B, in which municipalities that received a grant after 1700 and were more than 80km from the coast saw an increase in the area dedicated to livestock of 4.3%. The results show that while there was no persistence in the law itself, the expansion of livestock towards Western Brazil, which was followed through the grants, led to the economic specialization of those areas for livestock.

When analyzing the effects of the intensity and development of the livestock, measured by the percentage of pastures that are either natural or artificial, the results in Columns 2 and 3 of Table A.4 indicate that for both Panel A and Panel B that natural pastures are more present in municipalities more than 80km of the coast, and the effect is compounded by if the municipality had a grant post-1700. In either Panel, there are no effects on the area assigned to artificial pastures.

Given that there are effects on the dispersion of livestock in grants more than 80km from the coast of Brazil, I then turn to analyze whether an increase follows them in land size. Results can be found in Table A.6. In both Panel A and Panel B, the percentage of farms above 2,000ha is strictly lower in municipalities more than 80km from the coast. However, the effect of land concentration

[50] This is not fully surprising, as for some of the grants that I do have information on the economic activity of the request, even post-1701 there are still a large share of grants that mention raising cattle that are located within 80km of the coast.

only shows up in municipalities that are further from the coast and received a colonial land grant for both pre-1700 and post-1700 grants, with the effects being significantly higher for pre-1700 grants. A possible explanation is that similar to Table 2 as the land-size limit established in 1698 reducing the effect on land inequality of the later grants, causing land concentration to be focused on the grants that were given without a size limit. Results are qualitatively the same when considering different size cutoffs of 5,000ha and 10,000ha, as seen in Columns 2 and 3.

add here the results by limiting the bandwidth to around 80km.

Figure A.13, Figure A.14, Figure A.15

8.4. Treaty of Tordesillas

Results for the differential effects of the grants on the Spanish and Portuguese sides are found in Table 6. The first row, focusing on the first column, measures the effects of being on the Portuguese side on land inequality. The coefficient indicates that municipalities located on the Portuguese side of Brazil have a 6% higher proportion of farms over 2,000ha than the municipalities on the Spanish side. The second row captures the additional effect of the grants on the Portuguese side, with the coefficient indicating an increase of 2% of farms over 2,000 ha. The third row measures the effects of the grants on the Spanish side, with the positive coefficient indicating an increase of 6.8% of farms over 2,000 ha.

In Columns 2 and 3 of Table 6 the effect of the Portuguese side diminishes towards zero and becomes statistically insignificant. Similarly, the coefficient for the grants on the Spanish side. However, the presence of the land grants on the Portuguese side is consistently associated with an increase in the distribution of land.

Overall, the results of this section indicate that the mere difference between Portuguese and Spanish colonization does not explain the difference between land inequality for the municipalities in Brazil. Instead, part of that is compounded by the presence of land grants, which are associated with increases in land inequality in both areas.

9. Mechanisms and Other Channels

Having established that there is a strong association between colonial land grants and land concentration in the 1995 Agricultural Census, I further investigate some possible mechanisms and consequences of land grants.

9.1. Heterogeneity by Region

Given the present-day economic disparities and their different colonial histories, the grants could have differential effects on Brazil's Northeast and Southeast regions. Historically, land inequality has been more pronounced in the Northeast, mostly due to the expansion of cattle estates. The western area of the Northeast, known as the *sertao*, was known for the presence of large estates dominated by a few rancher families (Bethell, 1984, p. 460-461).[51] Further, the Northeast was more intensely colonized early on due to its proximity to Portugal, while the development of the Southeast would only happen later in the 17th and 18th centuries.

Given the historical differences between the colonization patterns and economic development, I estimate whether the effects of the grants vary by region. I estimate Equation 2 breaking down into two geographical regions, the Northeast and the Southeast.[52]

In Table 7, I show that for the 1995 Agricultural census in the Northeast municipalities, the presence of a land grant is still associated with an increase in the proportion of large farms in a municipality. The estimates in Panel A indicate that the presence of a grant is associated with an increase of 4.7% in the share of farms over 2,000 ha in the Northeast and 3% in the Southeast. The results indicate that even though the regions developed differently, the long-term effects of the grants are consistent in both the Northeast and Southeast.

In Panel B of Table 7, I estimate Equation 3 by analyzing the effects split between pre-1700 and post-1700 grants. The estimates for the Northeastern states indicate that there is evidence that both types of land grants are associated with an increase in the share of farms over 2,000 ha. The estimated coefficients indicate that pre-1700 grants are associated with an increase of 5.3% in

[51] Costa Porto (1979, p. 53) mentions a reason on why the large estates were so prominent in Northeastern Brazil, because "large tracts of lands were given as *sesmarias* to the same person"

[52] Northeast includes the states of Rio Grande do Norte, Paraiba, Bahia, Alagoas, and Pernambuco. The Southeast includes the states of São Paulo and Minas Gerais.

the share of farms over 2,000 ha, while post-1700 grants are associated with an increase of 3.2%. Similar to the aggregate estimates of Table 2, the pre-1700 grants have an increased effect on land inequality in the region. However, for the Southeastern states of São Paulo and Minas Gerais, there are no significant effects on the pre-1700 grants, which matches with the historical evidence that the expansion and development of these states only happened later than the ones in the Northeast. Further evidence of that is that municipalities with a grant post-1700 significantly increased large estates between 2.4 and 3.3%, which is the period when the grants were given more frequently in the region as it became more explored.

9.2. Land Tenure and Urbanization

Land grants could have an effect on regional development and how land is being used. I combine land tenure from the 1995 agricultural census and satellite data to estimate whether there are differential effects of land usage in the municipalities that received a grant by estimating Equation 2 and Equation 3. I consider three outcomes: the percentage of the municipality considered urban to measure the urbanization rates, the share of land occupied, and the share of land considered productive but not used.[53]

If the grants were the first settlements in Brazil and led to economic development and agglomeration, they would be expected to lead to a higher rate of urbanization. The grants themselves could cause land uncertainty as the boundaries were often poorly defined. Lastly, the major complaint about large agricultural areas in Brazil is that they are being poorly used; therefore, I choose to test it.

Table 8 shows the results for this specification. In Panel A, when considering the whole set of grants, there are no effects on urbanization, land occupation, or land misutilization. However, in Panel B, the results indicate that the municipalities that received a pre-1700 grant are more urbanized in the present, with an increase of its total area being considered urban by 2.3%. There are no effects on the percentage of land that is occupied, neither being unproductive, which indicates that the grants themselves are not associated with land rights uncertainty or misusage of land.

The results of this section indicate that even though the presence of a grant is associated with

[53]Land occupied means that the person living on the land neither legally owns it nor pays rent to someone to use it.

an increase in land inequality in the present day, it has led to urbanization without leading to other issues such as land squatting or poor land utilization.

9.3. Land Conflicts

Another possible mechanism by which the grants, through land inequality, themselves could affect present-day outcomes is an increase in land conflicts. Land conflicts in Brazil are frequent, with the Comissão Pastoral da Terra reporting that in the first semester of 2023, over 973 land-based conflicts were reported on Brazil.[54] Most of these conflicts occur as clashes between large estate owners with smallholders or people without farms. They either occur through the occupation of vacant land, destruction of property, large farmers expropriating land from smaller farms, or even murders.

Given that lack of access to land caused by land concentration is a key motive for why land conflicts exist, I test whether the presence of historical grants affects the present-day conflict over land in Brazil.[55] Results can be found in Table 9. The results in Panel A indicate that the presence of any land grant in a municipality is associated with an increase of 6.2 percentage points in the probability of a modern-day land conflict. In Panel B, I test whether pre-1700 or post-1700 grants drive those effects. The results indicate that both pre-1700 and post-1700 grants are associated with higher conflict incidence. Municipalities that received a grant pre-1700 are associated with a 9.1 percentage points increase in the likelihood of having a land conflict, while municipalities that received a grant post-1700 have an increase of 6 percentage points.

9.4. Historical Effects on Slavery

A possible mechanism by which the grants themselves are affecting present-day outcomes is through the presence of slavery in the region. While the grants themselves often required enslaved people, there was plenty of variation. For example, livestock grants would often use few slaves, as the labor requirement for livestock raising is low.

To study whether the presence of grants was associated with slavery, I estimate Equation 2 and

[54] More information can be found at: https://cimi.org.br/2023/10/comissao-pastoral-da-terra-cpt-divulga-dados-parciais-de-conflitos-no-campo-brasileiro-do-1o-semestre-de-2023/

[55] For the geolocation of land conflicts, I use the 2010 municipality boundaries since they are the ones used to track down where the conflict was located.

Equation 3 using data from the Brazilian 1872 census as it is the only census that was carried before abolition in 1888.[56] I estimate the effects on the percentage of the population that were slaves and the percentage of slaves that were working in agriculture.

Results are found in Table 10. In Panel A, the results indicate that the presence of a grant is not associated with either the percentage of slaves or the percentage of slaves working in agriculture. However, in Panel B, the first row shows that parishes that had a grant pre-1700 have a decrease in the percentage of slaves to the total population of 2.0%. The results indicate that there is not a strong association between the grants and the institution of slavery

9.5. Effects on Distribution

Add here how the gini was estimated.

10. Robustness

10.1. Removing outliers

A possible concern is that the results are solely driven by outliers, municipalities where most agricultural land is over 2,000 hectares. In order to address those concerns, I estimate Equation 2, but excluding municipalities with a higher share of agricultural land being in farms of over 2,000 hectares.

Results are found in Figure A.9. The results are consistently positive, indicating that a land grant is associated with an increase in the presence of farms over 2,000 ha. Even though the coefficients are smaller when excluding the sample of municipalities with a high share of agricultural land allocated to large farms, the coefficients are still positive, indicating that the grants are associated with an increase in land inequality.

[56] For the results in the 1872 census, I do not report matching estimators because over 50% of the parishes had a land grant within its boundary. Therefore, a 1-1 propensity score matching procedure would yield the same results as the OLS.

10.2. IV Robustness

As robustness, instead of using all the presence of any land grant, I only use grants post-1700 by using the following two equations:

$$GrantPost1700_{m,s} = \delta \cdot BandeiraDist_m + X_m + \mu_s + \epsilon_{m,s} \tag{9}$$

$$Y_{m,s} = \beta \cdot \widehat{GrantPost}1700_m + X_m + \mu_s + \epsilon_{m,s} \tag{10}$$

Results can be found in Table A.8 and remain qualitatively similar. For example, in the first two, the coefficients for the share of farms over 2,000ha only change from 22.5 to 20.7.

Another possible concern with the instrument's validity is that based on Figure A.17, the sharp drop in municipalities not getting a grant if they were located more than 150km of a bandeira route is driving the results. I show that the results are robust by excluding municipalities that were too far away from the *bandeirantes* exploration in Figure A.16. I further explore the robustness of the instrument through Anderson-Rubin and tF confidence intervals (Anderson et al., 1949; Lee et al., 2022). Results can be found in Figure A.18. Overall, the results are robust to Anderson-Rubin confidence intervals at the 95% level, but not for the tF confidence intervals from Lee et al. (2022).

11. Conclusion

In this paper, I describe, using novel data, the historical determinants of land grant distribution in Brazil. I find that colonial land grants given by Portugal in Brazil during the 17$^{\text{th}}$ and 18$^{\text{th}}$ century had persistent effects on land concentration when measured by the 1995 Agricultural Census. Results are robust to the inclusion of geographical controls, a 1-1 propensity score matching procedure, or different definitions of land concentration based on the 1995 Agricultural Censuses. In order to approximate the causal effect of the grants, I narrow down the estimates to the states of São Paulo and Minas Gerais to exploit the *bandeiras* as an instrument on the location of the grants. Consistent with the previous results, the estimates indicate an increase in land concentration in municipalities that received a grant.

Further, I test whether two policies in colonial Brazil caused differential effects of the land grants.

First, a coastal livestock ban in 1701 pushed livestock production away from the coast and led to the increased distribution of grants towards the west of Brazil. I find that the only municipalities with grants that were far away from that cutoff have an increase in livestock production and, subsequently, in land inequality. Second, exploiting the fact that Brazil was divided between Spain and Portugal, I test the key driver in land inequality, the Portuguese presence, or the colonial institution of the *sesmarias*. I find that while municipalities on the Portuguese side are associated with an increase in land inequality, the presence of a land grant is also associated with it in either the Portuguese or Spanish side. This provides evidence that the *sesmarias* is a driver in Brazil's regional inequality.

Lastly, I test what mechanisms could have caused the persistence of land inequality of the grants. Overall, there is no evidence of how the land is used and whether, historically, there was a higher presence of slavery. However, the presence of a land grant is associated with an increase in urbanization and land conflicts in modern Brazil.

While this paper focuses solely on Brazil's Northeast and Southeast, the grants were present throughout the territory. Further work can be conducted to understand how these grants operated differently in Northern and Central Brazil. Both regions were occupied later than the Northeast and Southeast, so the presence of grants there might not have been as pervasive; however, due to their distance to the coast, that allowed, and still allows, a vast amount of land to be squatted. Understanding the interactions between the historical roots of colonization and the present-day expansion toward the West could help us better understand the roots of inequality today in Brazil.

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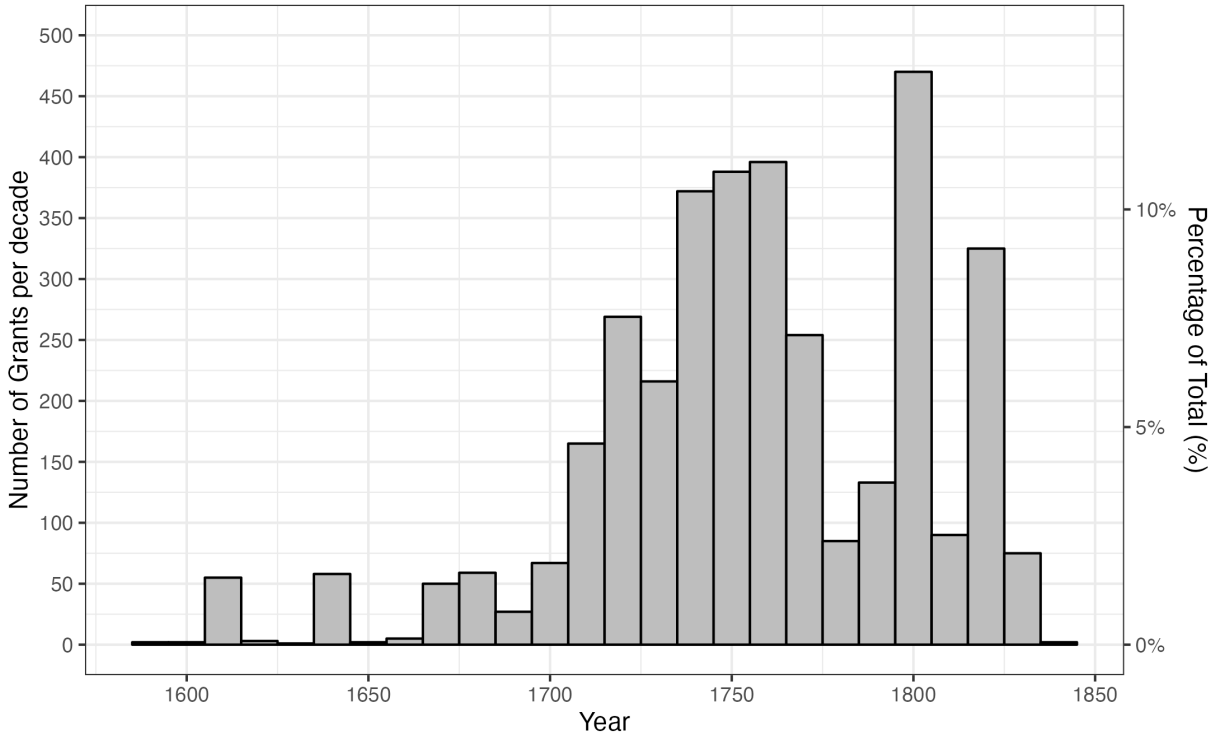
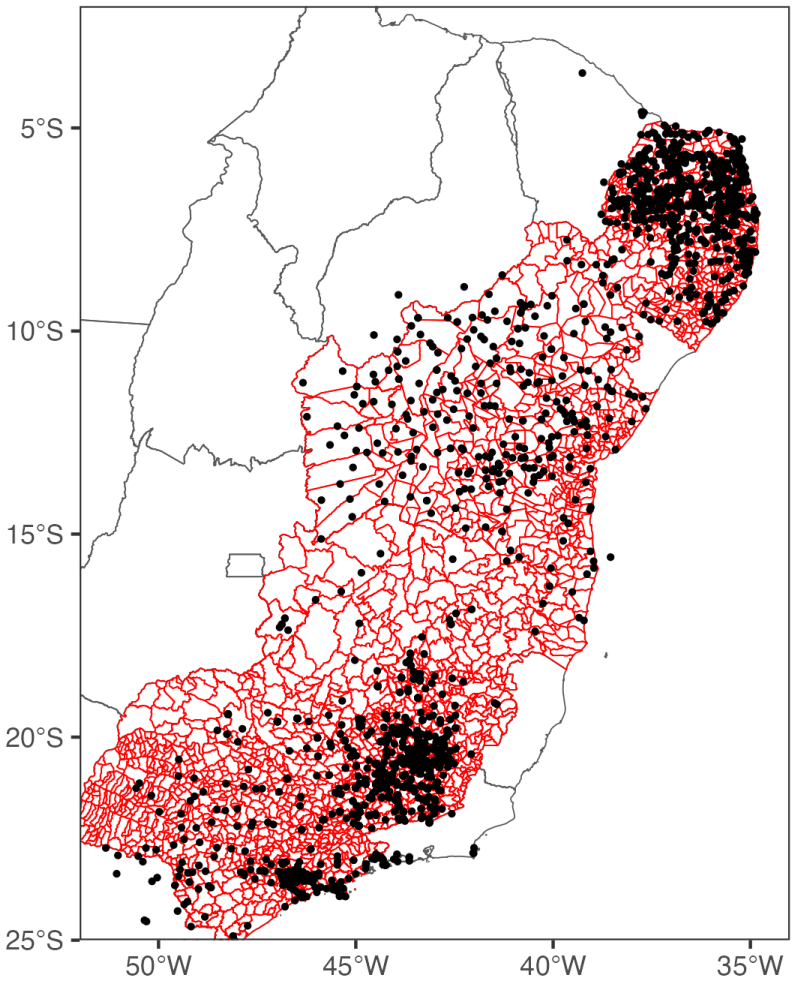
Figures

