Tordesillas, Slavery and the Origins of Brazilian Inequality*

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Abstract

This article documents the long-term impact of slavery on inequality at the receiving end. We focus on Brazil, the largest receiver of African slaves and the last country to abolish this institution in the Western Hemisphere, in 1888. To deal with the endogeneity of slavery placement, we use a spatial Regression Discontinuity Design (RDD), exploiting the Tordesillas Treaty, which established the colonial boundaries between the Portuguese and Spanish empires within Brazil. We find that the number of slaves in 1872 is discontinuously higher on the Portuguese side of the border, consistent with this power's comparative advantage in transatlantic slavery. We then show how this differential slave rate led to higher modern income inequality of 0.04 points (of the Gini Index), close to 10% of the average income inequality in the country. In terms of mechanisms, we find a wider income gap, and important differences in education, employment and prejudice for blacks in modern times. We rule out the role of colonizer identity and other mechanisms proposed in the historical literature.

JEL Codes: O10, N36, O54, O43, I24
Keywords: Slavery, Inequality, Brazil, Regression Discontinuity Design, Colonization, Institutions, Racial Income Gap, Education

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1 Introduction

The transatlantic slave trade constituted a defining demographic, social and economic event in world history. It is now estimated that between the fifteenth and the nineteenth centuries, more than 12 million slaves were taken from Africa, of which 10.7 disembarked in the Americas (Eltis and Richardson, 2010). Although the negative impact of this massive human trafficking has been documented for exporting African nations (Nunn, 2008a; Nunn and Wantchekon, 2011), less is known about the long-term impact of slavery as an institution on the receiving end of the spectrum. The analysis is complex due to the endogenous placement of slaves, as well as the lack of historical data, especially at a granular level.

To make progress on this important question, in this paper we focus on Brazil. This country is particularly well suited to study the aftermath of slavery, as the largest recipient of African slaves in history. Brazil was also the last country in the Western hemisphere to abolish this institution, in 1888. This allows us to use the 1872 Census to estimate the intensity of slavery at the municipal level.[1] At the same time, Brazil remains one of the most unequal countries in the world today (Milanovic, 2011). Hence our motivation here is twofold. First, we are interested in evaluating the impact of slavery on income inequality at the sub-national level. Conversely, we want to explore the historical roots of modern economic inequality in one of the most unequal societies in the world.

Conceptually, we perform a quantitative re-examination of the famous Engerman and Sokoloff hypothesis. According to this thesis, the development trajectories in the Americas can be explained by initial factor endowments and subsequent colonial productive structures, which affected inequality and development in the long run. In this paper we focus on the link between transatlantic slavery and economic inequality. Even though this hypothesis has been examined at the cross-country level (Nunn, 2008b; Soares et al., 2012), a careful sub-national analysis could help to isolate the confounding effect of national-level institutional, historical and cultural legacies.[2] We are further interested in the underlying mechanisms of transmission leading to inequality and potentially underdevelopment

[1]The First Republic Census of Brazil from 1890, already does not report slave status. In modern times, according to the 2010 Census, the majority of Brazilians defined themselves as non-white. The five ethnic categories in the census are: black, pardo, indigenous, Asian and white.

[2]Different from Lagerlöf (2005) and Fenske and Kala (2015) we do not focus here on evaluating the impact of geography or climate on slavery, since these are continuous variables in our analysis, but rather on the impact of slavery on inequality and income.

in the long run.

In our empirical analysis, we conduct a geographic regression discontinuity design (RDD). We exploit the historical boundary provided by the Treaty of Tordesillas (1494), which divided the Spanish and Portuguese empires in the New World along a meridian (a line crossing the globe from north to south). Importantly, the drawing of the Tordesillas line pre-dated the European "discovery" of South America, which occurred during the third voyage of Christopher Columbus (1498). Still, the Tordesillas Treaty provided the foundation for the eventual Portuguese colonization of the continent (Seed, 1995; Herzog, 2015). Portugal had a comparative advantage in slave trade relative to Spain, due to its previous exploration of the African coast as well as its plantation experience in Sao Tomé and the Azores Islands.

To assess the effect of slavery, we use as runnin variable a municipality's distance to the Tordesillas line. For estimation we use the non-parametric method proposed by Calonico et al. (2014) combined with the donut RDD of Barreca et al. (2011).[3] We use the earliest granular record of slave populations in Brazil (the 1872 census) to document that the share of population under enslavement in 1872 is discontinuously higher on the Portuguese (east) relative to the Spanish (west) side of the Tordesillas line, consistent with the historical narrative. In modern times, we observe a discontinuous jump in income inequality. The conservative estimates for 2010 range are in the order of 0.043 Gini Index points, or slightly less than 10% of the 0.484 index for Brazil. We do not find a substantial effect on the level of income, as hypothesized by Engerman and Sokoloff, suggesting that the effect of slavery is working in this case on the second moment of the income distribution (as Nunn (2008b) documents for the American case).

To better understand the effect of slavery on income inequality, we decompose our effects on both inequality within and between races. We find effects along both components. Municipalities on the the former Portuguese side of the border, where more slaves inhabited historically, present higher income gaps between Blacks and whites. These gaps are economically large, in the order of 20%. Further income decompositions reveal important differences within the white and black populations. Gini indexes for both races are discontinuously higher at the border. The same is true for the Theil index, in general, as well as for decompositions between and within races.

[3]Michalopoulos and Papaioannou, 2013 apply "thick" borders (50 or 100km) that separates ethnic groups in Africa. Lowes and Montero, 2021 also use a "Donut Hole" RD approach to test the effects of rubber colonial concessions on economic development.

To examine the potential role of colonizer identity, we look at the case of Dutch Brazil. The Dutch had an important early colonial presence in the Brazilian Northeast. Even though they might have been more different culturally from the Portuguese than the Spaniards, they were also major slave traders. Hence with this case we can distinguish between colonial cultural legacies and slavery policies. Empirically, we conduct a spatial RDD, we find no significant differences in the number of slaves imported, relative to the Portuguese and no corresponding differences in terms of inequality later on. The results suggest that slavery and not colonizer identity mattered for inequality in the Brazilian case.

We then turn to our main mechanisms of transmission for income inequality. Slaves were, by definition, a population with no wages, but also no assets and essentially no education. Accordingly, we examine long-term trends in education, the labor market and racial prejudice. We find significant discontinuities in literacy for blacks, even today. We also find that these differences are more present for the parents than for the children generation. We find similar results for unemployment rates, which are also higher for blacks, and hourly wages, which appear lower. These labor disparities are present at both the extensive (participation) and the intensive margins (hours worked). Using a specialized survey on race by the PERLA project (Telles, 2014), we also find suggestive evidence for discrimination in the labor market. We document a striking negative relationship between income, education and skin color in Brazil. We also show how skin color matters, even after controlling for observables, and how respondents hold negative attitudes towards blacks in this nationally representative survey.

We also explore other mechanisms of persistence that have been suggested in the literature. We mostly follow S. Engerman and Sokoloff (1997), finding no significant effects on land inequality, historic or modern voting. There are no significant differences on a variety of measures of institutional presence and judicial capacity, but important ones in self-organized racial equality councils. The effect on trust is observable, though muted, with the exception of trust in the judiciary (as in Nunn and Wantchekon, 2011). Demographically, there are no large jumps for white, pardo, black or international populations in modern times (cf. Fogel and Engerman, 1974; Bertocchi and Dimico, 2020).

Lastly, we provide several robustness tests for our baseline findings. They appear robust to changes in the parameters of the econometric estimation strategies, as well as alternative sources of historic and modern data. This holds both for slavery and modern income inequality.

1.1 Literature

Recent empirical research has quantified the negative economic impact of slave trade on origin African countries. Nunn (2008a) explains part of Africa's current underdevelopment with slave intensity, relying on data from shipping records and matching them to ethnicities today. Focusing on mechanisms of transmission, Nunn and Wantchekon (2011) show a negative relationship between an individual's reported level of trust in others and the number of slaves taken from his / her ethnic group during the transatlantic slave trades. Follow up papers have continued this line of inquiry. For instance, Fenske and Kala (2017) have related slavery to conflict, Bertocchi and Dimico (2019) to the prevalence of HIV/AIDS, Bertocchi and Dimico (2020) to family size, Teso (2019) to modern female labor force participation, while Lowes and Montero (2019) look at the particular case of the Congo.[4]

The effect of slavery as an institution on receiving and trading nations is relatively less well understood. Nunn (2008b) examines the Engerman and Sokoloff hypothesis empirically, using data at the national level. He finds again that slavery is related to underdevelopment, but that the relationship is not working through inequality. In turn, Soares et al. (2012) document a strong correlation between slavery and modern levels of inequality in a cross section of countries. Derenoncourt et al. (2021) document the staggering wealth gap between whites and blacks in the United States, while Derenoncourt (2018) documents a positive effect of slavery on European ports involved in this trade and Heblich et al. (2021) on British Industrialization.

Focusing on the US, Fogel and Engerman's watershed *Time on the Cross* (1974) provided a critical historic and quantitative re-examination of the American slavery experience. The authors documented the relatively low levels of slave imports, the higher than average reproduction rates and quantify the productivity of the slave economy. This seminal piece led to many other contributions including Smith (1984), Margo (1990), Coatsworth and Taylor (1998) and Mitchener and McLean (2003). More recently, Lagerlöf (2005) looked at the role of geography, Naidu (2012) at suffrage and schooling, and Bertocchi and Dimico (2014) at education. Gouda and Rigterink (2013) and Buonanno and Vargas (2019) link slavery to higher crime, while Acharya et al. (2016, 2018) analyze its sweeping

[4]Pierce and Snyder (2018) and Levine et al. (2020) document the impact of slavery on lower credit and access to finance. Zhang et al. (2021) looks at the impact of this institution on conflict, while Edlund and Ku (2011), La Ferrara et al. (2020) tie it to polygyny and female genital cutting.

impact on southern politics.