Figure 1: Number of Land Grants per Decade 1590-1840



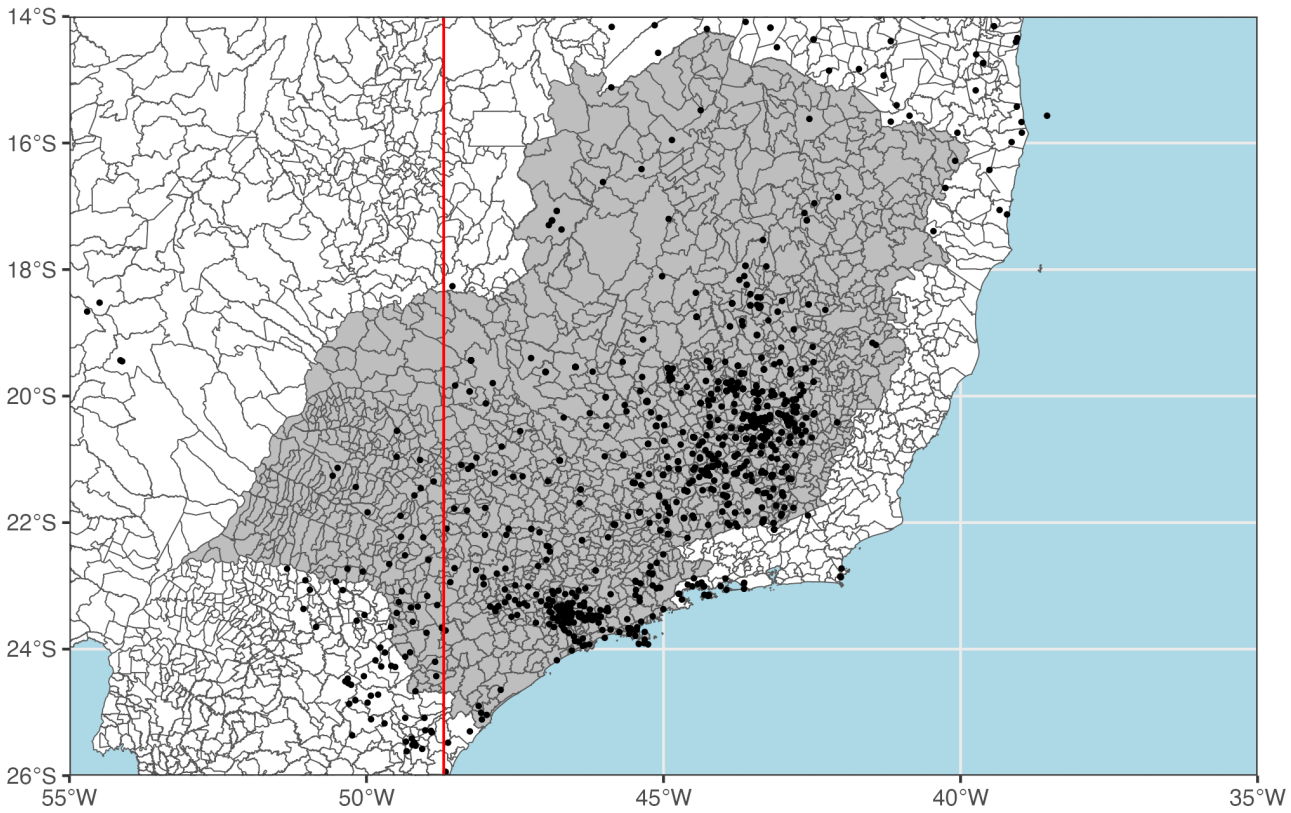
Notes: Histogram describing the distribution of the land grants used in the dataset per decade.

Figure 2: Geographical Land Grant Distribution



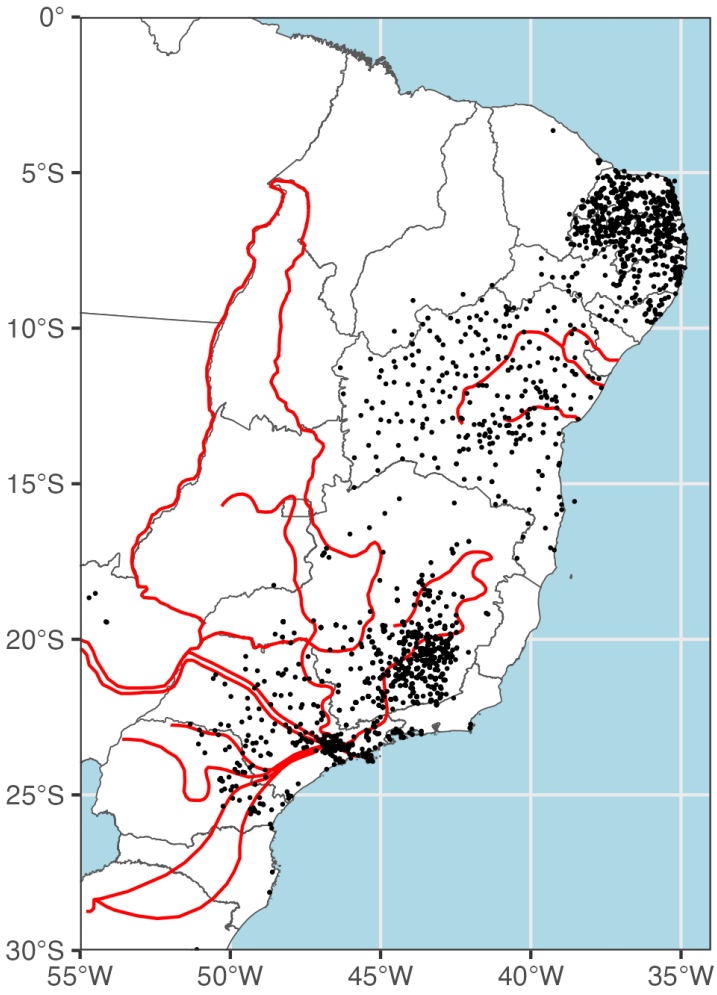
Notes: Geographical distribution of the land grants across the states. Municipalities for the 1991 census for the states which information on the land grants is available are highlighted in red. Each point indicates a unique land grant.

Figure 3: Distribution of Land Grants in Minas Gerais and Sao Paulo alongside the Treaty of Tordesillas line



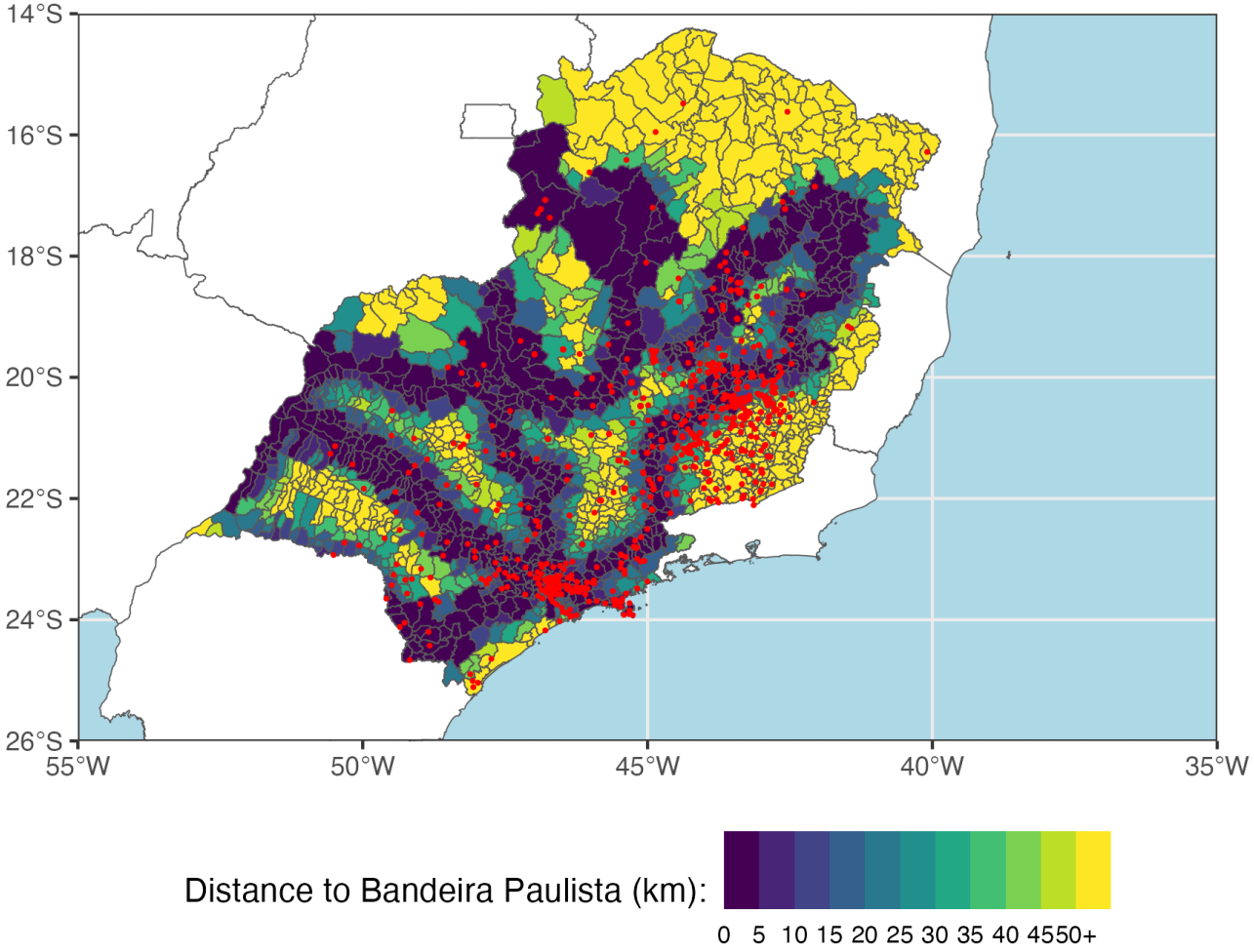
Notes: This figure shows the distribution of land grants in the states of Minas Gerais and Sao Paulo (shaded in gray) alongside the Treaty of Tordesillas. Black dots indicate the location of the land grants. The red vertical line is the Treaty of Tordesillas line following **Laudares2022-vy**. The treaty line is located at 48.7 W.

Figure 4: Distribution of Land Grants alongside Bandeiras



Notes: This figure shows the distribution of the land grants alongside the *bandeiras* routes. Each black dot represents a grant, while the red lines indicate the *bandeiras*. Present-day state boundaries are shown.

Figure 5: *Bandeira* Routes and 1995 Municipalities



Notes: Proximity to a *Bandeira* route and 1995 municipalities boundaries in the states of Sao Paulo and Minas Gerais. Darker colors indicate that the municipality is close to a *bandeira*, while lighter colors indicate that the municipality is further away. Red dots indicates the grants in those two states.

Tables

Summary Statistics

Table 1: Geographical Characteristics of Municipalities with and without a Land Grant

	Land Grant (N=736)		No Land Grant (N=1636)			
	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in Means	Std. Error
Average Slope	3.6	2.2	4.0	2.4	0.4***	0.1
Average Elevation	517.9	315.8	536.4	292.0	18.4	13.7
Distance to the Coast (km)	168.9	137.5	225.8	166.6	56.9***	6.5
Distance to Nearest River (km)	149.6	146.5	105.3	125.8	−44.2***	6.2
Potential Sugarcane	1517.2	500.9	1680.8	529.4	163.6***	22.6
Potential Calories pre-1500	10 293.8	1832.0	10 142.5	1449.6	−151.3**	76.4
Potential Calories post-1500	11 095.7	1425.7	11 065.6	1087.6	−30.1	59.0
Latosol Presence (0/1)	0.6	0.5	0.6	0.5	0.1***	0.0
Argisol Presence (0/1)	0.5	0.5	0.6	0.5	0.1***	0.0
Cambisol Presence (0/1)	0.3	0.4	0.2	0.4	−0.1***	0.0
Spondosol Presence (0/1)	0.0	0.1	0.0	0.1	0.0	0.0
Latitude	−41.2	4.3	−43.5	4.8	−2.3***	0.2
Longitude	−14.3	6.5	−17.0	5.6	−2.7***	0.3

[a] This table shows the balance on set of geographical characteristics using 1995 municipality census boundaries in Brazil. It compares municipalities that received a grant versus those that did not.

OLS + Matching

Table 2: Effects of Land Grants in Land Inequality - (%) of Farms over 2000 ha 1995

	OLS	OLS	Matching
Panel A			
Any Grants	3.125***	2.767***	2.927***
	(0.814)	(0.795)	(0.849)
Geographical Controls		✓	✓
N	2372	2372	1472
Control Mean	9.2	9.2	8.2
Panel B			
Grants Pre-1700	3.193*	4.210**	4.128**
	(1.669)	(1.674)	(1.753)
Grants Post-1700	2.823***	2.101**	2.367***
	(0.868)	(0.825)	(0.862)
Geographical Controls		✓	✓
Control Mean	9.2	9.2	8.2
N	2372	2372	1472

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Instrumental Variable Results

Table 3: IV and Matching Estimates on Agricultural Land Size - 1995 Agricultural Census

	Over 2,000ha (%)		Over 5,000ha (%)		Over 10,000ha (%)	
	Matching	2SLS	Matching	2SLS	Matching	2SLS
Any Land Grants	3.089**	22.454*	1.969**	12.774	1.186*	13.512*
	(1.266)	(12.246)	(1.002)	(9.354)	(0.703)	(7.796)
N	630	1365	630	1365	630	1365
Geographical Controls	✓	✓	✓	✓	✓	✓
Control Mean	10.5	10.5	4.3	4.3	1.9	1.9

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils. States considered are Sao Paulo and Minas Gerais. The F-statistic for the first stage is 13.8.

Heterogeneity by Coastal Livestock Ban

Table 4: Effects of Land Grants in Livestock and Pastures - 1995

	Area used for Livestock (%)	Area used as Natural Pasture (%)	Area used as Artificial Pasture (%)
Panel A - Grants Pre- 1700			
More than 80 km from the Coast	-5.459***	4.027***	-1.567
	(1.994)	(1.443)	(2.770)
Grants Pre-1700 x More than 80 km from the Coast	6.631**	1.216	-2.396
	(3.025)	(1.771)	(2.265)
Grants Pre-1700 x Less than 80 km from the Coast	-4.176	3.429	-1.685
	(3.618)	(7.311)	(2.482)
Geographical Controls		✓	✓
Control Mean	43.4	17.2	13.8
N	2372	2372	2372
Panel B - Grants Post- 1700			
More than 80 km from the Coast	-3.929*	5.156***	-1.877
	(2.349)	(1.767)	(2.914)
Grants Post-1700 x More than 80 km from the Coast	4.363***	1.464**	1.693
	(1.235)	(0.705)	(2.860)
Grants Post-1700 x Less than 80 km from the Coast	7.121	6.789	0.835
	(5.646)	(5.033)	(4.751)
Geographical Controls		✓	✓
Control Mean	40.3	15.7	13.7
N	2372	2372	2372

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table 5: Effects of Land Grants in Land Inequality - (%) of Farms over Size Cutoff 1995

	Over 2,000 ha (%)	Over 5,000 ha (%)	Over 10,000 ha (%)
Panel A - Grants Pre- 1700			
More than 80 km from the Coast	-6.100***	-3.563***	-2.407***
	(1.261)	(0.926)	(0.621)
Grants Pre-1700 x More than 80 km from the Coast	7.894***	3.671**	2.027
	(2.104)	(1.612)	(1.299)
Grants Pre-1700 x Less than 80 km from the Coast	1.568	0.859	1.007
	(2.377)	(1.802)	(1.422)
Geographical Controls		✓	✓
Control Mean	9.6	3.6	2
N	2372	2372	2372
Panel B - Grants Post- 1700			
More than 80 km from the Coast	-7.005***	-4.433***	-3.185***
	(1.403)	(1.040)	(0.740)
Grants Post-1700 x More than 80 km from the Coast	3.310***	2.865***	1.992***
	(0.881)	(0.721)	(0.563)
Grants Post-1700 x Less than 80 km from the Coast	-0.138	0.098	-0.217
	(1.716)	(1.285)	(0.922)
Geographical Controls		✓	✓
Control Mean	9.4	3.5	2
N	2372	2372	2372

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

[add tables for Northeast and Southeast separetly]

[add here the figures by the bands around the cutoff]

Heterogeneity by Treaty of Tordesillas Line

Table 6: Differential Effect of the Grants on 1995 Land Inequality - Tordesillas Treaty

	Over 2,000 ha	Over 5,000 ha	Over 10,000 ha
Portuguese Side	6.324**	2.425	0.744
	(2.588)	(2.117)	(1.740)
Any Grants x Portuguese Side	2.343*	1.963**	1.350**
	(1.196)	(0.963)	(0.664)
Any Grants x Spanish Side	6.812*	6.138*	4.084
	(4.029)	(3.419)	(2.972)
N	1365	1365	1365
Geographical Controls	✓	✓	✓
Dependent Variable Mean	11.21	3.68	1.54

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, whether or not the municipality contains four different types of soils, and the distance to the Tordesillas Treaty line.