Still, our knowledge of the long-term economic impact of slavery remains relatively precarious going south of the border. Dell (2010) documents the negative long-term effect of the *mita* labor system in Peru and Bolivia. Though this forced labor institution was not equivalent to slavery, this is perhaps the closest article conceptually. In a lone exception, Acemoglu et al. (2012), document the negative impact of slavery in Colombia, using variation in gold mines historically. Naritomi et al. (2012) stress the importance of colonial booms for Brazilian economic development. Notwithstanding, this is the first paper to quantify the effect of slavery in Brazil, the largest recipient of African slaves in world. We contribute to this literature with new data and a novel econometric identification strategy, based on former colonial boundaries.

We also contribute to the booming literature on historical inequality (Piketty, 2014, 2020; Piketty and Saez, 2003, 2006, 2014). In particular, as is pertains to Brazil both during historical (Milá, 2015; Souza, 2016; Wigton-Jones, 2019) and modern modern times (Arretche, 2018; Bourguignon et al., 2007; Ferreira et al., 2008). We add to the small literature on racial inequality in Brazil (Botelho et al., 2015; Hirata and Soares, 2020; Soares et al., 2012). We focus here on the underlying institutional structures leading to these income distributions, rather than the political or ideological dimensions of this problem (Gethin, 2018; Piketty, 2020). To this end we build on the historical comparative development literature, summarized by Bisin and Federico (2021), Michalopulos and Papaioannou (2017), Nunn (2009, 2014, 2020), Spolaore and Wacziarg (2013).

The rest of the paper is organized as follows. In the next section, we provide the historical background in terms of the Tordesillas Treaty, as well as slavery in South America and Brazil. Section 3 presents the identification strategy and estimation framework, and Section 4 describes the data. Section 5 contains the main empirical results of the paper. Section 6 presents mechanisms of transmission and Section 7 robustness tests. Section 8 concludes.

2 Historical Context

2.1 Tordesillas Treaty: Spanish and Portuguese South America

The Treaty of Tordesillas was signed soon after the discovery of the New World in 1492. After Columbus arrival from the Americas, in 1493, King Ferdinand II of Aragon, Queen Isabella I of Castile and King John II of Portugal secured two papal bulls - called *Inter Caetera*. The bulls entrusted the European monarchs with the duty to convert indigenous people in return for rights in territories discovered west of the meridian passing 370 leagues off the Cabo Verde and Azores Islands (Herzog, 2015). In 1494, the Spanish and Portuguese monarchs formally signed the Treaty of Tordesillas, in the province of Valladolid, Spain.[5] The treaty effectively separated the globe by a meridian located 370 leagues (approximately 1,850 kilometers) to the west of the Cape Verde Islands. Lands to the east of the meridian would be Portuguese, while those to the west would be Spanish (see Figure A1).

Importantly, the demarcation of the Tordesillas Line pre-dated the discovery of Brazil. The northern tip of South America was only sighted during Columbus third voyage in 1498-1500. The actual discovery of Brazil by Pedro Álvares Cabral occurred on April 22, 1500. Still, the preexisting Tordesillas Treaty dictated the borders of the New World and provided the foundation for the Portuguese colonization of South America (Seed, 1995). The actual implementation of the Treaty was not without controversy (Cintra, 2013; Herzog, 2015). Spanish and Portuguese representatives met later in Badajoz and Elvas in 1524 and signed in 1529 the Treaty of Zaragoza. This treaty confirmed the American boundaries and additionally demarcated the anti-meridian, defining the Spanish and Portuguese claims in Asia settling the claims for the Moluccas Islands.

In the 1530s, Spain and Portugal disagreed on the territory of the River Plate, in modern-day Argentina and Uruguay. From 1580 to 1640, Spain and Portugal were under the same kingdom, the Iberian Union, largely ignoring the Tordesillas Treaty. Immediately after, in 1641, Portuguese troops invaded the Spanish territory of Omaguas, in present-day Peru. An important flashpoint was the settlement of Colonia de Sacramento, in present-day Uruguay, on the River Plate delta, right in front of Buenos Aires. Disputes were later settled by the Lisbon

[5]The Tordesillas Treaty replaced the 1479 Alcáçovas Treaty between Spain and Portugal. Pope Julius II confirmed the Tordesillas Treaty in 1506.

Treaty of 1681. During the eighteenth century, disputes included territories that are currently located in Brazil, Paraguay, Uruguay, Argentina, Venezuela, Colombia, Ecuador, Peru and Bolivia. Again tensions were resolved with the The Treaty of Utrecht in 1715, in the context of the War of Spanish Succession. But it was not until the Treaty of Madrid in 1750, that the modern Brazilian boundaries were finally established. The treaty was annulled in 1761, integrated into the Treaty of Paris in 1763 and finally ratified by the San Idelfonso Treaty, in 1777. Still, for most of the Brazilian colonial era, the Tordesillas Treaty demarcated the Spanish and Portuguese boundaries in South America (Herzog, 2015).

2.2 Slavery in South America

Modern historical scholarship, using port to port data, estimates that between the fifteenth and the nineteenth centuries more than 12 million slaves were taken from Africa, of which 10.7 million disembarked in their destinations (Eltis and Richardson, 2010). 45.6% of that total number of slaves arrived to Brazil from 1501 to 1867 (Figure A2).[6] 21.5% of that grand total landed in southeast Brazil, 14.7%, in Bahia, 8.1%, in Recife and 1.3% Amazonia, as detailed later. By 1790, slaves in Brazil outnumbered US slaves by two to one and it is estimated that as many as 4 million slaves were imported to the country, four times the US total. Overall, Brazil was the destination for almost half of the African slaves who were shipped across the Atlantic.

Portugal had a comparative advantage in slave trading for historic reasons. Since the times of Henry the Navigator in the fifteenth century, Portuguese sailors had started exploring the African coast. In 1488, Bartolomeu Dias rounded the Cape of Good Hope and in 1498 Vasco da Gama reached India. The Portuguese established a seaborne empire reaching all the way to India and the Moluccas islands (Boxer, 1969). In Africa, as in India and Asia, they set up a series of factories or trading posts along the coast. Additionally, they set up plantation economies in Madeira, Sao Tomé, the Azores and Cape Verde Islands, which served as pilot projects for the eventual colonization of Brazil.

Slavery was one of the main pillars of the Portuguese colonial model established in Brazil after 1500. Slaves played an important role in agriculture and local societies, reflecting a key difference from previous systems. Several reasons led to the importing of African slaves into Brazil starting in 1570. One was the

[6]The Yale transatlantic project takes this date, after the US Civil War, though slavery in Brazil was abolished two decades later in 1888.

relative scarcity of Indian labor. Brazilian Indians were not used to agriculture or taxation, unlike the Amerindians located in Mexico or Peru. Second, Portuguese colonizers were eager to populate Brazil to avoid potential invasions from other European powers (such as the French, English and Dutch) increasingly interested in the Americas. As explained later, the funds to cover the import of African slaves would come mostly from increasing revenues of sugar exported to Europe.

In the Spanish case, transatlantic trade was mostly focused on Central America and the Caribbean (Figure A2).[7] The Spaniards transported 8,000 slaves to Rio de la Plata, while the majority of the slaves went to Cuba (600,000 out of 885,000). Slavery was further developed in the Spanish Americas at the beginning of the sixteenth century. In countries such as Mexico, Peru and Central America, African slaves were employed in mining activities. But already as early as 1600, the number of slaves arriving in Brazil surpassed the total number for Spanish America. Over time, the Brazilian slave plantation model became a reference for English, French and Dutch colonies. It is estimated that European and North American countries brought about 64,000 slaves in Rio de la Plata, representing 0.6% of the total slaves landed between 1501 and 1867. According to Eltis and Richardson (2010), 75% of the total disembarkations were documented. In the rest of South America, 0.3% of the slaves landed in French Guiana, 2.8% in Dutch Guiana and 0.7% British Guiana.

As noted before, Brazil was the last country in the Americas to end slavery in 1888. Haiti was the first country to abolish slavery in 1804, followed by Chile in 1823 and Mexico in 1829 (Bergad, 2007). These countries followed a similar processes starting with the end of the trading of slaves, followed by a free birth or free womb law for newborns, finishing with the final abolition of the slavery labor regime (see Table B1). On Brazilian emancipation, see Seyler and Silve (2021).

2.3 Slavery in Brazil

Brazil received subsequent waves of African slaves as early as the sixteenth century, closely following colonial economic booms (Bethell, 1987; Klein and Luna, 2009; Naritomi et al., 2012). The initial wave of slavery was channeled towards the production of sugar cane, and was mostly concentrated in the northeast of the country (Schwartz, 1974). By 1640, the number of slaves in Portuguese America was larger than in any other American colony. The Dutch also played an im-

[7]The New Laws of 1542 limited—at least in principle—the enslavement of indigenous people in the Spanish Empire.

portant role in the early development of Brazilian slavery with the invasion of Pernambuco from 1630 to 1651. The Dutch transported 28,000 slaves to Recife between 1630 and 1654. We examine the role of the Dutch slave trade in Brazil in Section 5.3

The discovery of gold and diamonds in the current state of Minas Gerais (general mines, in Portuguese) at the end of the seventeenth century started a new type of slave economy in Brazil. The number of slaves dramatically increased in the country. From 1716 to 1730, gold production was about 14,000 kilograms per year in Minas Gerais and the neighboring state of Goias. The gold period was followed by a precious stones export boom as Minas Gerais became the world's largest supplier of diamonds. By 1800, Brazil had one million African slaves, more than any other country in the world (Klein and Luna, 2009). The slave population growth resulted in an important native-born slave population by the end of the eighteenth century.

Another important economic product for slavery was cotton. In the North of Brazil, the General Trade Company of Grao-Para and Maranhao had a monopoly over cotton plantations in the region using slave workforce. The company exported raw cotton to England to produce textiles. By 1850, when England forcibly halted the maritime slave trade, internal slave trade grew substantially. The American Civil War (1861-1865) benefited Maranhao because the south of the United States was the largest producer of cotton at the time, and its exports to the UK came to a halt. At the end of the eighteenth century, the production of cotton in the Brazilian northeast started to decay and some plantations reverted into sugar.

The last major boom was the production of coffee in Rio de Janeiro and, eventually, Sao Paulo states. These regions had already been connected with the slave trade of the mining areas. By 1872, the area of Rio de Janeiro and the neighboring region in Sao Paulo (Vale do Paraiba) had mastered the techniques of mass coffee production. It was only around the 1880s that coffee expanded to the west of Sao Paulo and the southern region of Minas Gerais. Brazil soon became the largest coffee producer in the world. Coffee production relied on slave labor at this stage, albeit not exclusively (Mello, 1977).

To summarize, 53% slaves were located in the northeast of the country producing sugar as late as the 1820s, moving to 67% of slaves in the southeast producing coffee (S. Engerman, 2015). Table B2 shows the relative importance of the different colonial booms in relation to slavery.

3 Data

To study the long-term impact of slavery we combine historical records with modern economic outcomes, along with geographic and weather controls. Historical data comes from the Brazilian imperial Census of 1872 and is matched to modern-day Brazilian municipalities.[8] The census records the age, sex, civil status, religion and crucially the status (slave or free) of the respondent. We use the ratio of slaves over the total population as a variable to capture slavery intensity at the municipal level. We corroborate this information using the aggregate figures provided by Eltis and Richardson (2010).[9] We also use information from the 1890 and 1920 censuses, as well as from 1910 voting records.

Modern outcomes come from the Brazilian IBGE, IPEA data and DataSUS portals. Our main variables are income inequality and the income racial gap, defined here as the income of black over the income of white households. These measures are from the 2010 Census and are again at the municipality level. We also use *individual* level data from the 2010 census, to calculate our own Gini and Theil inequality measures and decompositions, by race. For robustness, we also use information from the 1980, 1991 and 2000 Censuses.

We use additional data from historic and modern times to test for alternative outcomes and mechanisms of transmission. These include modern measures of GDP per capita from 2012, information from the Municipal Profiles of 2014, data from the Latinobarometer survey of 2016 and institutional indicators from Naritomi et al. (2012). We also employ data from the SAEB test scores, from the Ministry of Education and the PERLA project of Telles, 2014. We also use a host of geographic and weather controls, at a highly disaggregated level, coming from Brazil's National Institute of Geology (INGEO) or calculated using ArcGIS. These include: rainfall, altitude, distance to the coast, distance to Portugal, latitude, longitude, sunlight, distance to the Equator and temperature. All variables and their sources are detailed in the Appendix.

3.1 Summary Statistics

We present the summary statistics, divided between Portuguese and Spanish Brazil in Table 1. For this division we use the meridian $48^o42'$ (48.7 degrees) west

[8] IBGE, 2011 provides the full history of the evolution of Brazilian municipalities, one important method of correspondence is the one proposed by Ehrl (2017) using *área mínima comparables* or minimum comparable areas.

[9] As well as information from the 1873 Fiscal Census and the 1890 Census.

for the Tordesillas line (Cintra, 2013). In total, our data contains the universe of Brazilian municipalities: 3,367 on the former Portuguese side and 2,136 on the former Spanish side. We can already see using this basic split that the number of slaves over the total population of Portuguese Brazil in 1872 was 14.7% in the Portuguese side and 10.6% in the Spanish side. The average number of black slaves by municipality in Portuguese Brazil was 2,628, and 1,184 in Spanish Brazil.

We can also see in Table 1 that the current income inequality –measured by the Gini Index– in Portuguese Brazil is 0.514 and 0.486 in Spanish Brazil. The latter also appears richer and has a slightly lower racial income gap (measured as average black income of black households over the average income of white households). We explore the relationship between these variables more systematically in the empirical analysis.

Figure 1, upper panel, shows the distribution of the municipalities around the Tordesillas line in 1872, in the left panel. At the time, 15.9% of the municipalities were located west of the Tordesillas and 84.1% to the east. The first city founded in Portuguese Brazil dates from 1534, while in Spanish Brazil it dates from 1635. Despite this general difference, there appears to be no differences in the figures between the number of municipalities at the two sides of the Tordesillas line in 1872 and 2010. We test this more formally using a McCrary test, where again we do not find evidence of sorting across the threshold (in Figure 1, lower panel). The same is true using the rddensity function (Cattaneo et al., 2020) instead.

4 Empirical Strategy

The fundamental challenge in conducting an empirical analysis of the long-term impact of slavery is the endogenous placement of slaves. Slaves were, for instance, sent to mines (Acemoglu et al., 2012) and employed in highly productive activities, such as cotton harvesting in the US South (Fogel and Engerman, 1974) and sugar production in the Brazilian northeast (Naritomi et al., 2012). Hence, without isolating the independent roles of these activities, one can naively conclude that slavery resulted in higher economic activity. To tackle this issue, we propose a novel identification strategy based on early colonial territorial boundaries. The idea is to combine the latest cartographical and historical research with standard econometric techniques. To isolate the impact of slavery from other confounders, we use a Regression Discontinuity Design (Imbens and Lemieux, 2008; Angrist and Pischke, 2008; Calonico et al., 2014 and Lee and Lemieux, 2010; Cattaneo

et al., 2015).

Historically, we will focus on what Tamar Herzog (2015) calls the *Frontiers of Possession* of the Spanish and Portuguese empires in the Americas. As can be seen in Figure 2, the Tordesillas Treaty Line of 1494 delimited the Spanish and Portuguese empires in the New World.[10] The territory to the right of the line was colonized by the Portuguese, who had a comparative advantage in slave trading, as described before. The key for identification is to exploit econometrically this colonial discontinuity between the Portuguese and Spanish empires, within modern-day Brazil, while holding geographic, weather and other local factors constant (or continuous, as we test later).

Another territorial difference emerges from the Dutch colonization of Brazil, as can be seen in Figure 3. Though shorter lived, this colonization wave played an important role in northeast Brazil, leaving an imprint on the modern-day state of Pernambuco (De Mello, 2010). We explore this additional source of heterogeneity employing a geographic RDD (as in Dell, 2010), to get at the potential confounding effect of colonizer identity.

4.1 Estimation Framework

For our main specification, we use an RDD along the Tordesillas line. The geodesic distance to the Tordesillas line functions as an assignment variable to measure the long-term impact of slavery. We can also relax the linearity assumption and include polynomial functions in the regression model. A polynomial model generates global estimates of the regression function over all values of the assignment variable. It can be a disadvantage because the RD design depends on local estimates of the regression function at the cutoff point (Lee and Lemieux, 2010; Angrist and Pischke, 2008). Gelman and Imbens (2014), for instance, argue that estimators for causal effects based on high-order (third, fourth or higher) polynomials of the assignment variable can be misleading. The authors recommend using estimators based upon local linear and quadratic polynomials, which we follow.

In its simplest form, our regression equation has the form:

$$Y_i = \alpha + D_i\tau + X_i\beta + \varepsilon \tag{1}$$

where Y_i is the outcome variable of interest for a municipality i, D_i is the side

[10] Figure A3 shows the map at the AMC level.

on which the municipality is located with respect to the Tordesillas line (D_i=1 when the municipality is east of the Tordesillas line and D_i=0 if it is located west of this meridian), τ is the coefficient of interest and X_i is a vector of covariates. We only follow this simple formulation when presenting the summary statistics. In our regressions, we reinterpret D_i as a distance variable from the centroid of a municipality to the Tordesillas line. In our convention a distance to the east is positive and to the west, negative. In our estimations, we also use standard errors clustered at state or municipal (AMC) level and state fixed-effects.

For our empirical estimations, we also apply the methodological framework developed by Cattaneo et al. (2015), which analyzes RD designs as local randomized experiments, employing a randomization inference setup. This method assumes exact finite-sample inference procedures, given that there might be few observations available close to the threshold where local randomization is more probable. This is a two-step procedure: first, we choose the window around the cutoff where the treatment is assumed to be as good as randomly assigned; and second, we apply the conventional randomization inference tools.

We implement the Donut RD approach used by Barreca et al. (2011). This method appears germane to our context given the uncertainty of the Tordesillas Treaty line. The Donut RD estimates equation 1 dropping observations right at the cutoff. Barreca et al. (2011) argue that Donut RD results in unbiased estimates of the treatment effect on continuous data. The conventional RD design for heaped data can be unbiased, although it tends to reduce the bandwidth. In our baseline specification, we drop observations one degree from each side of the cutoff. For robustness, we also present specifications with smaller and no bands.