11.1. Regional Heterogeneity

Table 7: Effects of Land Grants in Land Inequality - (%) of Farms over 2000 ha 1995

	Northeast			Southeast		
	OLS	OLS	Matching	OLS	OLS	Matching
Panel A						
Any Grants	6.017***	4.489***	4.742***	0.405	2.442**	3.089**
	(1.142)	(1.026)	(1.067)	(1.149)	(1.162)	(1.266)
Geographical Controls		✓	✓		✓	✓
N	1007	1007	842	1365	1365	630
Control Mean	7	7	7.4	10.5	10.5	7.5
Panel B						
Grants Pre-1700	4.180**	5.015***	5.332***	-0.055	4.178	2.811
	(1.735)	(1.773)	(1.833)	(4.151)	(4.540)	(4.691)
Grants Post-1700	5.133***	3.153***	3.269***	0.815	2.378**	3.306***
	(1.291)	(1.101)	(1.110)	(1.162)	(1.153)	(1.247)
Geographical Controls		✓	✓		✓	✓
Control Mean	7	7	7.4	10.5	10.5	7.5
N	1007	1007	842	1365	1365	630

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table 8: OLS and Matching Estimates on 1995 Agricultural Census and 1995 LandSat Data - Urbanization and Land Tenure

	Urban Area (%)			Occupied Land (%)			Productive Land Not Used (%)		
	OLS	OLS	Matching	OLS	OLS	Matching	OLS	OLS	Matching
Panel A									
Any Grants	1.093***	0.496**	0.385	-1.231	-0.666	-1.962	-1.328	-0.967	1.618
	(0.285)	(0.250)	(0.282)	(2.629)	(2.746)	(3.025)	(1.840)	(2.027)	(1.809)
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.1	1.1	1.4	9.6	9.6	9.3	8.7	8.7	5.8
N	2372	2372	1472	2372	2372	1472	2372	2372	1472
Panel B									
Grants Pre-1700	3.217***	2.482***	2.358***	-4.532***	-3.931**	-0.996	-2.963**	-1.630	-0.996
	(0.906)	(0.819)	(0.830)	(1.468)	(1.551)	(1.544)	(1.348)	(1.367)	(1.544)
Grants Post-1700	0.363	-0.107	-0.213	-0.269	0.126	2.129	-0.548	-0.507	2.129
	(0.240)	(0.232)	(0.257)	(2.876)	(2.980)	(2.075)	(1.969)	(2.199)	(2.075)
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.1	1.1	1.4	9.6	9.6	9.3	8.7	8.7	5.8
N	2372	2372	1472	2372	2372	1472	2372	2372	1472

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table 9: Effects of Land Grants in Land Conflict 2015-2022

	(OLS)	(Matching)
Panel A - Any Grants		
Any Land Grants	0.062***	0.069***
	(0.018)	(0.019)
Geographical Controls	✓	✓
N	2372	1472
Control Mean	0.2	0.2
Panel B - Pre-1700 and Post-1700 Split		
Grants Pre-1700	0.091**	0.087**
	(0.039)	(0.040)
Grants Post-1700	0.060***	0.070***
	(0.019)	(0.020)
Geographical Controls	✓	✓
N	2372	1472
Control Mean	0.2	0.2

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table 10: OLS Estimates on Slavery - 1872 Census

	Percentage of Slaves (%)		Percentage of Slaves Working in Agriculture (%)	
	OLS	OLS	OLS	OLS
Panel A				
Any Grants	-0.679	-0.996	2.418**	1.541
	(0.663)	(0.658)	(1.156)	(1.175)
Geographical Controls		✓		✓
Control Mean	16.1	16.1	37.8	37.8
N	813	813	813	813
Panel B				
Grants Pre-1700	-1.722**	-2.029***	-0.396	-1.409
	(0.691)	(0.751)	(2.106)	(2.112)
Grants Post-1700	0.175	0.108	2.669**	1.902
	(0.664)	(0.668)	(1.138)	(1.191)
Geographical Controls		✓		✓
Control Mean	16.1	16.1	37.8	37.8
N	813	813	813	813

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the parish contains four different types of soils.

11.2. 1970 Census

Table 11: OLS and Matching Estimates on 1970 Census

	People Working on Sugarcane (%)			People Working on Livestock (%)			Proportion People Sharecropping (%)		
	OLS	OLS	Matching	OLS	OLS	Matching	OLS	OLS	Matching
Panel A (Any Grants)									
Any Land Grants	0.547***	0.594***	0.551***	-2.104***	-1.612***	-1.782***	-1.092***	-0.942***	-0.765***
	(0.175)	(0.169)	(0.166)	(0.605)	(0.491)	(0.468)	(0.211)	(0.225)	(0.249)
N	2208	2208	1468	2208	2208	1468	2208	2208	1468
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.4	1.4	1.4	19.4	19.4	19	3.4	3.4	3.2
R^2	0.07	0.14	0.18	0.20	0.40	0.48	0.21	0.28	0.25
Panel B (Pre 1700 Grants)									
Grants Pre-1700	0.538	0.577	0.543	-3.028***	-2.095**	-2.160**	-0.216	0.069	-0.314
	(0.589)	(0.573)	(0.557)	(0.941)	(0.830)	(0.887)	(0.327)	(0.341)	(0.449)
N	2208	2208	1468	2208	2208	1468	2208	2208	308
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.3	1.3	2	19.2	19.2	19.1	3.4	3.4	2.4
R^2	0.06	0.14	0.18	0.20	0.39	0.47	0.19	0.27	0.37
Panel C (Post 1700 Grants)									
Grants Post-1700	0.631***	0.659***	0.619***	-1.491**	-1.326***	-1.350***	-1.150***	-1.085***	-1.047***
	(0.182)	(0.173)	(0.166)	(0.628)	(0.499)	(0.476)	(0.219)	(0.236)	(0.257)
N	2208	2208	1468	2208	2208	1468	2208	2208	1294
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.4	1.4	1	19.3	19.3	19.1	3.4	3.4	3.6
R^2	0.07	0.14	0.18	0.19	0.39	0.47	0.21	0.29	0.27

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils. All regressions are weighted by the area of the municipality.

Table 12: OLS and Matching Estimates on 1970 Census - Northeast

	People Working on Sugarcane (%)			People Working on Livestock (%)			Proportion People Sharecropping (%)		
	OLS	OLS	Matching	OLS	OLS	Matching	OLS	OLS	Matching
Panel A									
Any Land Grants	0.666***	0.692***	0.666***	-0.753	-1.375**	-1.490**	-0.214	-0.260	-0.322
	(0.255)	(0.225)	(0.224)	(0.868)	(0.630)	(0.669)	(0.244)	(0.276)	(0.288)
N	915	915	820	915	915	820	915	915	820
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.9	1.9	1.6	23.1	23.1	23.5	2.6	2.6	2.9
R^2	0.09	0.26	0.26	0.02	0.30	0.30	0.19	0.33	0.33
Panel B									
Grants Pre-1700	0.754	1.116*	1.040*	-1.990**	-1.651*	-2.011*	0.061	-0.029	-0.602
	(0.670)	(0.630)	(0.607)	(1.007)	(0.855)	(1.068)	(0.383)	(0.346)	(0.503)
N	915	915	228	915	915	228	915	915	228
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.6	1.6	2.1	23.1	23.1	21.7	3.1	3.1	2.6
R^2	0.09	0.27	0.43	0.02	0.30	0.36	0.19	0.33	0.41
Panel C									
Grants Post-1700	0.755***	0.666***	0.508**	0.096	-0.761	-1.210*	-0.388	-0.448	-0.447
	(0.269)	(0.230)	(0.220)	(0.916)	(0.647)	(0.685)	(0.260)	(0.299)	(0.316)
N	915	915	694	915	915	694	915	915	694
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	2	2	1.4	22.9	22.9	24.2	2.6	2.6	3.5
R^2	0.09	0.26	0.27	0.01	0.30	0.31	0.19	0.33	0.35

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils. All regressions are weighted by the area of the municipality.

Table 13: OLS and Matching Estimates on 1970 Census - Southeast

	People Working on Sugarcane (%)			People Working on Livestock (%)			Proportion People Sharecropping (%)		
	OLS	OLS	Matching	OLS	OLS	Matching	OLS	OLS	Matching
Panel A									
Any Land Grants	0.434*	0.502**	0.412**	-3.394***	-1.680***	-2.547***	-1.929***	-1.390***	-0.992***
	(0.242)	(0.224)	(0.163)	(0.868)	(0.636)	(0.612)	(0.321)	(0.295)	(0.341)
N	1293	1293	648	1293	1293	648	1293	1293	648
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.1	1.1	0.9	17.4	17.4	15	3.9	3.9	3.3
R^2	0.02	0.15	0.22	0.07	0.30	0.37	0.16	0.30	0.21
Panel B									
Grants Pre-1700	-0.658*	-0.125	0.853	-8.777***	-4.967***	-2.070*	-1.750***	-0.679	0.355
	(0.390)	(0.526)	(0.727)	(1.424)	(1.002)	(1.237)	(0.227)	(0.562)	(0.279)
N	1293	1293	80	1293	1293	80	1293	1293	80
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.1	1.1	0.4	16.7	16.7	7	3.6	3.6	0.5
R^2	0.02	0.14	0.31	0.05	0.30	0.79	0.10	0.27	0.74
Panel C									
Grants Post-1700	0.508**	0.519**	0.223	-3.064***	-1.514**	-1.358*	-1.904***	-1.365***	-1.151***
	(0.248)	(0.225)	(0.275)	(0.882)	(0.637)	(0.706)	(0.330)	(0.296)	(0.374)
N	1293	1293	600	1293	1293	600	1293	1293	600
Geographical Controls		✓	✓		✓	✓		✓	✓
Control Mean	1.1	1.1	1.5	17.2	17.2	15.6	3.8	3.8	3.5
R^2	0.03	0.15	0.25	0.05	0.30	0.38	0.15	0.29	0.23

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

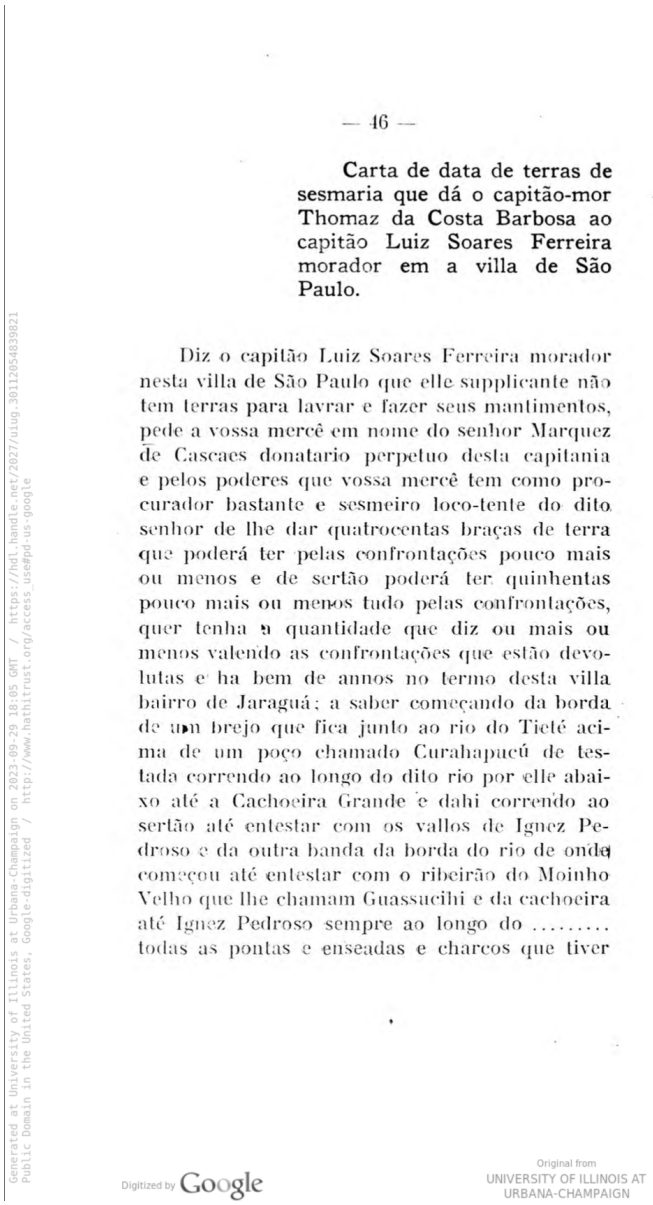
[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils. All regressions are weighted by the area of the municipality.

11.3. 1980 Census

11.4. 1991 Census

A. Figures and Tables

Figure A.1: Example letter from *Sesmarias; documentos do Archivo do Estado de São Paulo* (1921)



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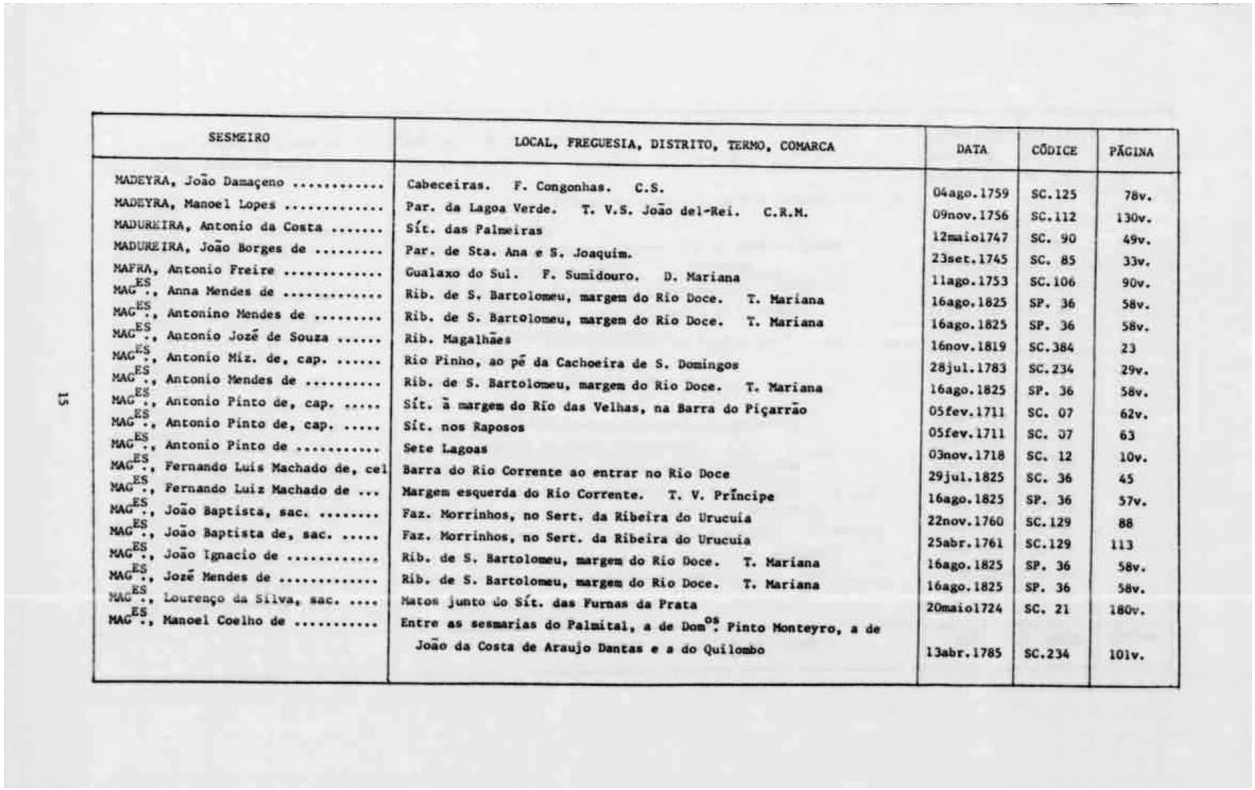
Carta de data de terras de sesmaria que dá o capitão-mor Thomaz da Costa Barbosa ao capitão Luiz Soares Ferreira morador em a villa de São Paulo.

Diz o capitão Luiz Soares Ferreira morador nesta villa de São Paulo que elle supplicante não tem terras para lavrar e fazer seus mantimentos, pede a vossa mercê em nome do senhor Marquez de Cascaes donatario perpetuo desta capitania e pelos poderes que vossa mercê tem como procurador bastante e sesmeiro loco-tente do dito senhor de lhe dar quatrocentas braças de terra que poderá ter pelas confrontações pouco mais ou menos e de sertão poderá ter quinhentas pouco mais ou menos tudo pelas confrontações, quer tenha a quantidade que diz ou mais ou menos valendo as confrontações que estão devolutas e ha bem de annos no termo desta villa bairro de Jaraguá; a saber começando da borda de um brejo que fica junto ao rio do Tieté acima de um poço chamado Curahapucú de testada correndo ao longo do dito rio por elle abaixo até a Cachoeira Grande e dahi correndo ao sertão até entestar com os vallos de Ignez Pedroso e da outra banda da borda do rio de onde começou até entestar com o ribeirão do Moinho Velho que lhe chamam Guassucihi e da cachoeira até Ignez Pedroso sempre ao longo do ..... todas as pontas e enseadas e charcos que tiver

Notes: Example letter for the state of Sao Paulo, obtained from *Sesmarias; documentos do Archivo do Estado de São Paulo* (1921, p. 47). Based on the letter we extract information on the geographical location, alongside year of concession, economic activity, and etc. This letter extends another page which includes more information.

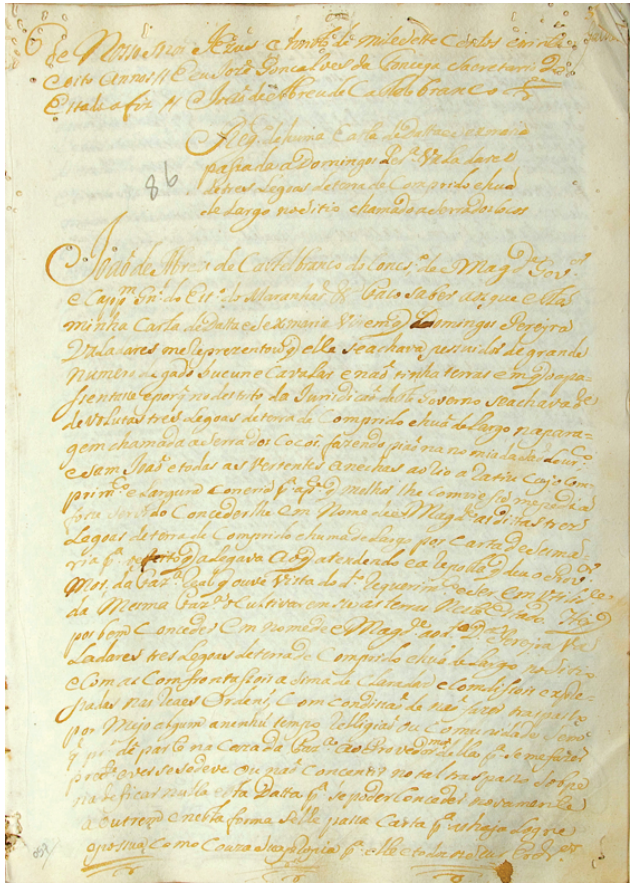
Figure A.2: Example Inventory of *Sesmarias* from the Minas Gerais State Archives



SESMEIRO	LOCAL, FREGUESIA, DISTRITO, TERMO, COMARCA	DATA	CÓDICE	PÁGINA
MADEYRA, João Damaçeno	Cabeceiras. F. Congonhas. C.S.	04ago.1759	SC.125	78v.
MADEYRA, Manoel Lopes	Par. da Lagoa Verde. T. V.S. João del-Rei. C.R.M.	09nov.1756	SC.112	130v.
MADUREIRA, Antonio da Costa	Sít. das Palmeiras	12maio1747	SC. 90	49v.
MADUREIRA, João Borges de	Par. de Sta. Ana e S. Joaquim.	23set.1745	SC. 85	33v.
MAFRA, Antonio Freire	Gualaxo do Sul. F. Sumidouro. D. Mariana	11ago.1753	SC.106	90v.
MAG^{ES}., Anna Mendes de	Rib. de S. Bartolomeu, margem do Rio Doce. T. Mariana	16ago.1825	SP. 36	58v.
MAG^{ES}., Antonino Mendes de	Rib. de S. Bartolomeu, margem do Rio Doce. T. Mariana	16ago.1825	SP. 36	58v.
MAG^{ES}., Antonio Jozé de Souza	Rib. Magalhães	16nov.1819	SC.384	23
MAG^{ES}., Antonio Miz. de, cap.	Rio Pinho, ao pé da Cachoeira de S. Domingos	28jul.1783	SC.234	29v.
MAG^{ES}., Antonio Mendes de	Rib. de S. Bartolomeu, margem do Rio Doce. T. Mariana	16ago.1825	SP. 36	58v.
MAG^{ES}., Antonio Pinto de, cap.	Sít. à margem do Rio das Velhas, na Barra do Piçarrão	05fev.1711	SC. 07	62v.
MAG^{ES}., Antonio Pinto de, cap.	Sít. nos Raposos	05fev.1711	SC. 07	63
MAG^{ES}., Antonio Pinto de	Sete Lagoas	03nov.1718	SC. 12	10v.
MAG^{ES}., Fernando Luis Machado de, cel	Barra do Rio Corrente ao entrar no Rio Doce	29jul.1825	SC. 36	45
MAG^{ES}., Fernando Luiz Machado de ...	Margem esquerda do Rio Corrente. T. V. Príncipe	16ago.1825	SP. 36	57v.
MAG^{ES}., João Baptista, sac.	Faz. Morrinhos, no Sert. da Ribeira do Urucuia	22nov.1760	SC.129	88
MAG^{ES}., João Baptista de, sac.	Faz. Morrinhos, no Sert. da Ribeira do Urucuia	25abr.1761	SC.129	113
MAG^{ES}., João Ignacio de	Rib. de S. Bartolomeu, margem do Rio Doce. T. Mariana	16ago.1825	SP. 36	58v.
MAG^{ES}., Jozé Mendes de	Rib. de S. Bartolomeu, margem do Rio Doce. T. Mariana	16ago.1825	SP. 36	58v.
MAG^{ES}., Lourenço da Silva, sac.	Matos junto do Sít. das Furnas da Prata	20maio1724	SC. 21	180v.
MAG^{ES}., Manoel Coelho de	Entre as sesmarias do Palmital, a de Dom^{os}. Pinto Monteyro, a de João da Costa de Araujo Dantas e a do Quilombo	13abr.1785	SC.234	101v.

Notes: Example of an inventory page for the state of Minas Gerais, obtained from the Revista do Arquivo Publico Mineiro - Inventory of the sesmarias letters on the Public Archive Codex - Volume 37 (1988). Based on the letter we extract the name, the year, and the location of the grant.

Figure A.3: Example original letter alongside its transcribed version



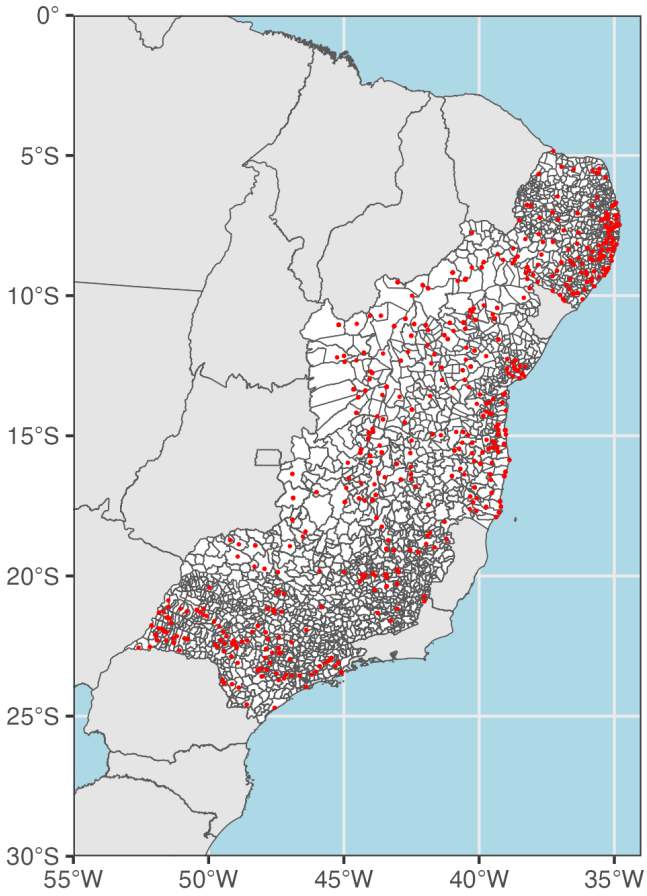
PA 0001
Carta de concessão a Domingos Pereira Valadares - 19/06/1738

Registro de uma carta de data e sesmaria passada a Domingos Pereira Valadares de 3 léguas de terra de comprimento e uma de largura, no sítio chamado a Serra dos Cocos.

João de Abreu Castelo Branco, do Conselho de Sua Majestade, governador e capitão-general do estado do Maranhão, etc. Faço saber, aos que esta minha carta de data e sesmaria virem, que Domingos Pereira Valadares me representou que ele se achava possuidor de grande número de gado vacum e cavalar, e não tinha terras em que apascentasse, e porque no distrito da jurisdição deste governo se achavam devolutas 3 léguas de terra de comprido e uma de largo, na paragem chamada a Serra dos Cocos, fazendo pião na nomeada São Lourenço e São João, e todas as vertentes anexas ao Rio Araticu, cujo comprimento e largura correria para a parte que melhor lhe conviesse; me pedia fosse servido conceder-lhe, em nome de Sua Majestade, as ditas 3 léguas de terra de comprido e uma de largo, por carta de sesmaria, para efeito que alegava; ao que atendendo, e a resposta que deu o provedor-mor da Fazenda Real, que houve vista do dito requerimento, e ser em utilidade da mesma Fazenda o cultivarem-se as terras neste estado. Hei, por bem, conceder, em nome de Sua Majestade, ao dito Domingos Pereira Valadares, 3 léguas de terra de comprido e uma de largo, no sítio e com as confrontações acima declaradas e condições expressadas nas Reais Ordens, com condição de não fazer trespasse, por meio algum, em nenhum tempo, religião ou comunidade, sem que primeiro dê parte na Casa da Fazenda ao provedor-mor dela, para se me fazer presente e ver se se deve ou não consentir no tal trespasse, sob pena de ficar nula esta data para se poder conceder novamente a outrem. E, nesta forma, se lhe passa carta para as haja, logre e possua como coisa sua própria, para ele e todos os seus herdeiros, ascendentes e descendentes, sem pensão, nem tributo algum mais que o dízimo a Deus, Nosso Senhor, dos frutos que nelas tiver; a qual concessão lhe faço não prejudicando a terceiro nem a Sua Majestade, se no dito sitio quiser mandar fundar alguma vila, reservando os paus Reais que nelas houver para embarcações, com declaração que mandará confirmar esta data por Sua Majestade dentro de 3 anos primeiros seguintes, e cultivará as ditas terras de maneira que dê fruto; e dará caminhos públicos e particulares aonde forem necessários para pontes, fontes, portos e pedreiras; e se demarcará, ao tempo da posse, por rumo de corda e braças craveiras, como é estilo e o dito senhor ordena. E, outrossim, não sucederão nelas religiões ou pessoas eclesiásticas por nenhum título; e, acontecendo, possuí-las será com o encargo de pagar delas dízimos a Deus como se fossem possuídas por seculares; e, faltando a qualquer destas cláusulas, se haverão por devolutas e se darão a quem as denunciar. Pelo que mando ao provedor-mor da Fazenda Real, e mais ministros e pessoas a que tocar, que, na forma referida, deixem ter e possuir ao dito Domingos Pereira Valadares as ditas terras, para ele e todos os seus herdeiros, ascendentes e descendentes, como coisa sua própria. Cumpram e guardem esta carta de data e sesmaria tão inteiramente como nela se contém, a qual lhe mandei passar por mim assinada e selada com o sinete de minhas armas, que se registrará aonde tocar e se passou por duas vias. Dada na cidade de São Luís do Maranhão, aos 19 dias do mês de junho do ano do nascimento de Nosso Senhor Jesus Cristo de 1738. E eu, José Gonçalves da Fonseca, secretário do estado, a fiz // João de Abreu Castelo branco//.

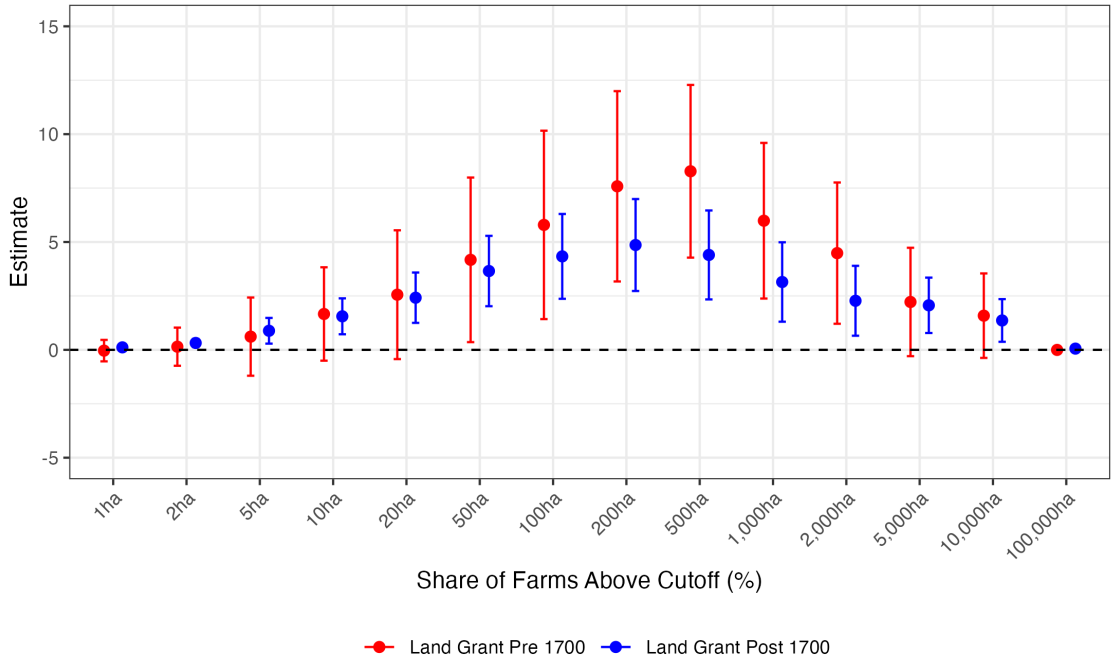
Notes: Example of an original manuscript and its transcribed version. Obtained from *SILB*.

Figure A.4: Geographical distribution of Land Conflicts in Brazil

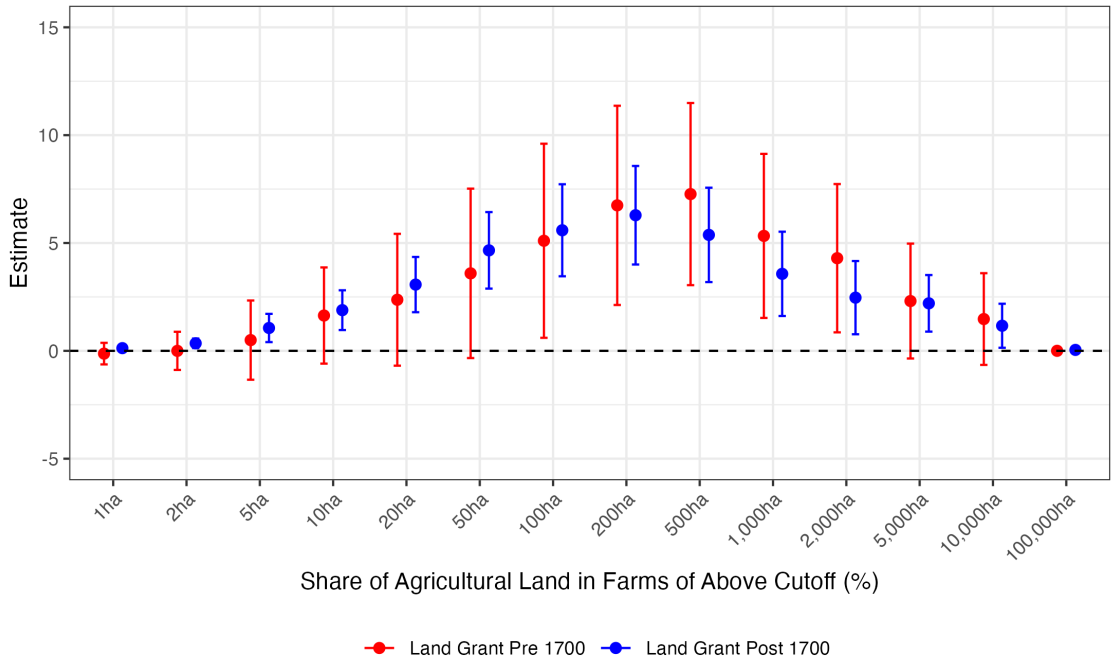


Notes: Geographical distribution of Land Conflicts in Brazil from 2014-2018 from the *Comissao Pastoral da Terra* (Pastoral Comission of Land). Red dots indicate a conflict as reported on their yearly reports alongside with 2010 municipality boundaries.

Figure A.5: Distribution Effects of the Grants - Entire Sample



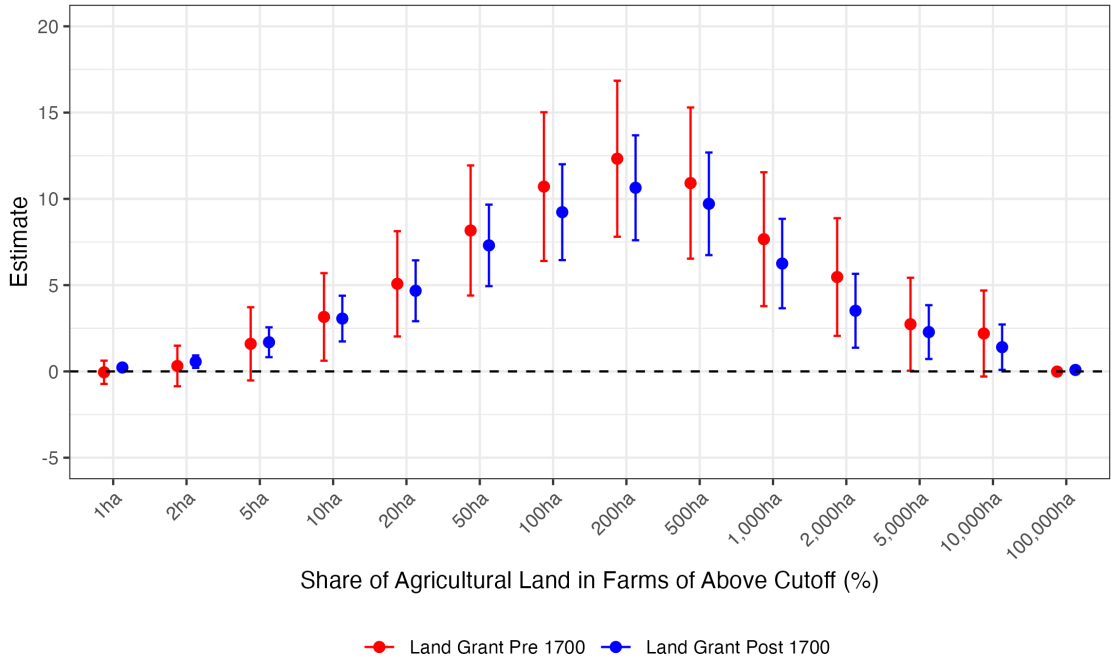
(a) Subfigure A



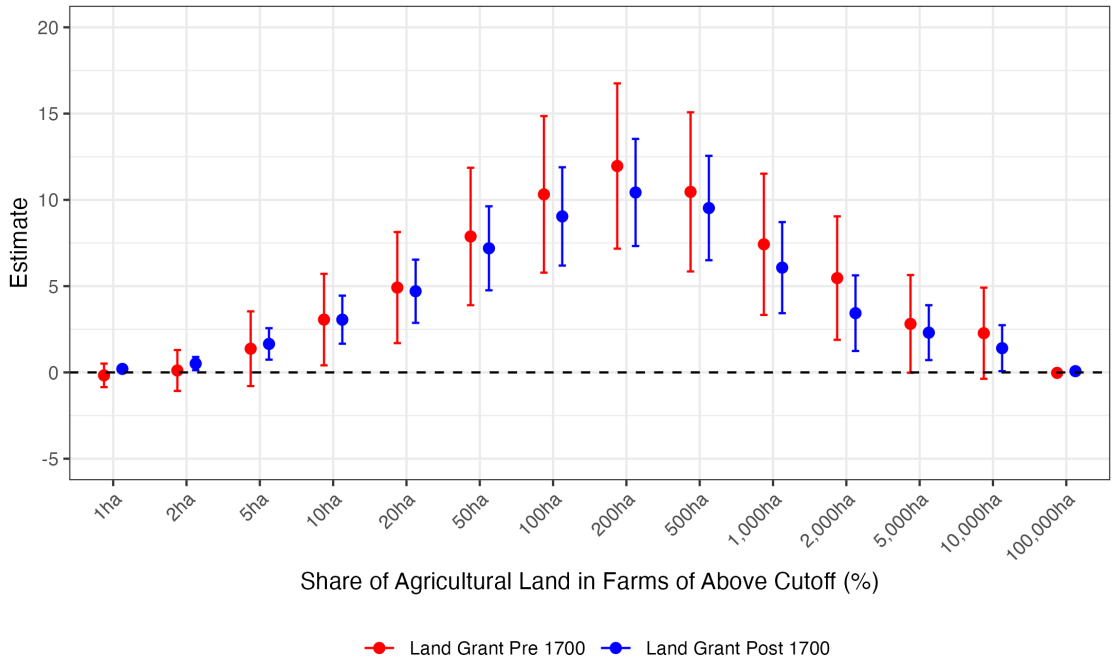
(b) Subfigure B

Notes:

Figure A.6: Distribution Effects of the Grants - Northeastern States Sample



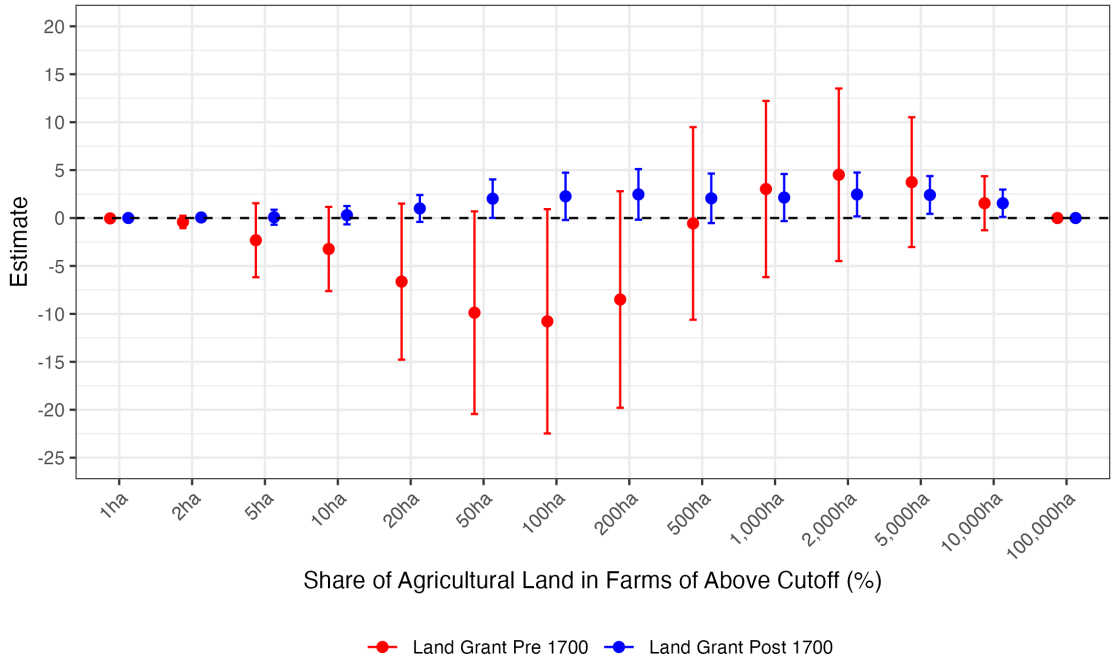
(a) Subfigure A



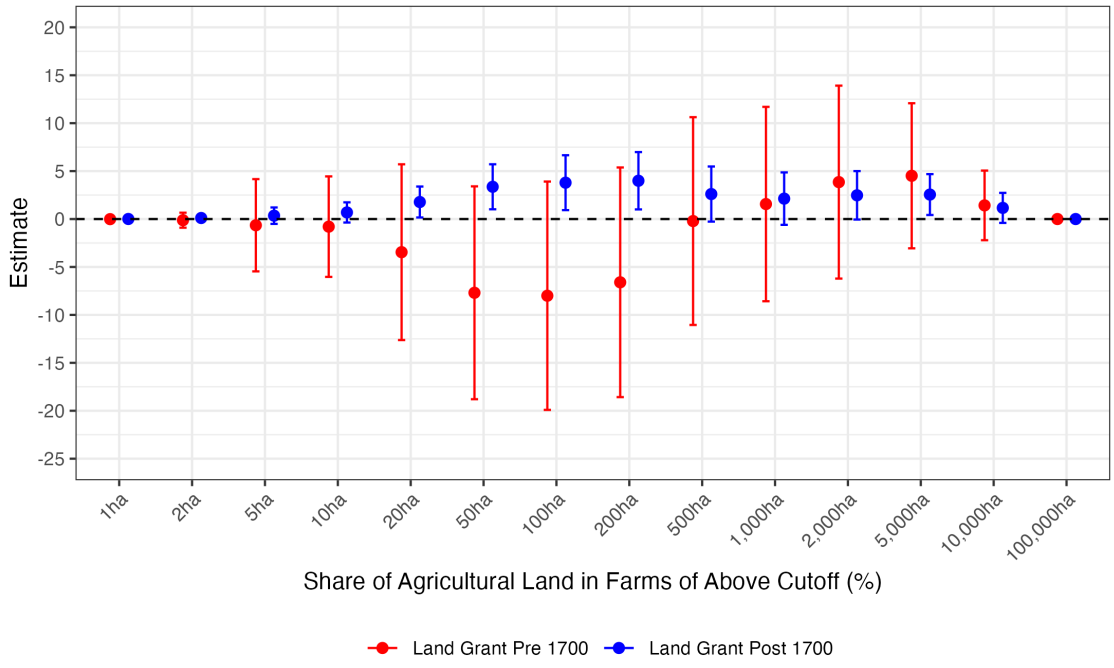
(b) Subfigure B

Notes:

Figure A.7: Distribution Effects of the Grants - Southeastern States Sample



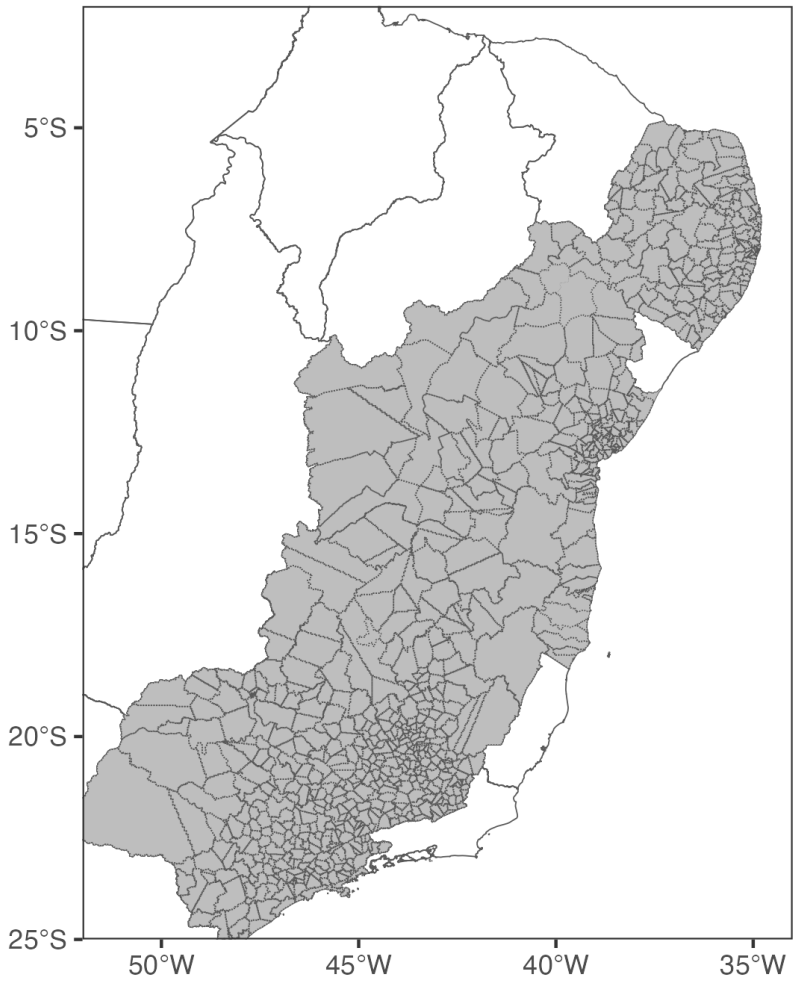
(a) Subfigure A



(b) Subfigure B

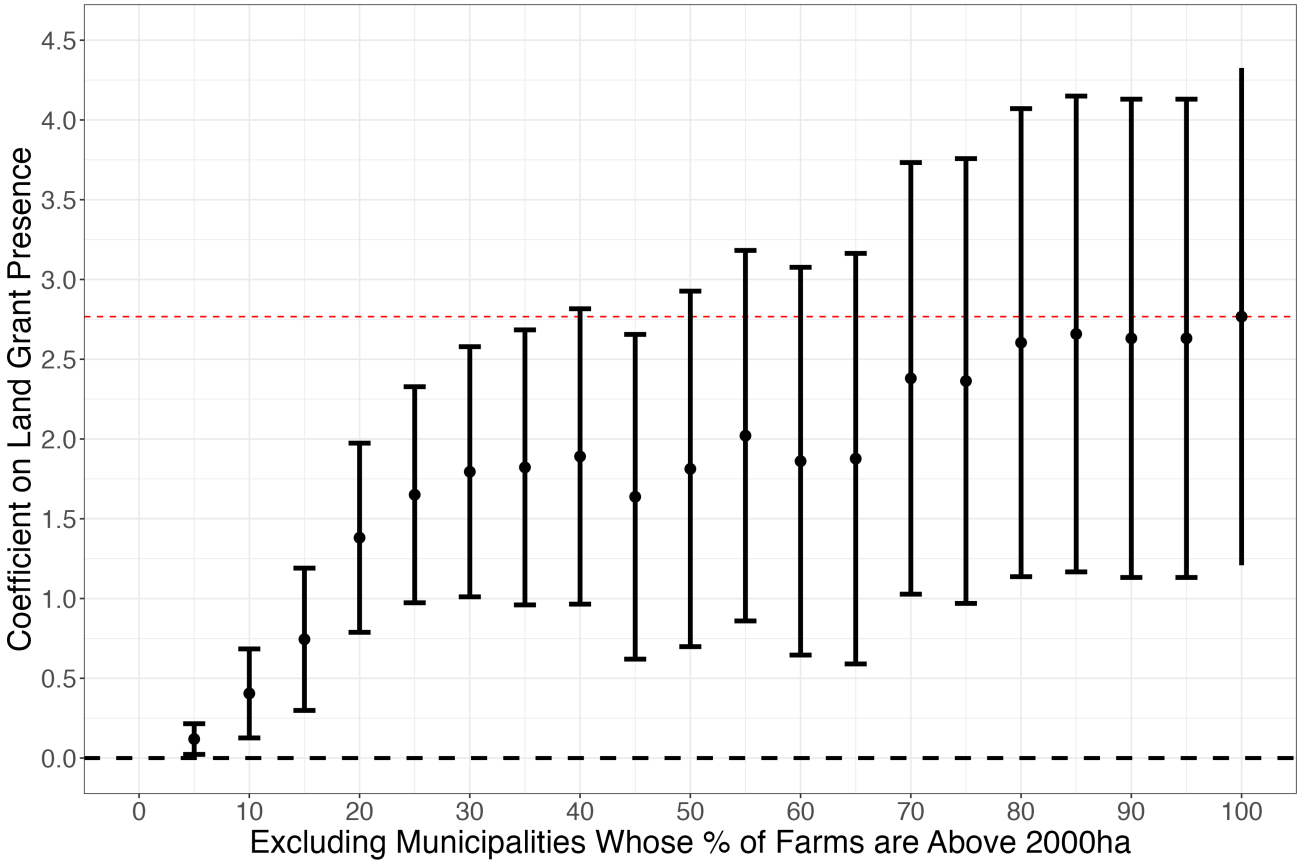
Notes:

Figure A.8: 1872 Municipalities and Parish Locations

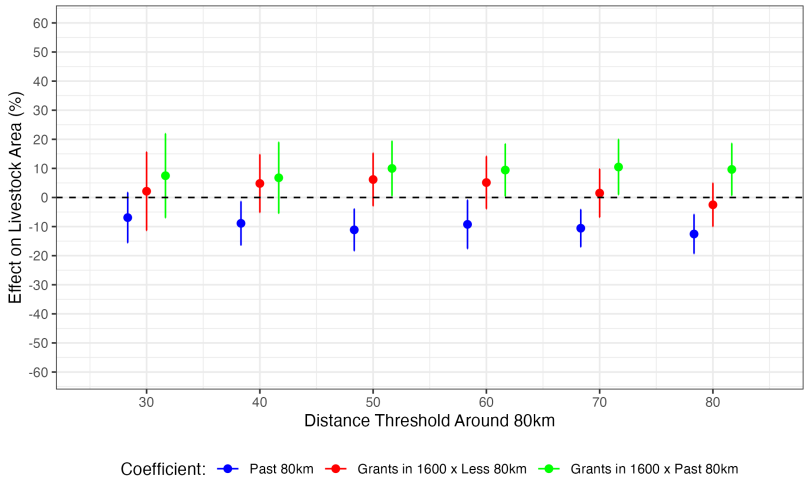


Notes: Geographical distribution of 1872 parishes alongside 1872 municipality and state boundaries. The states to which I have information on the land grants are highlighted in red. This map shows that several municipalities, especially in the Southeastern states have more than one parish per municipality. The sample increases by using parish-level information instead of municipalities from 337 to 815.

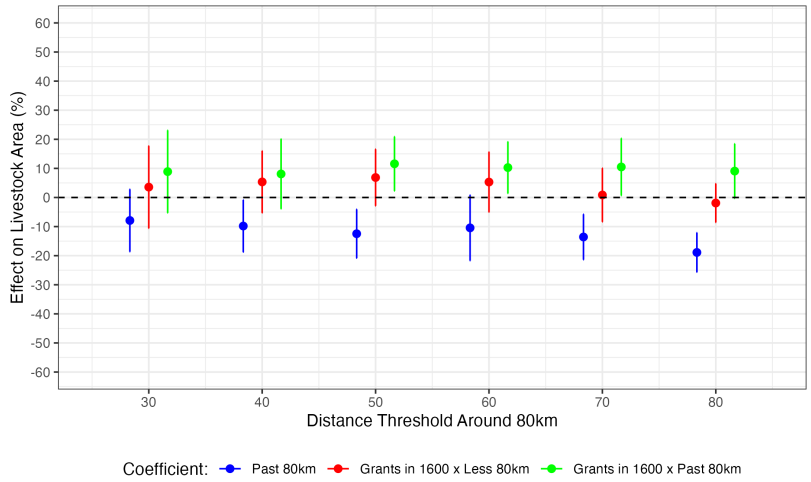
Figure A.9: Estimated Coefficients Excluding Municipalities Whose % of Agricultural Units are above a cutoff



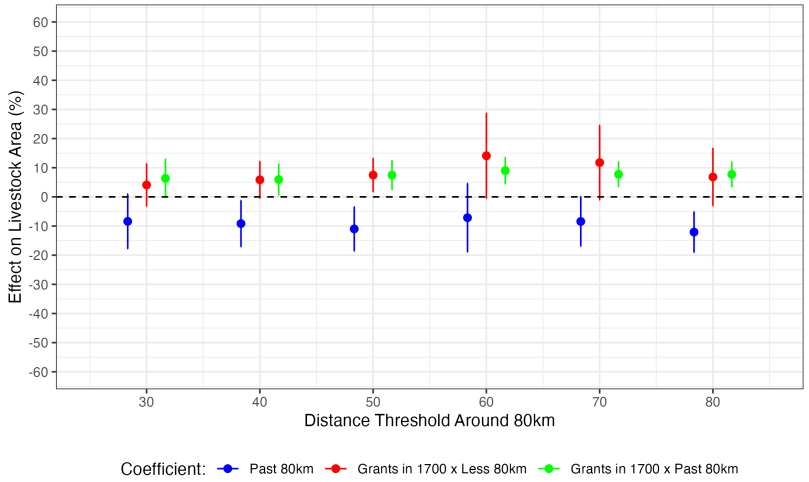
Notes: This figure shows the OLS results from Equation 2 by excluding municipalities whose % of farms over 2000ha is above a certain cutoff. For example, the estimate at 10 excludes all municipalities that have more than 10% of their total agricultural land in farms over 2,000ha. Red line indicates the main estimate based on.