5 Results

5.1 OLS: Benchmarking

Before presenting the RDD results, we estimate OLS and state fixed effects for the full dataset to capture broader correlations (Table B3). While the results are not econometrically identified, they provide a quantitative benchmark for the later empirically analyses. The sample is restricted to the 73 to 1,000 kilometers used later. The results show a correlation between slavery—measured by the ratio of the number of slaves in 1872 over the total population—with income inequality. We find that a 1% increase in the number of slaves by municipality in 1872

increases the Gini Index—our measure of income inequality—by around 0.03, in the first column. This estimate is reduced by half and is no longer significant with state fixed effects, geographic controls and errors clustered at the AMC level.[11] Slavery also appears significantly correlated with income gap between black and white people. For each 1% increase in the number of black slaves, the average income of a black household in relation to a white household declines by around 30%, across the different specifications. Still, these results are suggestive and can be confounded by the endogeneity of slavery, omitted variables or measurement error. To address these empirical challenges we proceed the analysis with the proposed Regression Discontinuity identification strategy.

5.2 Regression Discontinuity Design

As discussed before, in the historical and estimation framework sections, we perform a donut RD for our baseline estimates (Barreca et al., 2011). As the parameter for the interval around the Tordesillas line, we use the measure of 1^o, approximately 73 km at the Equator. This is similar to what Michalopoulos and Papaioannou (2013) term "thick borders" in their historical setting or the "Donut Hole" approach of Lowes and Montero (2021). The estimation of the local linear regressions follows the bias-corrected inference procedure, which is robust to "large" bandwidth choices (Calonico et al., 2014). We present local polynomial estimates and other specifications, for robustness.

We start the analysis by empirically testing whether slavery presents any discontinuity at the threshold. Figure 4, left panel, shows the RD plots for the number of black slaves over the total population in 1872 using binned local averages. The first graph suggests that there were indeed more slaves in the Portuguese relatively to the Spanish side, consistent with the historical narrative. We further scrutinize this discontinuity using additional information from the historical census. Figure A4 shows that there is no discontinuity for the number of free people in 1872, while there is for the number of black slaves, suggesting no general demographic differences. The share of free population is discontinuously *lower* at the east of the Tordesillas line. There are also no discontinuities in the sex ratios or the share married (Figure A5).

We proceed the empirical analysis of the Engerman and Sokoloff hypothesis looking at potential discontinuities in inequality. The main empirical result can be

[11] The geographic variables used are longitude, latitude, rain, distance to the coast, altitude, distance to the federal capital, sunlight, average monthly temperature and types of soils.

observed in Figure 4, right panel. Here we test whether there is a corresponding discontinuity in the Gini Index in 2010, at the same Tordesillas threshold. We find this to be the case indeed: inequality appears significantly higher at the East of the line, relative to the West. This corresponds with the patterns observed before of higher slavery at the former Portuguese side of the border.

We further investigate the differences in inequality by focusing on the income racial gap, i.e. the ratio of black over white incomes. Results from this exercise can be seen in Figure 6. We observe there a significant decline in the income racial gap on the eastern side of the Tordesillas line. This means that blacks earn *less* relative to whites in the former Portuguese side of the border—where slavery was higher historically—which helps explain the broader increase in inequality.

As is standard in these types of exercises, we also show that a large number of covariates are smooth or continuous. The results of these empirical tests are reported in Figure 5. Geographical and weather characteristics such as rainfall, altitude, and sunlight appear smooth at the border. A series of distances such as to the coast, to the Equator and to Portugal also appear continuous. The year of foundation of municipalities is also continuous at the cutoff. These results are consistent with those presented before on the distribution of municipalities, in Figure 1.

Table 2 presents our baseline specifications, for slavery and income inequality. We present different bandwidths, at 500, 1,000 and 200 kilometers, as well as different donuts at one degree and half a degree.[12] The first panel contains the RD estimates for the first order polynomial. We see, in the first column, that the coefficient for slavery is positive, highly significant and in the order of 5%. This is a large gap, when the mean of the dependent variable is in the order of 10 to 15%. This is consistent with the figures reported as well as the earlier summary statistics. The magnitude becomes larger, in the second column, when we look at places as far away as 1,000 from the Tordesillas line.[13] It returns back to the smaller level in the third column, with the smaller donut, and goes up again in the smaller window of up to 200 kilometers. In the last column we pick the optimal bandwidth, where again the estimates are in the order of 5%.

The second panel presents estimates for the RD of second order. We reach find very similar estimates as above. Now the magnitude of the coefficients oscillates

[12]In the context of RD, we are interested in the variation around the cutoff. Therefore, we believe that there is no substantial reason to evaluate the influence of the Tordesillas line more than 1,000 km away from the line.

[13]We present additional results for even more different bandwidths in the Robustness Section.

closer to the 5% number. The estimate is insignificant, but of the same sign and magnitude in the fourth column, and larger, positive and highly significant in the last one. The third panel presents the estimates using the local randomization method from Cattaneo et al. (2015).[14] The results are again consistent, and now slightly higher, in the order of 7 to 8% in the first three columns, and slightly lower in the last two. The last specification uses the entire sample. In sum, regardless of the estimation method, the bandwidth or the size of the donut, we find a statistically significant jump in the number of slaves in 1872 at the threshold, consistent with he baseline figures.

The right panel of Table 2 presents the estimates for income inequality, using the Gini Index for 2010.[15] The structure is the same as the one for slavery. In the first panel, we find results in the order of 0.04 Gini points. This positive and significant effect is also economically significant, with a mean dependent variable of less than 0.5, so in the order of 8%. The estimate is fairly stable across specifications, becoming larger in the smaller window, reaching almost 0.1. The second panel reaches similar conclusions as previous, with the second order instead of the first order polynomial estimate.[16] They are in the order of 0.04 Gini points in the first columns and 0.1 in the last two. The local randomization estimates, in the third panel, give consistently smaller estimates of close to 0.04. Again, the different estimation methods show a significant and sizable discontinuity in modern day income inequality.

We present in the Appendix several additional tables, for robustness. Table B4 presents the slavery results clustering at the AMC level, which is larger than the municipality. Results are essentially unchanged. Table B5 reproduces the main table, showing both variables, using state level fixed effects. The results again appear very similar, both for slavery in 1872 and for income inequality in modern times. Table B6 combines both exercises, presenting estimates clustering at the AMC level and using state fixed effects. The results are largely unchanged.

5.2.1 Income Racial Gap

Our analysis shows that slavery not only causes income inequality between rich and poor but also between white and black households, more specifically. We present the RD estimates in Table 4 and Figure 6, showing that on average black

[14] In particular, we use here the rdlocand package.

[15] Figure A7, panel a, illustrates this outcome.

[16] Following Gelman and Imbens, 2014 we do not use higher order polynomials, but report non-parametric localized estimates instead.

households have lower income than white households as a result of slavery.[17] The result appears both significant and sizable in the figure. To get a better sense of magnitudes, we report the results of the estimation in in Table 4. The first column, with linear estimates shows a reduction in 0.07 of the gap, slightly more than 10% considering that the mean of the gap is 0.67. The estimate is even larger in the second order formulation, in Panel B. The message is largely the same for the other formulations, where the magnitude remains closer to 8%, with some exceptions.[18] We present a similar figure for pardos, in Figure A6, instead of blacks in the appendix, showing a similar discontinuity.[19] Table B7 presents the corresponding empirical estimates.

5.2.2 Decompositions

We provide further income inequality decompositions using data at the *individual* level. While the DataSUS, based on IBGE's census, provides aggregate Gini measures and income by race at the municipal level, it does not compute other relevant statistics such as Gini and Theil indexes by race. To supplement the analysis we compute these statistics at the municipality level. When we restrict the sample to white respondents, we see a significant discontinuity in Figure 7, upper right panel. The same is true for the Gini of blacks, in Figure 7, upper left panel. We conduct another decomposition using the Theil index. First we see a significant discontinuity with this alternative income index in figure c, and then we present the decompositions in panels d and e. Table 3 contains the results for the Theil index as a whole, revealing a positive impact across the board. We observe a discontinuity in the between race (black and white) component in the left panel as well as the within race component in the right one. Tables B8 and B9 present the empirical estimates, for the between and within components, respectively. The results point towards broader differences in economic structure, that transcend purely racial lines.[20] We look at inequality over time in the robustness section.

[17] Figure A7, panel b, illustrates this point.

[18] We report modern population shares by race in Figure A10. These do not appear discontinuous at the border for Asians, whites, indigenous, pardo or black populations. Hence, we do not find substantial differences in household composition, as in Bertocchi and Dimico, 2020.

[19] Income racial gap is also discontinuous for non-whites, when blacks and pardos are taken together, in the right panel.

[20] This is something that we are able to observe using the 1920 census. For that time period we observe a larger share of manufacturing in the Portuguese side of the border, in the right panel of Figure A9 as well as a lower share of agriculture, in the right panel.

5.2.3 Income

An important follow up question is whether the results that we observe for inequality also translate into income and GDP. According to the Engerman and Sokoloff hypothesis, areas with more inequality should also be more underdeveloped ones in terms of income.[21] We do *not* find this to be the case at discontinuity provided by the Tordesillas line, as can be see in Figure 8. If anything, income is slightly higher on the Portuguese side, but the estimates are not significant. The same is true for GDP per capita in panel b. These insignificant results are confirmed when using instead the Human Development index in Figure A8. The analysis confirms that the empirical results are working through the second, instead of the first moment of the income distribution, especially along racial lines. Our findings are in line with other analyses of the Engerman and Sokoloff hypothesis, such as Nunn (2008b) which does not find either that the relationship between slavery and development is working through inequality. We know from Kuznets (2019) that the relationship between inequality and income varies significantly during the different stages of development of a country.

5.3 Dutch Brazil and Colonizer Identity

One important confounder of the slavery effect could be colonizer identity. A large literature in economics has explored this issue since the seminal papers of La Porta et al. (1997, 1998).[22] In the case of Brazil, Portuguese and Spanish conquerors might have differed not only in the intensity of their slave regimes, but also in other factors such as language and culture. To test the possible role of colonizer identity, we use the Dutch colonization of Brazil as a historical experiment. The Dutch presumably were more different culturally from the Portuguese than the Spanish, yet they were important players in the commerce of slaves, bringing a large quantity of them into Brazil. A good illustration of this fact can be seen in Figure A11 which plots the number of slaves over total population at the municipal level, comparing Portuguese and Dutch Brazil. We can see how the distribution overlaps, showing a high number of slaves in both cases.

[21] We note that inequality itself could be a measure of underdevelopment.

[22] For a summary of this literature see La Porta et al. (2008) and Easterly and Levine (2016) for a recent application.

5.3.1 History

The Dutch sent their first fleet to Brazil as early as 1599 (De Mello, 2010). In 1604 and again in 1624 they attacked the city of Salvador, the capital of colonial Brazil until 1763, under the auspices of the recently founded Dutch West India Company (WIC). Dutch merchants were interested in the commerce of Brazil wood and sugarcane. They were also important players in the slave trade, moving a total of more than half a million people from 1501 to 1866, mostly to the Caribbean and the Guianas (Van Welie, 2008). Dutch Brazil or New Holland, was established officially in 1630 in the former captaincy of Pernambuco, one of the most important areas for sugar production in the world. The Dutch West India Company, set up its headquarters in the Brazilian city of Recife. The Dutch expanded their area of influence to the states of Ceará and Maranhao, and the Sao Francisco River. Dutch Brazil flourished during the governorship of Johan Maurits van Nassau, who founded several sugar mills and other infrastructure projects (Schwarcz, 2015). To set this industry in motion, the Dutch brought approximately 28,000 African slaves to Brazil. The number of slaves over the total population in Dutch Brazil was as high as 20 to 30% percent. Portuguese planters, who remained uneasy with Dutch rule, rebelled and finally captured Salvador in 1654. In the Treaty of The Hague (1661) the Dutch recognized the Portuguese imperial sovereignty over New Holland, officially putting an end to Dutch Brazil. Despite their relatively short presence, the Dutch deeply shaped ethos of northeast Brazil.[23]

5.3.2 Geographic Regression Discontinuity

For our analysis, we digitized the map from Hettema Jr. (1920) book on Dutch Brazil. As can be seen in Figure 3, municipalities that were colonized by the Dutch all lie to the right of the Tordesillas line and are then surrounded by those originally colonized by the Portuguese. The territory is large, covering today 1,135 municipalities from nine states. For our Regression Discontinuity analysis, we compared the Dutch Brazil area with the area up to 600 Km away from the Dutch Brazil's border.

To test our hypothesis empirically we conduct a geographic Regression Discontinuity. As can be seen in Figure 9, first we do not find a significant discontinuity in slavery between the former Dutch and the former Portuguese territories. Car-

[23]The Appendix presents a fuller description of the Dutch colonization of Brazil. Table B10 presents summary statistics for Dutch Brazil and its closer neighbors.

rying forward with the analysis, we do not find a corresponding jump in income inequality or the income racial gap (Figure 9, parts b and c).[24] Overall, the results for Dutch Brazil are suggestive that what mattered for subsequent distributions of income was slavery, more than colonizer identity per se. Since the Dutch had very similar slave regimes than the Portuguese, it is not surprising to find similar levels of inequality in the long run. However, this leaves out the larger question of why do we observe the baseline empirical results we do. For this we turn to the key mechanisms of transmission.

6 Channels of Persistence

Our empirical results show a relationship between the institution of slavery in the colonial period and current income inequality in Brazil. In this section, we explore the main channels through which the persistence in inequality may have been be enacted. Slaves were—by definition—a population with no wages, but also no assets and essentially no education.[25] We follow the recent theoretical literature and focus on education as a key driver of inter-generational mobility (Becker et al., 2018). Similarly, we present results for the labor market and on racial prejudice, using data from the PERLA project (Telles, 2014). We also follow the historical literature, which has postulated the importance of land inequality, extension of the franchise and institutional capacity (S. L. Engerman and Sokoloff, 2002; S. Engerman and Sokoloff, 1997), as well as the centrality of cultural mechanisms (Nunn and Wantchekon, 2011).

6.1 Education

Education constitutes one of our main mechanisms of transmission. On net, we observe that illiteracy rates of the modern-day black population are much higher, but not discontinuously so, in Figure 10.[26] The results are more apparent in the 1872 census, in Figure 10, lower panel, for free over slave literacy rates.[27] We

[24]Tables Table B11 and B12 confirm these inconclusive results.

[25]The average literacy rate for slaves in 1872 was 0.09%.

[26]Figure A7, panel c, illustrates this outcome. This result is also present for the 2000 and 1991 censuses, in Figure A12. We do not observe this to be the case for the white population or for the Brazilian population as a whole, not shown.

[27]Figure A15 shows the total for 1872 as well as the difference instead of the ratio of literacy for free and enslaved populations. Results at the aggregate level are consistent with those using the 1920 Census, where aggregate literacy does not show any discontinuity, not shown. This census did not ask about race. The 1890 census did not ask about literacy.

expand on the main education result to see whether the effect is working at the extensive or the intensive margin. We find first, at the extensive margin, that more black children are out of school at the right of the cutoff, in a discontinuous manner, in 10, part b.

To evaluate performance at the intensive margin, for children, we look at data from the 2011 SAEB national exams which are performed in 5th an 9th grades. We observe no significant discontinuities in performance in Portuguese and mathematics, for students in either grade (Figure A13). The SAEB also reports information about the educational level of the parents. We look at this inter-generational level measure and find no discontinuity for mother's education, but slightly lower levels of education for black fathers (Figure A14). As a result, parents education is also discontinuous for parents as a whole.[28] Overall, the inequalities in education seem to be more present in the the older generations.

6.2 Labor Markets

A full labor market analysis is beyond the scope of this paper, but we speak to the recent literature on this topic (Derenoncourt et al., 2021; Gerard et al., 2021). In our setting, we perform a similar RDD analysis for labor markets and reach similar results to those for education. First, we find that unemployment (people actively looking for a job) of blacks is marginally higher at the right of the cutoff, in Figure 11. At the intensive margin, hours worked also appears discontinuously lower at the right side, in panel b. Most notably, we find important differences in the hourly wage gap, in panel c, for the working age population. As the recent literature on this topic has noted, there might also be racial differences with respect to firm wage setting, informality and minimum wage policies.[29] There is still the question whether and why blacks and white are earning differently in the labor market, for which we turn to prejudice and discrimination as a potential answer.

6.3 Racial Prejudice

To assess whether prejudice might be a driving force in racial inequality, especially in labor markets, We use the first survey in Brazil of the Project on Ethinicity

[28] Additionally, we find no gaps in the probability of a father being part of the household, by race, not reported.

[29] We do not observe significant discontinuities by race in the informal sector, not reported. The minimum wage is set at the federal level.

and Race in Latin America (PERLA) project by Telles (2014). In this nationally representative survey, skin tones go from 1 which is lighter to 11 which is darkest[30]. We create an index based on six questions related to prejudice against blacks in the labor market.[31] The higher the composite values, the higher the prejudice against black people.

We also use the second PERLA project's survey on Brazil to analyze the relationship of skin color on income and education. First, we document a very strong negative gradient between skin color and income in Figure 12, upper left panel. The result is equally striking for education in the upper right panel. Both results survive the inclusion of ethnicity fixed effects.[32] We note that these results do not necessarily reflect discrimination. Lower earnings could be in part, generated by lower education and lower labor force participation, as examined before. We also perform a Oaxaca-Blinder type decomposition, following Woo-Mora, 2021. We find a larger coefficient for color on income on the former Portuguese side of the border, relative to the former Spanish side in Table 5.[33] In the fully controlled specification, the effect on the Portuguese side is negative and significant, in the order of 8%, while in the Spanish side it ceases to be significant. With the usual caveats of such compositions, which depend on the observables included, there seems to be evidence for more discrimination at the right of the cutoff. With respect to the prejudice index itself, the results shown in Figure 12, part c, suggest marginally (at the 10% confidence level) more prejudice against blacks in the labor market on the right-hand side of the cutoff.

Since the results in this section are from surveys, we also present additional evidence from the whole of Brazil, based on a municipality-level census data[34]. We find discontinuously more racial equality councils at the right of the threshold, in Figure A16, suggesting that racism is an active issue. These bodies were established between 1983 and 2014 (last data available), while the majority of

[30]The sample has over six thousand observations across the country.