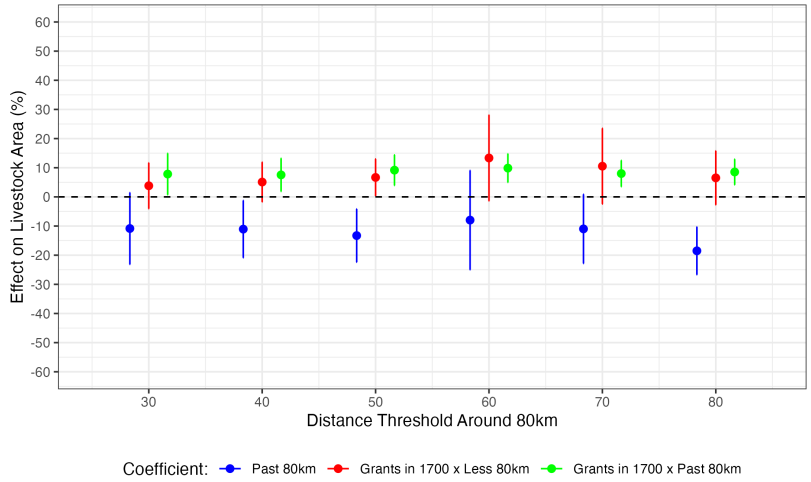
(a) Caption for Figure 1



(b) Caption for Figure 2

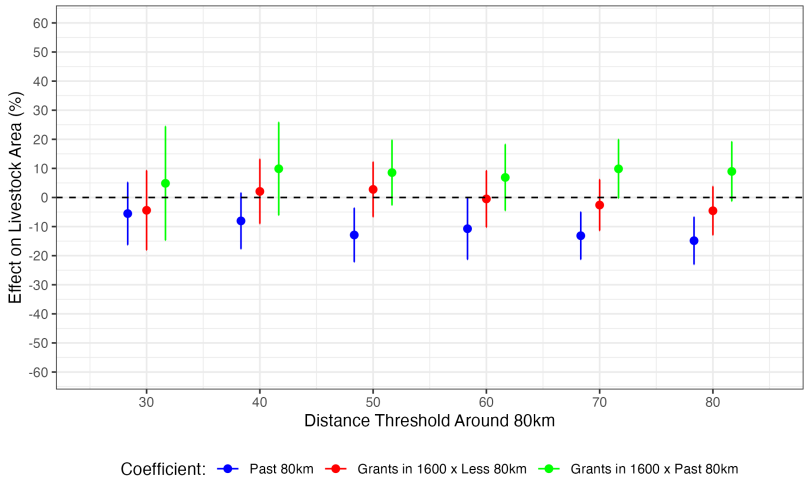


(c) Caption for Figure 3

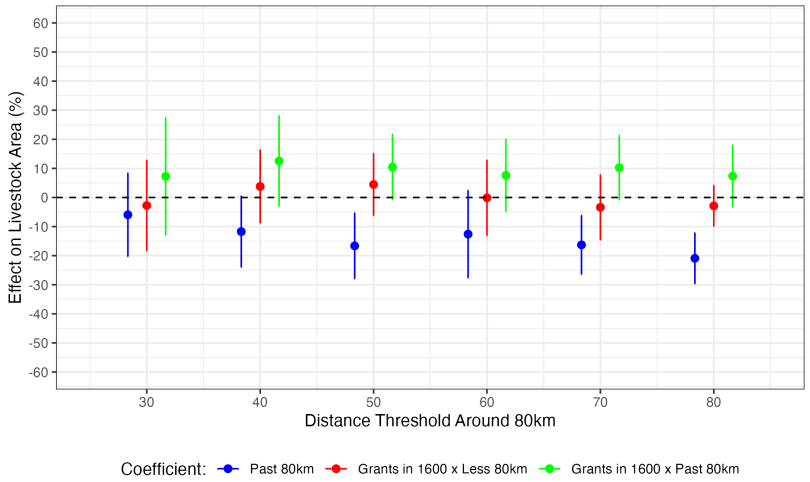


(d) Caption for Figure 4

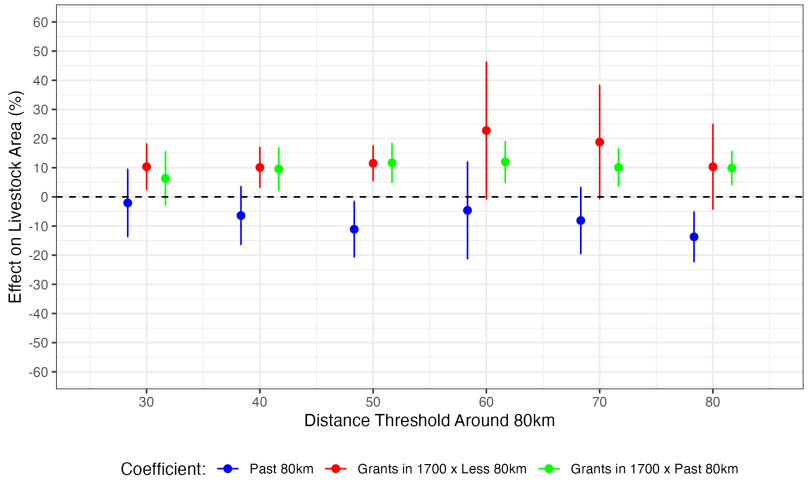
Figure A.10: Entire Sample



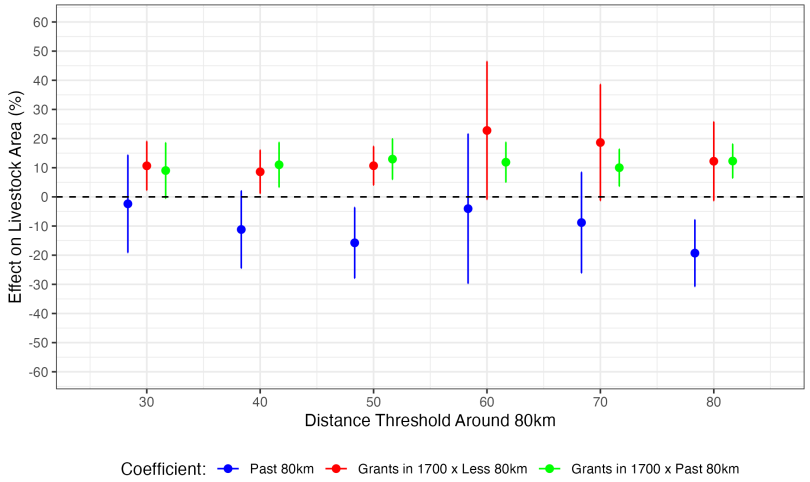
(a) Caption for Figure 1



(b) Caption for Figure 2

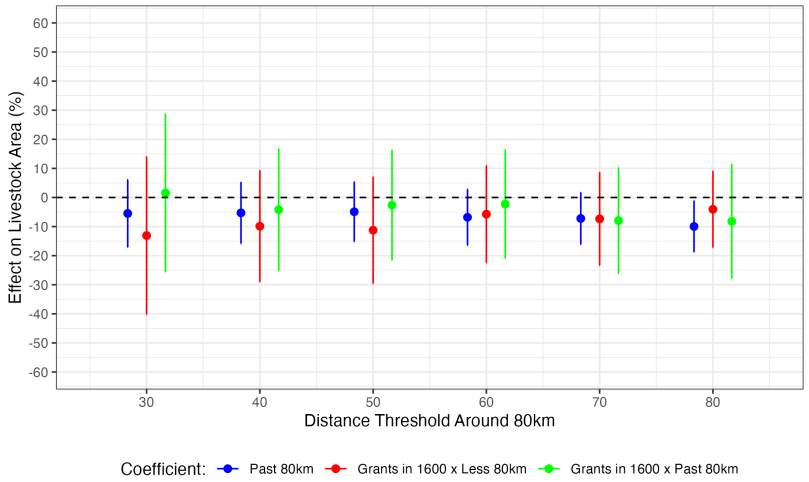


(c) Caption for Figure 3

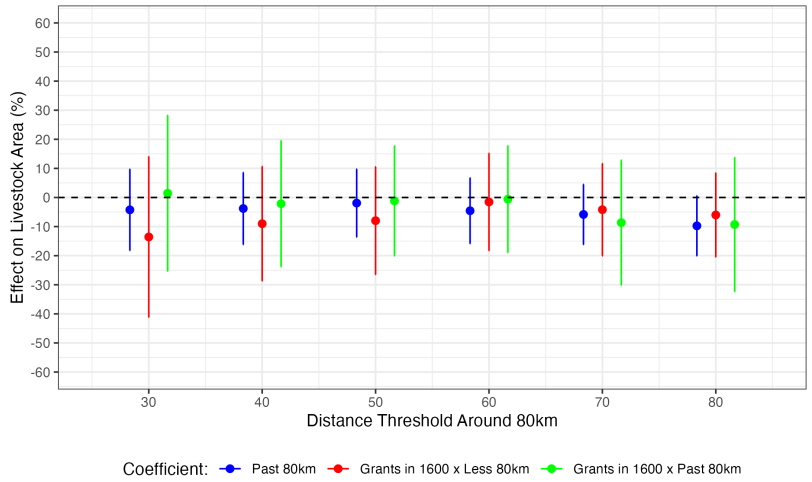


(d) Caption for Figure 4

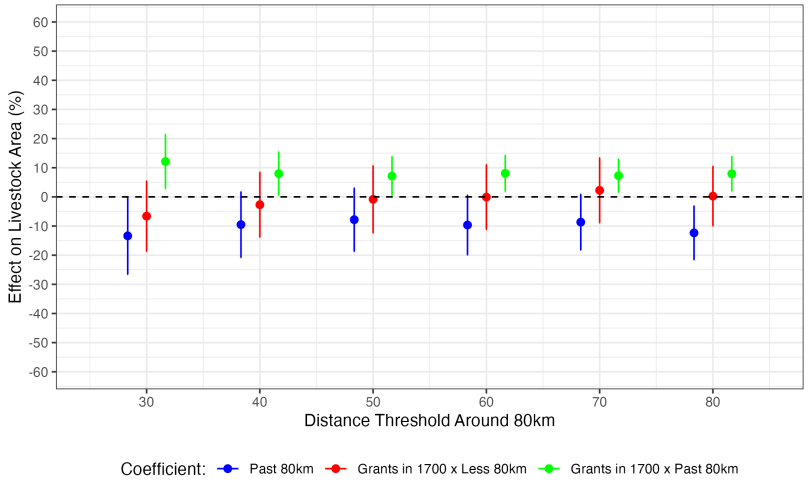
Figure A.11: Northeast sample



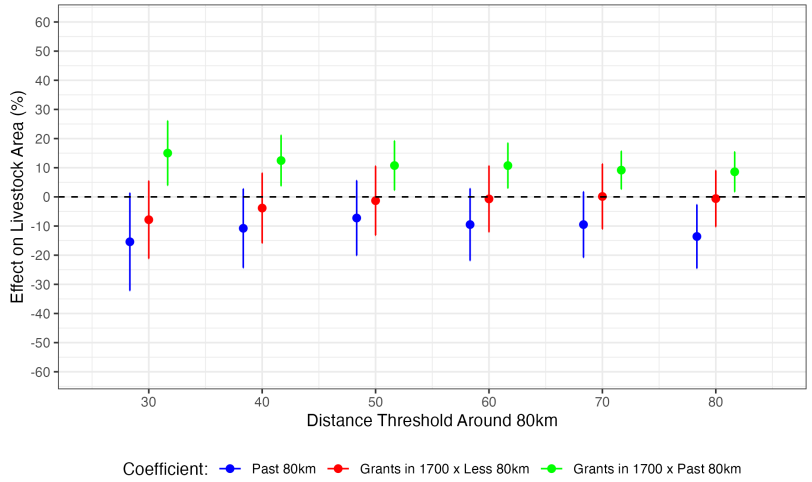
(a) Caption for Figure 1



(b) Caption for Figure 2

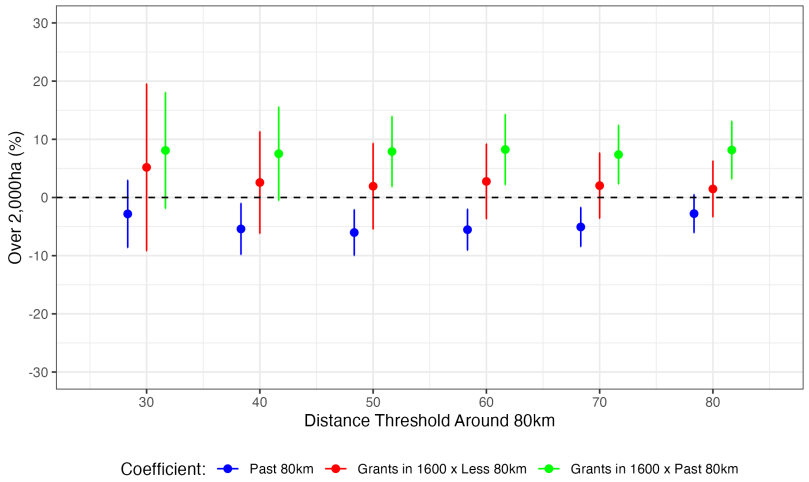


(c) Caption for Figure 3

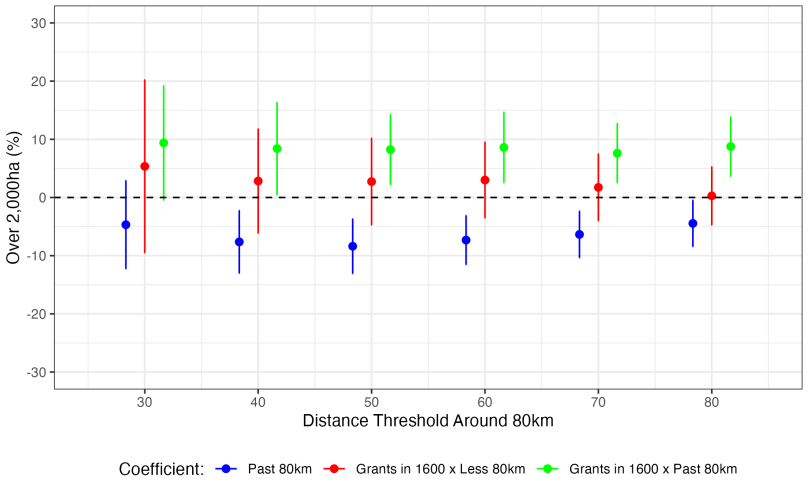


(d) Caption for Figure 4

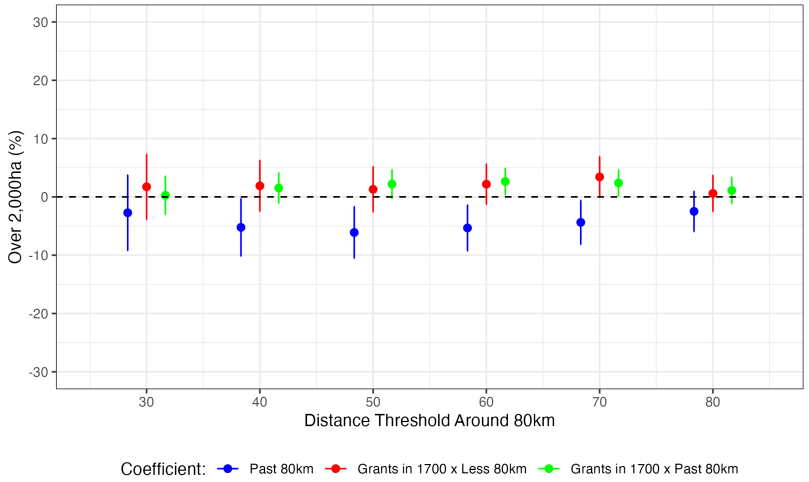
Figure A.12: Southeast Sample



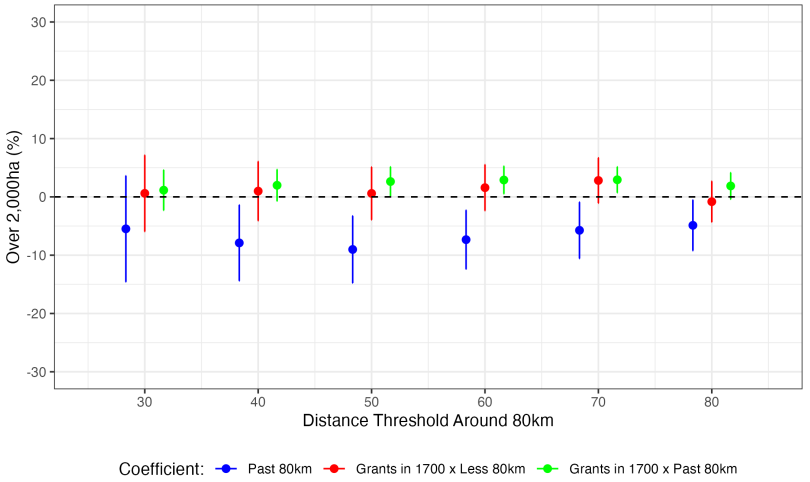
(a) Caption for Figure 1



(b) Caption for Figure 2

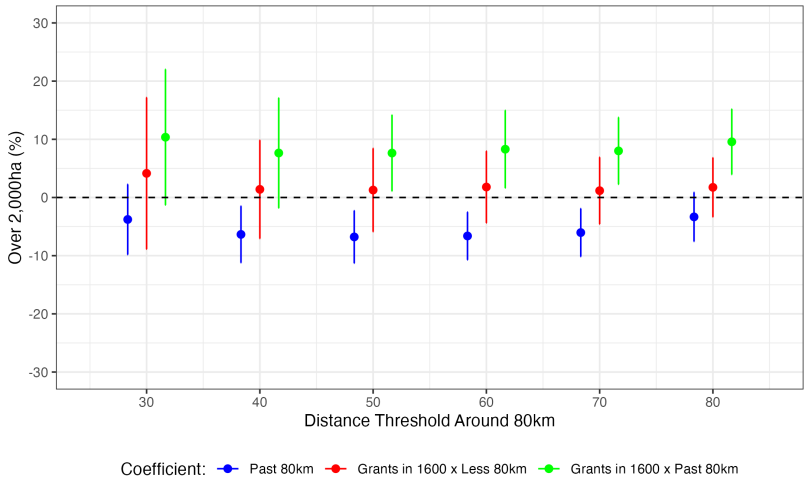


(c) Caption for Figure 3

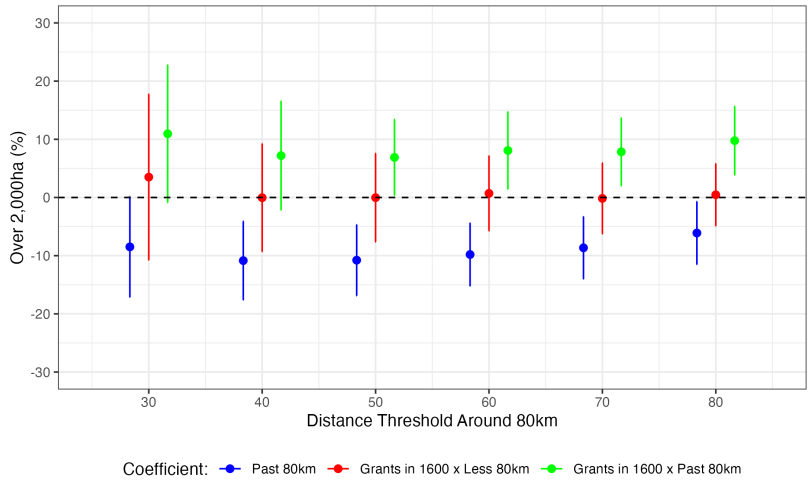


(d) Caption for Figure 4

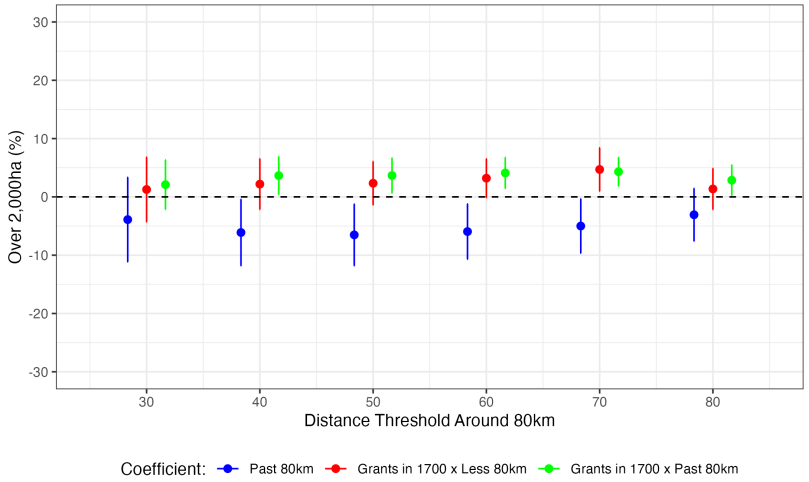
Figure A.13: Land Distribution - Entire Sample