[31]Using a Likert scale that varies from 1 to 5, the statements are i. Blacks are poor because they do not work enough; ii. Blacks are poor because, in general, they are less intelligent; iii. Blacks are poor because they have been maltreated; iv. Blacks are poor because they do not want to change their culture; v. Blacks are poor because they have low education; vi. Blacks are poor because the schools are inadequate and inefficient. We reversed the order of the answers from questions iii and vi for consistency. The survey has one thousand observations. We thank Guillermo Woo Mora for kindly sharing the data for Brazil of his paper (Woo-Mora, 2021).

[32]These are, for Brazil: white, black, mulatto, indigenous and Asian.

[33]We report his Spatial First Differences (SFD) method as well in Table B14. We can also replicate his results for income and educational inequality using the MLD index, though the small number of observations make some results insignificant.

[34]IBGE, Municipal Profile ('Perfil Municipal'), 2014.

them dated from 2000. The increase of legislation and administrative bodies to combat racism in the 2000s is more pronounced were there were more slaves in the past. We recognize the endogeneity of the relationship but it suggests a recent reaction of local governments to fight racial equality.

6.4 Other Mechanisms

Having covered what we think are the main mechanisms of transmission of the income inequality effect, we examine other important channels that have been suggested in the literature. We start with land inequality, following S. Engerman and Sokoloff (2002, 1997). As mentioned before, slaves were a population with no income, but also no assets. We do *not* find significant discontinuities in land inequality in modern times, in Figure A17, left panel. Though the data is more sparse, we also do not find any discontinuities in the number or size of farms historically, using the 1920 census in the right panel. These results are interesting, perhaps suggesting that the inequalities observed are not going through the asset side. Another interpretation is that the results observed are not due to historical land tenure patterns, but more about owning more or less slaves in a relatively similar land tenure regime.

We also look at voting, as extension of the franchise has been suggested as a mechanism in the historical literature. We start with the caveat that most of these decisions are taken at the federal level, but we still try to see potential *de facto* variations at the sub-national level within the same *de jure* legal framework. We do not find any discontinuities in modern voting, measured as turnout in the 2010 elections, in Figure A18, left panel. The same is true for historical elections using 1910 data, right panel. Unfortunately, there is no information about turnout by race we could exploit for this channel of transmission.

Public policies can contribute to the persistence of inequality by either not delivering public services or not managing them well. Hence, we look at other potential institutional mechanisms of transmission of the main effect, beyond voting. To this end we use data from Naritomi et al. (2012).[35] We do not find major discontinuities in access to justice or managerial capacity at the border (Figure A19). If anything, these appear slightly higher on the former Portuguese side. The judiciary has been suggested as channel of persistence in racial inequality in the US context.[36] To examine this potential mechanism we use data

[35]We thank Joana Naritomi for sharing and helping us navigate their data.

[36]See the discussion in Acharya et al., 2018 on the Jim Crow era and redlining in Aaronson

from Ponticelli and Alencar (2016) on judicial backlogs, but find no evidence of discontinuities at the border (Figure A19, part c).[37]

Following Nunn and Wantchekon (2011) we look at trust as a potential mechanism of transmission. Here we use Latinobarometer data, which does not cover the universe of Brazilian municipalities. Still, we find some slight discontinuities with respect to generalized trust in Figure A20. The same pattern emerges for trust in different institutions such as the police, the government, and especially the judiciary, which was analyzed before. We find more muted results in Brazil than in Africa, suggesting that the mistrust channel is stronger at the the sending rather than the receiving end of the spectrum. It is conceptually very clear how the threat of enslavement eroded trust in certain areas within Africa. It is less obvious why the historically enslaved population might generate lower levels of trust at the receiving end. On the cultural dimension, we do find more respondents practicing Candomblé on the former Portuguese side of the border, in Figure A21, though the numbers are small. We interpret the prevalence of this traditional religion of African roots as a tangible cultural marker.[38]

7 Robustness

This section presents robustness exercises of the main empirical results. Figure A22 shows the relative number of slaves in 1872 at different donut thresholds. We argued for one degree at each side of the border in the paper, given the historical uncertainty about the Tordesillas line. However, the results for slavery are robust to using half a degree on each side, in figure a, a quarter of a degree, in figure b, or no donut at all, in figure c. We also conduct a similar exercise, for the different donut thresholds, including our baseline, collapsing to the original 1872 AMC municipalities in figure A23. Though there naturally fewer number of observations, the discontinuity is still apparent. We also employ alternative data on slavery from the 1873 fiscal census.[39] This data has many missing observations, and covers a subset of the municipalities covered in the 1872 census. Still, it presents a very high correlation with our baseline measure in Figure A24. This alternative measure of slavery is also discontinuous at the cutoff, in the right

et al., 2021.

[37]We thank Jacopo Ponticelli for sharing his data. The same is true for his other measures of bank branches and manufacturing value added.

[38]This is consistent with Lambais (2020).

[39]We thank Thomas Fujiwara for pointing us to this alternative source.

panel.[40]

With regards to the uncertainty of the Tordesillas line itself, we have used the consensus meridian by historians and geographers. However, we also present additional results for a further east meridian at $45^o17'$ west calculated by the cartographer Oviedo. Table B13 shows the RD estimates of two outcome variables (slavery and income inequality) using the distance to Oviedo's meridian as the assignment variable. We replicate the methodologies used before. The main results are consistent, for slavery and income inequality, in terms of sign and significance, though they are now smaller. We also employ a more data driven approach, by looking at *all* potential cutoffs in (Figure A27). We observe there that the consensus Tordesillas line employed in the paper is essentially at the global maximum of the effect for inequality.

We also look at inequality over time, using data from other censuses. The 2000 and 1991 census are the most comparable with the 2010 census we employ, not only in terms of time, but also quality. We present these additional estimates in Figure A26. We also observe a significant discontinuity in those years in the upper panels. We are less confident about the quality of the 1980 and especially the 1970 census, which was run during the middle of the dictatorship, and for instance did not include any information about race. Still, we present the estimates in the lower panels, where, if anything, the discontinuities in inequality are even higher.[41] We note that, inequality declined during the 2000s in Latin America, including in Brazil (Lustig et al., 2013). We perform a similar exercise with the income racial gap, though we are limited to starting in 1980, because of the reasons just described. We see in Figure A28 that this measure (the ratio of average income of blacks over whites) is lower a the right of the discontinuity, as in the baseline results. Figures A29 and A30 present the coefficient plots for both measures. Overall, we show robustness for the historical measures of slavery, different estimation strategies and modern inequality measures.

[40] Slavery was abolished with the *Ley Áurea* on the 13th of May of 1888. Hence the 1890 census does not report any slavery measures, but only the race of the respondent. Using this information, we find a higher share of blacks in 1890 at the right of the cutoff in Figure A25. We also find a high correlation with slavery in 1872. We note, however, that not all blacks in 1890 were necessarily slaves in 1872.

[41] A similar pattern can be observed using the Theil index instead, not reported.

8 Conclusions

This paper exploits discontinuities of the Tordesillas line pre-dating the discovery of Brazil to show the impact of colonial slavery on modern-day inequality. Previous research had shown a correlation between slavery and modern levels of inequality at the national and sub-national levels. But to the best of our knowledge, a rigorous empirical test of the Engerman and Sokoloff hypothesis was lacking. And so was a serious scrutiny of the role of slavery for Brazilian underdevelopment, to improve our understanding of this institution on the receiving end of the spectrum, along with the intervening mechanisms of transmission.

We use a Regression Discontinuity Design, where the assignment variable is the municipalities' distance to the Tordesillas line. With technique, we demonstrate that the number of black slaves over the total population in 1872 was larger on the Portuguese side of the Tordesillas line compared with the Spanish side. Applying a Donut RD design, we find that the treatment effect on income inequality is in the order of 10% of of Brazilian inequality. We decompose the main income inequality effect in several dimensions. We use individual level data, to calculate Gini and Theil indexes by race. We thus zoom into income racial gap between blacks and whites as the main driver of the broader inequality measures. This income racial gap also appears discontinuous at the border.

We also expand on the intervening mechanisms of transmission of the main effect. These are education, employment and prejudice, where again we find important differences by race. Black Brazilians have lower literacy rates, worse employment outcomes and face more racial prejudice, and these measures are discontinuously higher at the cutoff. We also explore other mechanisms that have been suggested by the historical literature, such as land inequality, voting, institutional and judicial capacity, and trust. These measures appear less relevant in this particular context.

As the issue of income inequality gains increased attention in the academic and popular literature, our findings can help expand our knowledge on its historical causes. A better understanding of these deep-rooted determinants could be important for academics as well as policymakers who want to design policies that promote equality of opportunities for all.

References

Aaronson, D., Hartley, D., & Mazumder, B. (2021). The effects of the 1930s holc" redlining" maps. *American Economic Journal: Economic Policy*, *13*(4), 355–92.

Acemoglu, D., Garcıa-Jimeno, C., & Robinson, J. A. (2012). Finding eldorado: Slavery and long-run development in colombia. *Journal of Comparative Economics*, *40*(4), 534–564.

Acharya, A., Blackwell, M., & Sen, M. (2016). The political legacy of american slavery. *The Journal of Politics*, *78*(3), 621–641.

Acharya, A., Blackwell, M., & Sen, M. (2018). *Deep roots*. Princeton University Press.

Andrews, G. R. (2004). *Afro-latin america, 1800-2000*. Oxford University Press.

Angrist, J. D., & Pischke, J. (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton university press.

Arretche, M. (2018). *Paths of inequality in brazil: A half-century of changes*. Springer.