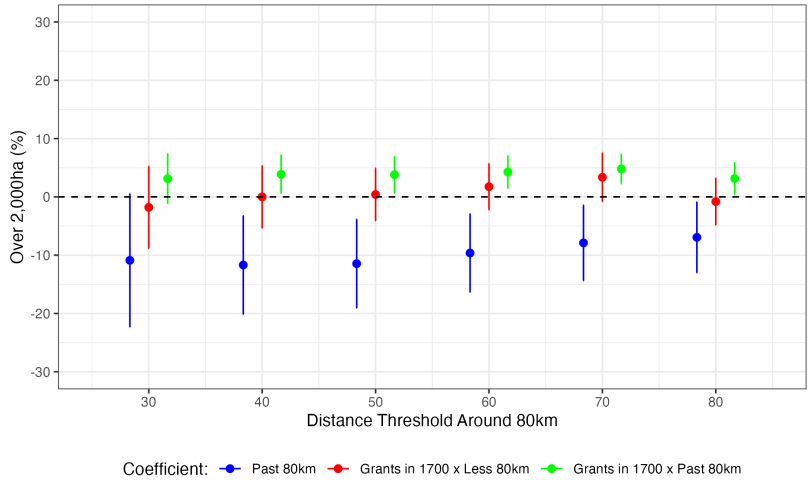
(a) Caption for Figure 1



(b) Caption for Figure 2

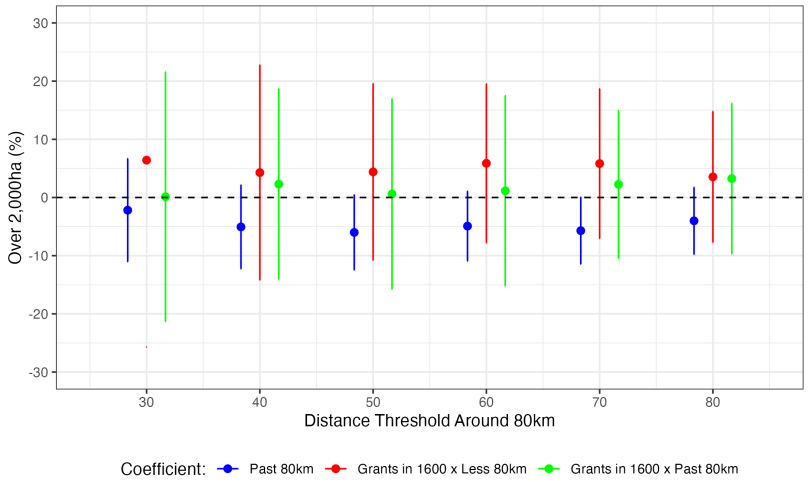


(c) Caption for Figure 3

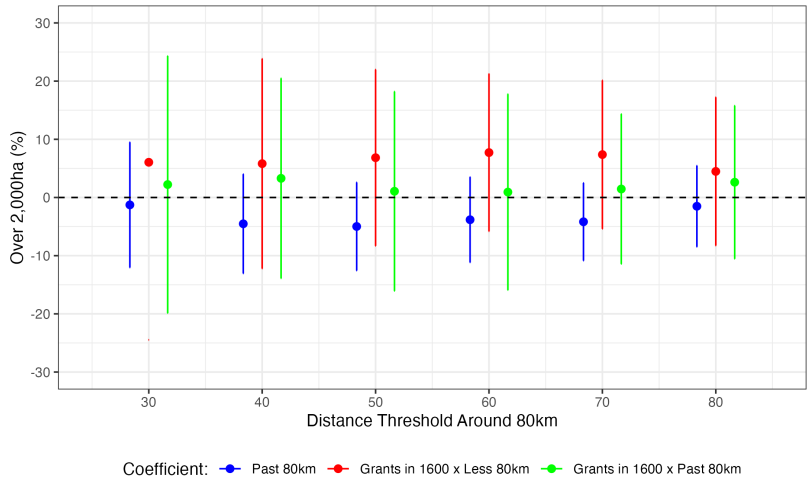


(d) Caption for Figure 4

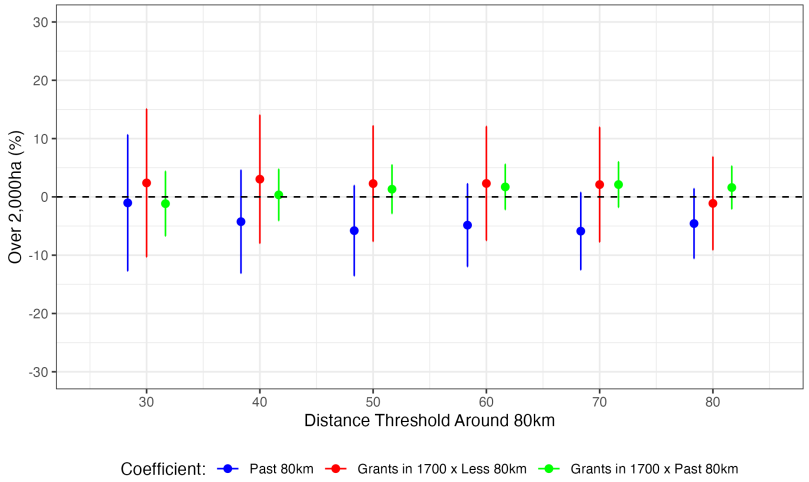
Figure A.14: Land Distribution - Northeast sample



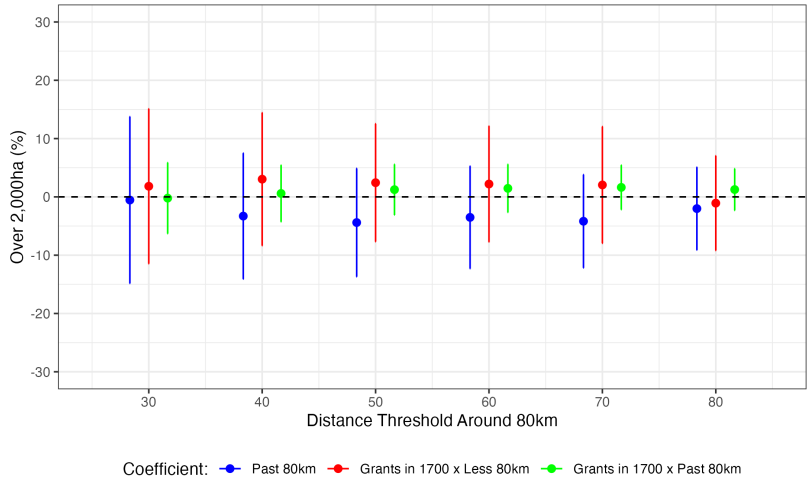
(a) Caption for Figure 1



(b) Caption for Figure 2



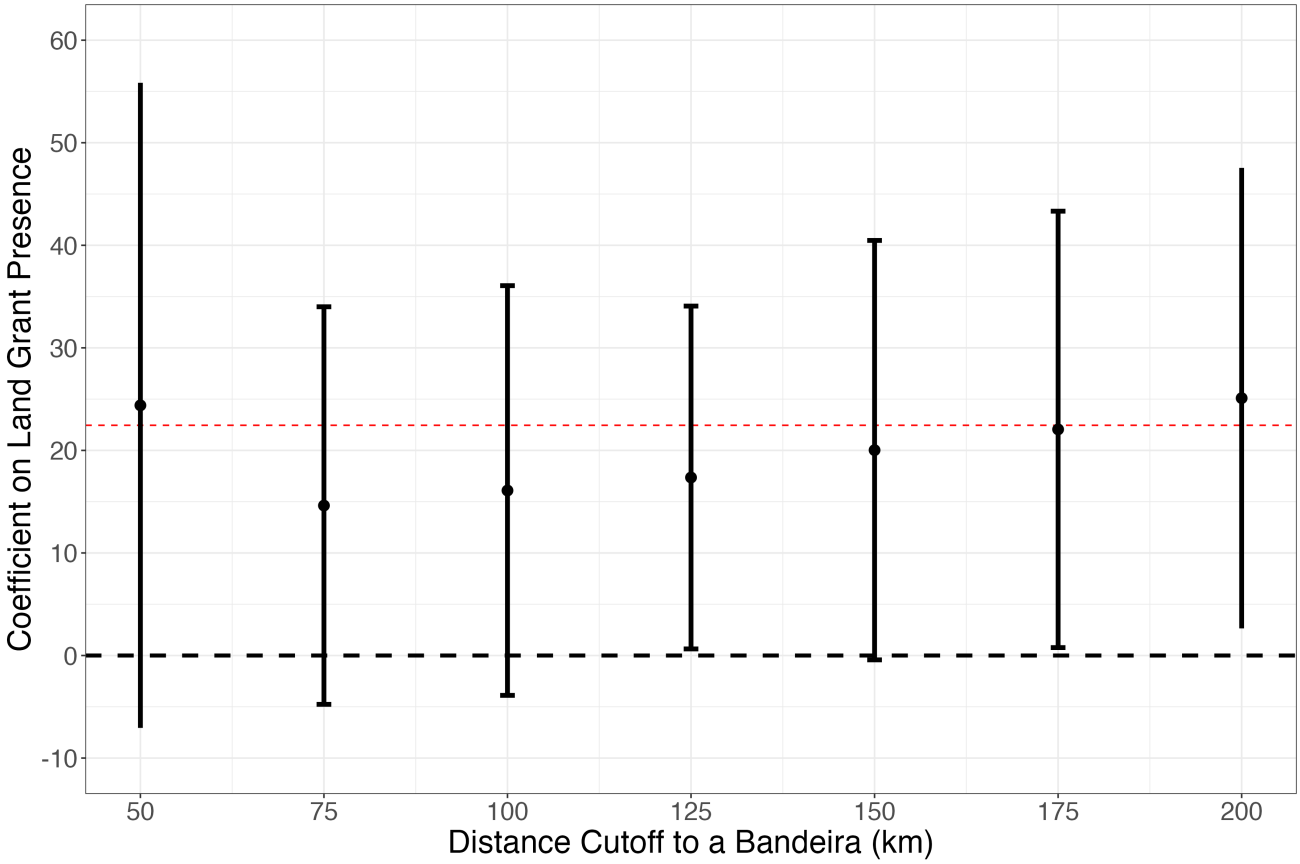
(c) Caption for Figure 3



(d) Caption for Figure 4

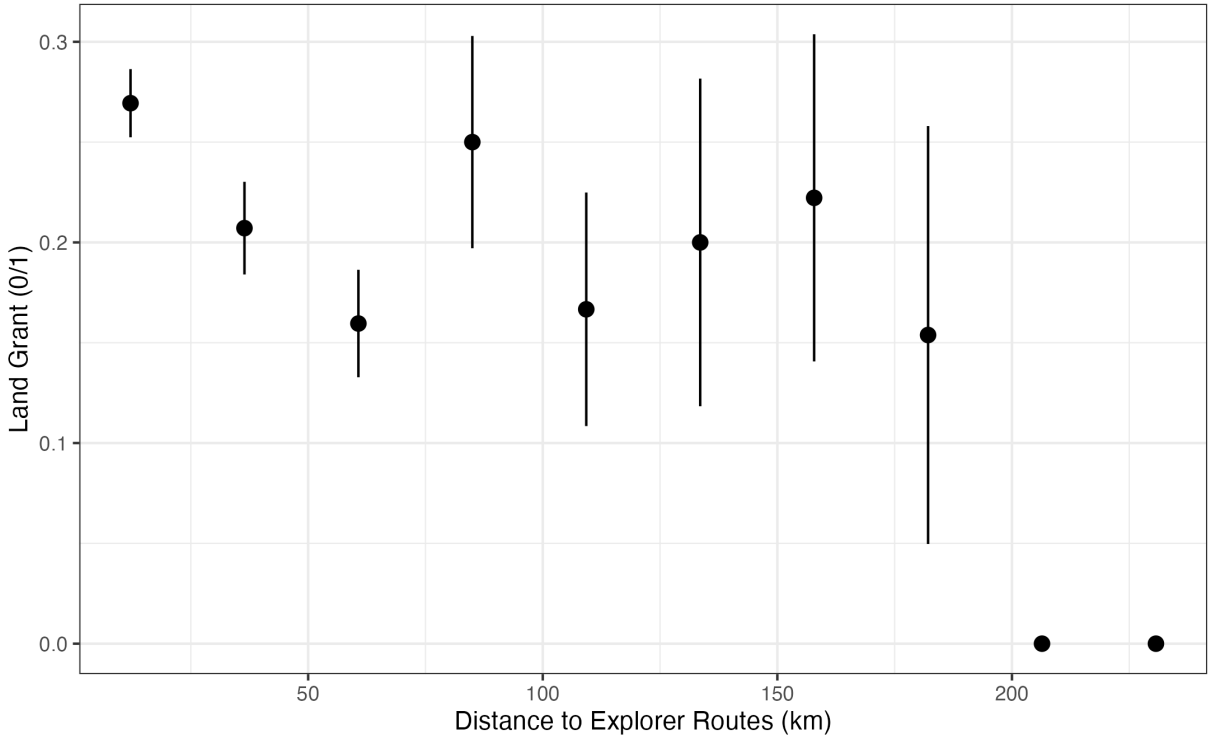
Figure A.15: Land Distribution - Southeast Sample

Figure A.16: Estimated Coefficients Excluding Municipalities Whose % of Agricultural Units are above a cutoff



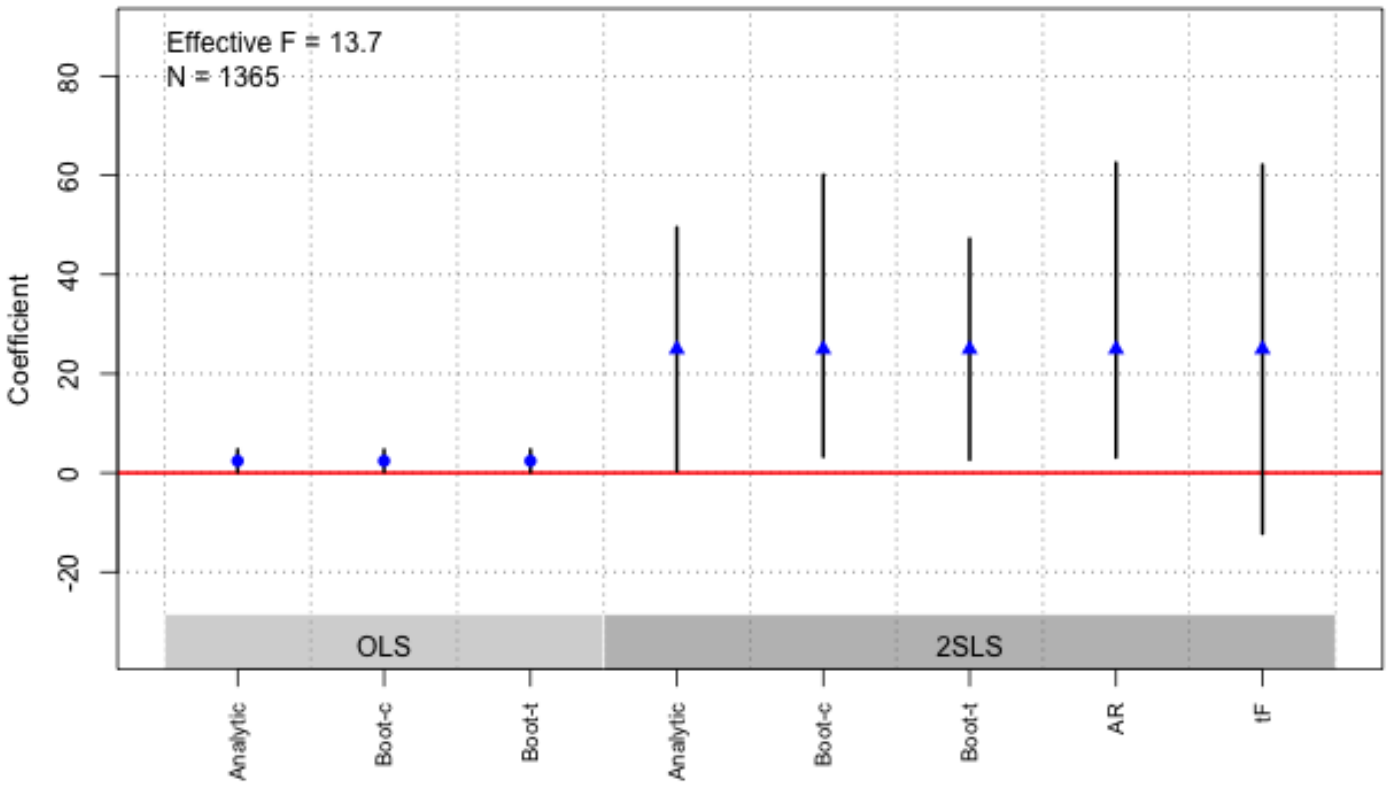
Notes: Figure shows the estimates from Equation 5 by excluding municipalities too far from a certain cutoff. For example, the first estimate at 50 indicates that the sample selection are only municipalities within 50km of a *bandeira*. 95% confidence intervals are represented as error bars. Red line indicates the main estimate reported in Column 2 of Table 3.