Barreca, A. I., Guldi, M., Lindo, J. M., & Waddell, G. R. (2011). Saving babies? revisiting the effect of very low birth weight classification. *The Quarterly Journal of Economics*, *126*(4), 2117–2123.

Becker, G. S., Kominers, S. D., Murphy, K. M., & Spenkuch, J. L. (2018). A theory of intergenerational mobility. *Journal of Political Economy*, *126*(S1), S7–S25.

Bergad, L. (2007). *The comparative histories of slavery in brazil, cuba, and the united states*. Cambridge University Press.

Bertocchi, G., & Dimico, A. (2014). Slavery, education, and inequality. *European Economic Review*, *70*, 197–209.

Bertocchi, G., & Dimico, A. (2019). The long-term determinants of female hiv infection in africa: The slave trade, polygyny, and sexual behavior. *Journal of Development Economics*, *140*, 90–105.

Bertocchi, G., & Dimico, A. (2020). Bitter sugar: Slavery and the black family.

Bethell, L. (1987). *Colonial brazil*. Cambridge University Press.

Bisin, A., & Federico, G. (2021). *The handbook of historical economics*. Academic Press.

Botelho, F., Madeira, R. A., & Rangel, M. A. (2015). Racial discrimination in grading: Evidence from brazil. *American Economic Journal: Applied Economics*, *7*(4), 37–52.

Bourguignon, F., Ferreira, F. H., & Menéndez, M. (2007). Inequality of opportunity in brazil. *Review of income and Wealth*, *53*(4), 585–618.

Boxer, C. R. (1969). *Four centuries of portuguese expansion, 1415-1825: A succinct survey* (Vol. 3). Univ of California Press.

Buonanno, P., & Vargas, J. F. (2019). Inequality, crime, and the long run legacy of slavery. *Journal of Economic Behavior & Organization*, *159*, 539–552.

Calonico, S., Cattaneo, M. D., & Titiunik, R. (2014). Robust data-driven inference in the regression-discontinuity design. *Stata Journal*, *14*(4), 909–946.

Cattaneo, M. D., Frandsen, B. R., & Titiunik, R. (2015). Randomization inference in the regression discontinuity design: An application to party advantages in the us senate. *Journal of Causal Inference*, *3*(1), 1–24.

Cattaneo, M. D., Jansson, M., & Ma, X. (2020). Simple local polynomial density estimators. *Journal of the American Statistical Association*, *115*(531), 1449–1455.

Cintra, J. P. (2013). Reconstruindo o mapa das capitanias hereditárias. *Anais do Museu Paulista: História e Cultura Material*, *21*(2), 11–45.

Cintra, J. P. Et al. (2012). O mapa das cortes e as fronteiras do brasil. *Boletim de Ciências Geodésicas*, *18*(3), 421–445.

Coatsworth, J. H., & Taylor, A. M. (1998). *Latin america and the world economy since 1800*. Harvard University Press Cambridge, MA.

De Mello, E. C. (2010). *O brasil holandês: 1630-1654*. Companhia Das Letras.

Dell, M. (2010). The persistent effects of peru's mining mita. *Econometrica*, *78*(6), 1863–1903.

Derenoncourt, E. (2018). 20. the historical origins of global inequality, In *After piketty*. Harvard University Press.

Derenoncourt, E., Gérard, F., Lagos, L., & Montialoux, C. (2021). Racial inequality, minimum wage spillovers, and the informal sector. May.

Easterly, W., & Levine, R. (2016). The european origins of economic development. *Journal of Economic Growth*, *21*(3), 225–257.

Edlund, L., & Ku, H. (2011). The african slave trade and the curious case of general polygyny.

Ehrl, P. (2017). Minimum comparable areas for the period 1872-2010: An aggregation of brazilian municipalities. *Estudos Econômicos (São Paulo)*, *47*, 215–229.

Eltis, D., & Richardson, D. (2010). *The trans-atlantic slave trade database voyages:introductory maps*. Emory University: Digital Library Research Initiative.

Engerman, S. (2015). 40 years of slavery studies. *História Econômica & História de Empresas*, *18*(1).

Engerman, S. L., & Sokoloff, K. L. (2002). *Factor endowments, inequality, and paths of development among new world economics* (tech. rep.). National Bureau of Economic Research.

Engerman, S., & Sokoloff, K. (1997). Factor endowments, institutions and differential paths of growth among the new world economies," in stephen haber, ed., how latin america fell behind, stanford: Stanford university press. stanford: Stanford university press.

Fenske, J., & Kala, N. (2015). Climate and the slave trade. *Journal of Development Economics*, *112*, 19–32.

Fenske, J., & Kala, N. (2017). 1807: Economic shocks, conflict and the slave trade. *Journal of Development Economics*, *126*, 66–76.

Ferreira, F. H., Leite, P. G., & Litchfield, J. A. (2008). The rise and fall of brazilian inequality: 1981–2004. *Macroeconomic Dynamics*, *12*(S2), 199–230.

Fogel, R. W., & Engerman, S. L. (1974). Time on the cross: The economics of american negro slavery.

Gelman, A., & Imbens, G. (2014). *Why high-order polynomials should not be used in regression discontinuity designs* (tech. rep.). National Bureau of Economic Research.

Gerard, F., Lagos, L., Severnini, E., & Card, D. (2021). Assortative matching or exclusionary hiring? the impact of employment and pay policies on racial wage differences in brazil. *American Economic Review*, *111*(10), 3418–57.

Gethin, A. (2018). Cleavage structures and distributive politics.

Gouda, M., & Rigterink, A. S. (2013). The long-term effect of slavery on violent crime: Evidence from us counties. *Available at SSRN 2358389*.

Heblich, S., Redding, S., & Voth, J. (2021). Slavery and the british industrial revolution. *Manuscript, Princeton University and University of Bonn*.

Herzog, T. (2015). *Frontiers of possession: Spain and portugal in europe and the americas*. Harvard University Press.

Hettema Jr., H. ((1920). Dutch brazil 1630-1654.

Hirata, G., & Soares, R. R. (2020). Competition and the racial wage gap: Evidence from brazil. *Journal of Development Economics*, *146*, 102519.

IBGE. (2011). Evolução da divisão territorial do brasil 1872-2010. IBGE Rio de Janeiro.

Imbens, G. W., & Lemieux, T. (2008). Regression discontinuity designs: A guide to practice. *Journal of econometrics*, *142*(2), 615–635.

Klein, H. S., & Luna, F. V. (2009). *Slavery in brazil*. Cambridge University Press.

Kuznets, S. (2019). *Economic growth and income inequality*. Routledge.

La Ferrara, E., Corno, L., & Voena, A. (2020). Female genital cutting and the slave trade.

La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2008). The economic consequences of legal origins. *Journal of economic literature*, *46*(2), 285–332.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1997). Trust in large organizations. *The American economic review*, 333–338.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of political economy*, *106*(6), 1113–1155.

Lagerlöf, N.-P. (2005). Geography, institutions and growth: The united states as a microcosm.

Lambais, G. (2020). Slave resistance, cultural transmission, and brazil's longrun economic development.

Lee, D. S., & Lemieux, T. (2010). Regression discontinuity designs in economics. *Journal of Economic Literature*.

Levine, R., Lin, C., & Xie, W. (2020). The african slave trade and modern household finance. *The Economic Journal*, *130*(630), 1817–1841.

Lowes, S., & Montero, E. (2019). Traditional medicine in central africa, In *Aea papers and proceedings*.

Lowes, S., & Montero, E. (2021). Concessions, violence, and indirect rule: Evidence from the congo free state. *The Quarterly Journal of Economics*, *136*(4), 2047–2091.

Lustig, N., Lopez-Calva, L. F., & Ortiz-Juarez, E. (2013). Declining inequality in latin america in the 2000s: The cases of argentina, brazil, and mexico. *World development*, *44*, 129–141.

Margo, R. A. (1990). *Race and schooling in the south, 1880-1950: An economic history*. University of Chicago Press.

Mello, P. C. d. (1977). The economics of labor in brazilian coffee plantations, 1850-1888.

Michalopoulos, S., & Papaioannou, E. (2013). Pre-colonial ethnic institutions and contemporary african development. *Econometrica*, *81*(1), 113–152.

Michalopulos, S., & Papaioannou, E. (2017). *The long economic and political shadow of history: Europe and the americas*. CEPR Press.

Milá, M. M. (2015). Income concentration in a context of late development: An investigation of top incomes in brazil using tax records, 1933–2013.

Milanovic, B. (2011). *Worlds apart: Measuring international and global inequality*. Princeton University Press.

Mitchener, K. J., & McLean, I. W. (2003). The productivity of us states since 1880. *Journal of Economic Growth*, *8*(1), 73–114.

Naidu, S. (2012). *Suffrage, schooling, and sorting in the post-bellum us south* (tech. rep.). National Bureau of Economic Research.

Naritomi, J., Soares, R. R., & Assunção, J. J. (2012). Institutional development and colonial heritage within brazil. *The journal of economic history*, *72*(02), 393–422.

Nunn, N. (2008a). The long-term effects of africa's slave trades. *The Quarterly Journal of Economics*, *123*(1), 139–176.

Nunn, N. (2008b). Slavery, inequality, and economic development in the americas. *Institutions and economic performance*, *15*, 148–180.

Nunn, N. (2009). *The importance of history for economic development* (tech. rep.). National Bureau of Economic Research.