Figure A.17: *Bandeira* Routes and 1995 Municipalities



Notes: Binscatter plot showing the correlation between proximity to a *Bandeira* route and the probability of having received a land grant. Each observation is a 1995 municipality from the states of Sao Paulo and Minas Gerais.

Figure A.18: Robustness checks on the IV estimates for the percentage of farms over 2,000 ha



Notes: Figure shows the OLS and IV estimators, alongside a variety of robustness checks for both which include bootstrapped standard errors, Anderson-Rubin Confidence intervals (Anderson et al., 1949), and tF Confidence Intervals (Lee et al., 2022). Confidence intervals shown are at the 95% level.

Table A.1: Geographical Characteristics of Municipalities with a Land Grant Pre-1700, a Land Grant Post-1700, or no Land Grant

	No Grants (N=1636)		Post-1700 Grant (N=650)		Pre-1700 Grant (N=86)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Average Slope	4.0	2.4	3.6	2.1	3.7	2.4
Average Elevation	536.4	292.0	537.3	315.3	371.7	281.3
Distance to the Coast (km)	225.8	166.6	180.2	137.9	83.6	100.1
Distance to Nearest River (km)	105.3	125.8	148.3	148.0	158.7	135.2
Potential Sugarcane	1680.8	529.4	1503.0	494.6	1625.0	537.5
Potential Calories pre-1500	10 142.5	1449.6	10 392.3	1750.6	9549.5	2233.3
Potential Calories post-1500	11 065.6	1087.6	11 184.9	1360.6	10 421.4	1709.2
Latosol Presence (0/1)	0.6	0.5	0.6	0.5	0.5	0.5
Argisol Presence (0/1)	0.6	0.5	0.5	0.5	0.6	0.5
Cambisol Presence (0/1)	0.2	0.4	0.3	0.5	0.1	0.3
Spondosol Presence (0/1)	0.0	0.1	0.0	0.1	0.1	0.2
Latitude	−43.5	4.8	−41.4	4.3	−40.1	4.2
Longitude	−17.0	5.6	−14.3	6.5	−13.8	6.3

[a] This table shows the balance on set of geographical characteristics using 1995 municipality census boundaries in Brazil. It compares municipalities that received a grant pre-1700, those that received a grant post-1700, and those that never received a grant.

Table A.2: OLS and Matching Estimates on 1995 Agricultural Census - Varying Land Sizes

	Over 2,000ha (%)		Over 5,000ha (%)		Over 10,000ha (%)	
	OLS	Matching	OLS	Matching	OLS	Matching
Grants Pre-1700	4.210**	4.128**	1.961	2.156	1.415	1.394
	(1.674)	(1.753)	(1.288)	(1.362)	(1.024)	(1.100)
Grants Post-1700	2.101**	2.367***	1.984***	2.151***	1.304**	1.130**
	(0.825)	(0.862)	(0.656)	(0.668)	(0.515)	(0.527)
N	2372	1472	2372	1472	2372	1472
Geographical Controls	✓	✓	✓	✓	✓	✓
Control Mean	9.2	8.2	3.7	3.1	1.7	1.6

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls, which are also used fot the matching, include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table A.3: Effects of Land Grants in Livestock and Pastures - 1995

	Area used for Livestock (%)	Area used as Natural Pasture (%)	Area used as Artificial Pasture (%)
Panel A - Grants Pre- 1700			
More than 80 km from the Coast	-0.366	6.892***	-0.663
	(2.712)	(2.392)	(4.558)
Grants Pre-1700 x More than 80 km from the Coast	5.118*	-0.026	-3.120
	(2.754)	(1.771)	(3.116)
Grants Pre-1700 x Less than 80 km from the Coast	-7.113	6.212	-1.295
	(4.540)	(10.162)	(2.462)
Geographical Controls		✓	✓
Control Mean	42.1	16.6	14.1
N	1007	1007	1007
Panel B - Grants Post- 1700			
More than 80 km from the Coast	2.155	8.703***	-1.247
	(3.638)	(3.163)	(4.416)
Grants Post-1700 x More than 80 km from the Coast	8.845***	3.272***	2.255
	(1.981)	(1.212)	(5.947)
Grants Post-1700 x Less than 80 km from the Coast	10.586	9.215	0.665
	(7.319)	(6.342)	(5.827)
Geographical Controls		✓	✓
Control Mean	38.3	15.3	14.2
N	1007	1007	1007

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table A.4: Effects of Land Grants in Livestock and Pastures - 1995

	Area used for Livestock (%)	Area used as Natural Pasture (%)	Area used as Artificial Pasture (%)
Panel A - Grants Pre- 1700			
More than 80 km from the Coast	-12.557***	2.110	-5.220***
	(3.030)	(1.897)	(1.786)
Grants Pre-1700 x More than 80 km from the Coast	-7.170	-2.408	-4.623***
	(8.226)	(4.289)	(1.714)
Grants Pre-1700 x Less than 80 km from the Coast	0.924	-8.634***	3.226
	(6.190)	(3.250)	(3.488)
Geographical Controls		✓	✓
Control Mean	48.8	19.6	12.7
N	1365	1365	1365
Panel B - Grants Post- 1700			
More than 80 km from the Coast	-13.328***	3.205	-5.880***
	(3.325)	(2.118)	(2.123)
Grants Post-1700 x More than 80 km from the Coast	2.280	0.786	2.453
	(1.576)	(0.886)	(3.125)
Grants Post-1700 x Less than 80 km from the Coast	0.795	1.036	2.610
	(5.263)	(2.932)	(2.817)
Geographical Controls		✓	✓
Control Mean	46.5	17.3	12
N	1365	1365	1365

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table A.5: Effects of Land Grants in Land Inequality - (%) of Farms over Size Cutoff 1995

	Over 2,000 ha (%)	Over 5,000 ha (%)	Over 10,000 ha (%)
Panel A - Grants Pre- 1700			
More than 80 km from the Coast	-8.419***	-5.451***	-3.760***
	(1.676)	(1.340)	(1.069)
Grants Pre-1700 x More than 80 km from the Coast	9.220***	4.177**	2.546*
	(2.415)	(1.694)	(1.305)
Grants Pre-1700 x Less than 80 km from the Coast	2.562	1.658	1.981
	(2.490)	(2.064)	(2.017)
Geographical Controls		✓	✓
Control Mean	9.7	4	2.3
N	1007	1007	1007
Panel B - Grants Post- 1700			
More than 80 km from the Coast	-8.673***	-6.279***	-4.389***
	(1.864)	(1.511)	(1.221)
Grants Post-1700 x More than 80 km from the Coast	4.923***	3.803***	2.365***
	(1.184)	(0.867)	(0.682)
Grants Post-1700 x Less than 80 km from the Coast	0.987	-0.239	-0.214
	(1.818)	(1.315)	(1.157)
Geographical Controls		✓	✓
Control Mean	9.2	4	2.5
N	1007	1007	1007

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table A.6: Effects of Land Grants in Land Inequality - (%) of Farms over Size Cutoff 1995

	Over 2,000 ha (%)	Over 5,000 ha (%)	Over 10,000 ha (%)
Panel A - Grants Pre- 1700			
More than 80 km from the Coast	-1.413	-0.822	-0.693
	(2.308)	(1.679)	(0.871)
Grants Pre-1700 x More than 80 km from the Coast	7.444	6.963	4.596
	(8.261)	(7.582)	(6.286)
Grants Pre-1700 x Less than 80 km from the Coast	3.296	2.634	0.517
	(5.502)	(3.851)	(0.694)
Geographical Controls		✓	✓
Control Mean	9.1	2.2	0.8
N	1365	1365	1365
Panel B - Grants Post- 1700			
More than 80 km from the Coast	-3.238	-1.407	-1.278
	(2.397)	(1.711)	(0.893)
Grants Post-1700 x More than 80 km from the Coast	3.109***	2.506**	1.776**
	(1.187)	(1.029)	(0.804)
Grants Post-1700 x Less than 80 km from the Coast	-2.191	1.894	-0.103
	(4.178)	(3.618)	(0.911)
Geographical Controls		✓	✓
Control Mean	10.1	1.9	0.6
N	1365	1365	1365

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils.

Table A.7: First-Stage Results (1995 Municipality Boundaries)

	Grant Presence Pre-1700s	Grant Presence Post-1700s
Distance to Bandeira (10km)	0.001	−0.012***
	(0.001)	(0.003)
Geographical Controls	✓	✓
Dependent Variable Mean	0.03	0.21
N	1365	1365
F-stat	1.94	16.52

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils. For the sake of the cregression I consider the variable determined in tens of kilometers, so the coefficients are multiplied by 10. All regressions are weighted by the area of the municipality. States considered are Sao Paulo and Minas Gerais.

Table A.8: IV and Matching Estimates on Agricultural Land Size - 1995 Agricultural Census

	Over 2,000ha (%)		Over 5,000ha (%)		Over 10,000ha (%)	
	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Any Land Grants	22.454*		12.774		13.512*	
	(12.246)		(9.354)		(7.796)	
Grants post-1700		20.782*		11.823		12.505*
		(11.176)		(8.594)		(7.097)
N	1365	1365	1365	1365	1365	1365
Geographical Controls	✓	✓	✓	✓	✓	✓
Control Mean	10.5	10.4	4.3	4.2	1.9	1.9

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[a] All regressions include state fixed effects. Geographical controls include latitude, longitude, average slope, average elevation, distance to the nearest navigable river, distance to the coast, maximum caloric output from pre-Columbian and post-Columbian crops, and whether or not the municipality contains four different types of soils. States considered are Sao Paulo and Minas Gerais.

B. Data Source Appendix

Below I describe the sources to which the land grants were compiled from. The states with a * indicate that the works was done by the researchers at SILB.

Pernambuco*

- Documentação Histórica Pernambucana. Recife: Imprensa Oficial, 1954. Vol. 1-2
- Documentação Histórica Pernambucana: sesmarias. Recife: Secretaria de Educação e Cultura. Biblioteca Pública, 1959. Vol. 1-4
- Coleção Documentos Históricos Biblioteca Nacional do Rio de Janeiro. Vol. 20-22
- Arquivo Nacional do Rio de Janeiro. Códice 427
- Arquivo Nacional do Rio de Janeiro. Códice 155
- Livro do Tombo do Mosteiro de São Bento de Olinda, Imprensa Oficial - Recife, 1948
- Livros do Tombo de São Bento. Book 1-3
- Revista do Instituto Arqueológico, Histórico e Geográfico Pernambucano, 1896.
- Revista do Instituto Histórico de Goiana, 1871.

Rio Grande do Norte*

- O Treslado do auto e mais diligências que se fizeram sobre as datas de terras da capitania do Rio Grande, que se tinham dado. Fortaleza: Revista do Instituto do Ceará, 1909, Ano XXIII.
- IHGRN - Fundo Sesmarias - Books 1-9
- Documentos Históricos da Biblioteca Nacional do Rio de Janeiro..Vol. 23
- Documentos Históricos da Biblioteca Nacional do Rio de Janeiro..Vol. 24 Arquivo Nacional Rio de Janeiro, Códice 427

Bahia*

- Códice 427 - Rio de Janeiro
- FREIRE, Felisbello. História territorial do Brasil. Salvador: Secretaria da Cultura e Turismo, Instituto Geográfico e Histórico da Bahia, 1998
- DHBN - cartas publicadas na coleção Documentos Históricos da Biblioteca Nacional - DHBN, volumes 13 a 22
- Anais do Arquivo Público do Estado da Bahia - Publicação dos anais do APEB - Anais do Arquivo Público do Estado da Bahia. Volumes 3 e 11
- Códice 155 - Rio de Janeiro
- Mosteiro de São Bento - Cartas publicadas nos Livros do Tombo do Mosteiro de São Bento

Paraiba*

- British Library: Livro 1 (Land Grants (sesmarias) / Land Registers, 1757 - 1764); Livro 2: (Plots of Land 1722-1727 / Land Grants (sesmarias) 1722-1727); Livro 3: (Land Grants (sesmarias), 1785 -1787); Livro 4: (Land Grants (sesmarias), 1728 -1738); Livro 5: (Land Grants (sesmarias), 1816 - 1824); Livro 6: (Land Grants (sesmarias), 1747 - 1755); Livro 7: (Land Grants (sesmarias), 1789 - 1808); Livro 8: (Plots of Land - 1714-1717 / Land grants (sesmarias); Livro 9: (Land Grant - Various Parishes, 1768 - 1776); Livro 10: (Land Grants 1704-1722 / Sesmarias 1704-1722)
- TAVARES, João de Lira. Apontamentos para a História territorial da Parahyba. ed. Facsimilar. Brasília: Senado Federal, 1982. vol. CCXLV.
- Documentação Histórica Pernambucana: sesmarias. Recife:
- SECRETARIA DE EDUCAÇÃO E CULTURA BIBLIOTECA PÚBLICA, 1959
- Documentos Históricos da Biblioteca Nacional (DHBN): DHBN, V. 23. P.402-405.
- Códice 427 - Arquivo Nacional - Rio de Janeiro PUBLICAÇÕES DO ARCHIVO NACIONAL. VOL XXVII RIO DE JANEIRO Officinas Graphicas do ARCHIVO NACIONAL 1931. (Códice 155)

- Biblioteca Pública do Estado de Pernambuco (BPE) - Recife

Sao Paulo

- *Sesmarias; documentos do Archivo do Estado de São Paulo* (1921) Vols. 1-3
- Instituto Histórico e Geográfico de São Paulo (1928)

Minas Gerais

- Revista do Arquivo Publico Mineiro - Inventory of the sesmarias letters on the Public Archive Codex - Volume 37 (1988)
- Revista do Arquivo Publico Mineiro - Volumes 10-24 (1905-1933).

C. Description of Letters and Georeferencing

Below is a description on how the process used to georeference the land grants.

1. Based on the letter information, since a location was required in order for the land to be granted, the geographical information on where the land was requested and who it was their neighbors is extracted.

2. It is also possible to georeference based on who the neighbors of the person were.

   (a) For example, the sesmaria of Matheus Ferndandes Ramos which was granted in 1698, is described as being close to the sesmaria of Lucas Pedroso which was granted in 1638.

3. When not possible to georeference based on the above, the location is approximated at the municipality level.

D. Parish Level Georeferencing

The 1872 census was conducted at the parish level. For the 1872 census, the seven states that had a total of 337 municipalities, I georeferenced the information at the parish level for that census increasing the total sample size to 881.

Below is a description of how the georeferencing was done:

1. If the municipalities only had one parish, then the parish location is the same as the municipality seat.

   (a) The municipality of Serpa in Amazonas has only one parish, “Nossa Senhora do Rosário de Serpa", therefore it is georeferenced to the municipality seat of Serpa.

2. If a municipality has more than one parish, first I checked based on the name whether or not the parish level can be traced to a present-day city.

   (a) The municipality of Vigia in Para has three parishes: “Nossa Senhora de Nazaré da Vigia", “Nossa Senhora do Rosário de Collares", and “São Caetano de Odivellas".

   (b) All of these parishes can be traced down to present-day cities, “Nossa Senhora de Nazaré da Vigia" is the present-day municipality of Vigia, “Nossa Senhora do Rosário de Collares" is the present-day municipality of Collares, and “São Caetano de Odivellas" is the present-day municipality of São Caetano de Odivellas

3. If the parish cannot be traced down based on the name to a present-day municipality then I took a look at other sources.[57]

[57] https://cidades.ibge.gov.br/ includes information on historical names for municipalities, based on their history.

E. Data Appendix - 1872

Below are the definitions of the variables measured for the 1872 census and how they were constructed. Some of the variables are already defined in the census:

E.1. Base Variables, available by gender and free vs. enslaved:

1. Number of Literate People
2. Number of People 6-15 Attending/Not Attending/No Information on Schooling
3. Demographic Information on Race
   (a) Number of Enslaved People
   (b) Number of Pardos
   (c) Number of Whites
   (d) Number of Blacks
   (e) Number of Caboclos
4. Number of People not born in the state based on origin: Within Brazil or from another country.
5. Number of people on types of jobs: Liberal/Manual/Agricultural/Industry/Other Jobs/No Jobs
   (a) Liberal: Religious men/women, judges, lawyers, notaries, attorneys, justice officials, medics, surgeons, pharmacists, midwives, teachers, public officials, and artists.
   (b) Manual or Mechanical:
   (c) Agricultural: Farmers and livestock breeders.
   (d) Industry: Manufacturers and merchants.
   (e) Other: Military officers, mariners, fishermen, capitalists/owners, *jornaleiros* (workers that are paid based on a working day), domestic workers, and no information
6. Number of people by age group.

E.2. Constructed Variables:

1. Proportion of Slaves to Free Population:

$$100 \times \frac{\#\text{ of Enslaved People}}{\#\text{ of Free People}}$$

2. Proportion of Slaves in Agriculture:

$$100 \times \frac{\#\text{ of Slaves in Agriculture}}{\#\text{ of Slaves}}$$