Nunn, N. (2014). Historical development, In *Handbook of economic growth*. Elsevier.

Nunn, N. (2020). The historical roots of economic development. *Science*, *367*(6485).

Nunn, N., & Wantchekon, L. (2011). The slave trade and the origins of mistrust in africa. *American Economic Review*, *101*(7), 3221–52.

Pierce, L., & Snyder, J. A. (2018). The historical slave trade and firm access to finance in africa. *The Review of Financial Studies*, *31*(1), 142–174.

Piketty, T. (2014). Capital in the 21st century.

Piketty, T. (2020). *Capital and ideology*. Harvard University Press Cambridge.

Piketty, T., & Saez, E. (2003). Income inequality in the united states, 1913–1998. *The Quarterly journal of economics*, *118*(1), 1–41.

Piketty, T., & Saez, E. (2006). The evolution of top incomes: A historical and international perspective. *American economic review*, *96*(2), 200–205.

Piketty, T., & Saez, E. (2014). Inequality in the long run. *Science*, *344*(6186), 838–843.

Ponticelli, J., & Alencar, L. S. (2016). Court enforcement, bank loans, and firm investment: Evidence from a bankruptcy reform in brazil. *The Quarterly Journal of Economics*, *131*(3), 1365–1413.

Schwarcz, L. M. (2015). *Brasil: Uma biografia*. Editora Companhia das Letras.

Schwartz, S. B. (1974). The manumission of slaves in colonial brazil: Bahia, 1684-1745. *Hispanic American Historical Review*, *54*(4), 603–635.

Seed, P. (1995). *Ceremonies of possession in europe's conquest of the new world, 1492-1640*. Cambridge University Press.

Seyler, F., & Silve, A. (2021). Frontier planters, immigrants, and the abolition of slavery in brazil. *Available at SSRN 3866950*.

Smith, J. P. (1984). Race and human capital. *The American Economic Review*, *74*(4), 685–698.

Soares, R. R., Assunção, J. J., & Goulart, T. F. (2012). A note on slavery and the roots of inequality. *Journal of Comparative Economics*, *40*(4), 565–580.

Souza, P. H. G. F. d. (2016). A desigualdade vista do topo: A concentração de renda entre os ricos no brasil, 1926-2013.

Spolaore, E., & Wacziarg, R. (2013). How deep are the roots of economic development? *Journal of economic literature*, *51*(2), 325–69.

Telles, E. (2014). *Pigmentocracies: Ethnicity, race, and color in latin america*. UNC Press Books.

Teso, E. (2019). The long-term effect of demographic shocks on the evolution of gender roles: Evidence from the transatlantic slave trade. *Journal of the European Economic Association*, *17*(2), 497–534.

Van Welie, R. (2008). Slave trading and slavery in the dutch colonial empire: A global comparison. *New West Indian Guide/Nieuwe West-Indische Gids*, *82*(1-2), 47–96.

Wigton-Jones, E. (2019). *Legacies of inequality: The case of brazil* (tech. rep.). Working Paper.

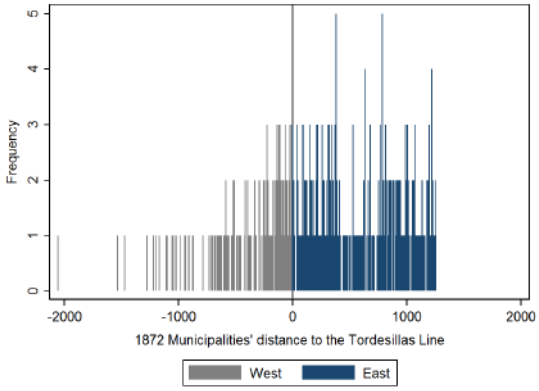
Woo-Mora, L. G. (2021). Unveiling the cosmic race: Racial inequalities in latin america. *Available at SSRN*.

Zhang, Y., Xu, Z. P., & Kibriya, S. (2021). The long-term effects of the slave trade on political violence in sub-saharan africa. *Journal of Comparative Economics*, *49*(3), 776–800.

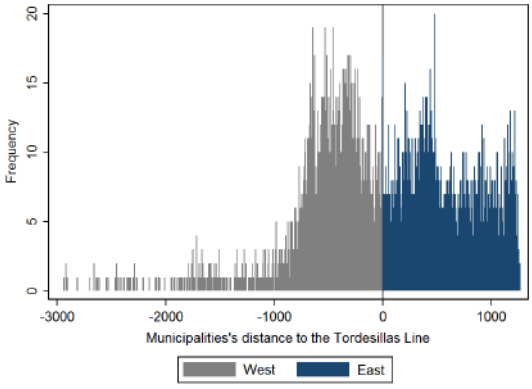
Figures

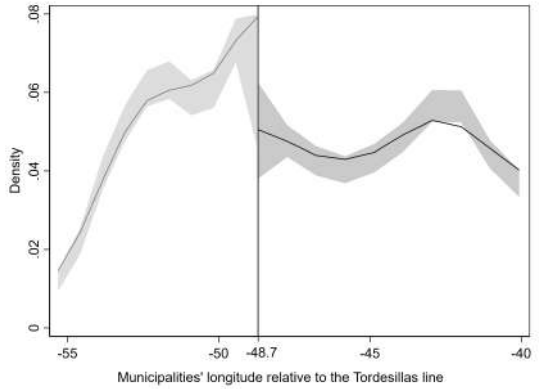
Figure 1: Frequency of Municipalities' by distance to the Tordesillas Line: 1872 and 2010

(a) Frequency of the Municipalities' distance to the Tordesillas Line: 1872

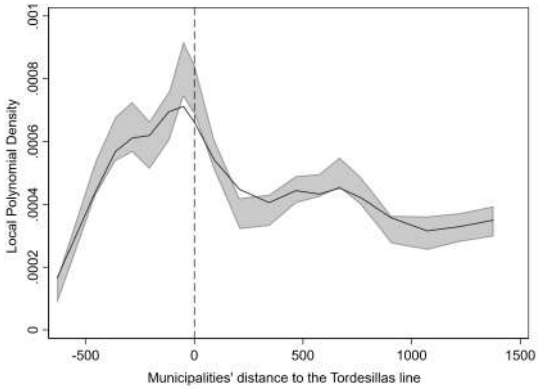


(b) Frequency of the Municipalities' distance to the Tordesillas Line: 2010





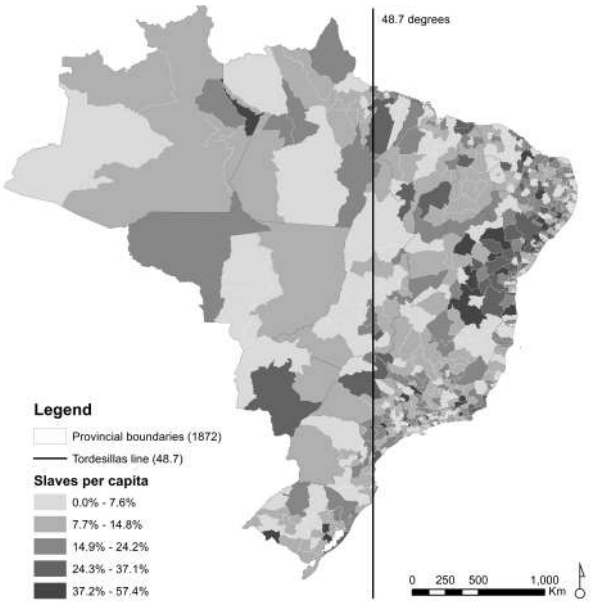
(c) Manipulation testing: Municipalities' longitude relative to the Tordesillas Line



(d) Local polynomial density estimation: Municipalities' distance to the Tordesillas Line

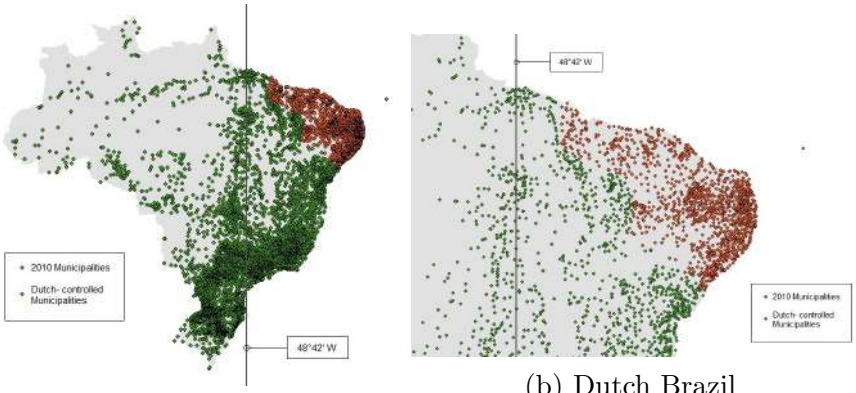
Plot (a) shows the histogram of distance from the Tordesillas line for municipalities founded before 1872. Plot (b) does the same for all 2010 municipalities. Plot (c) shows a kernel density estimate of the distribution of distance from Tordesillas line for modern municipalities. Plot (c) exhibits the local polynomial estimation of the cumulative distribution function (Cattaneo et al., 2020) Plot (d) shows the Manipulation test for the municipalities' longitude density, which shows that the distribution of location of modern day municipalities is not discontinuous close to the line. The local polynomial density estimates are presented with robust bias corrected confidence intervals (shaded in gray) (Cattaneo et al., 2020).

Figure 2: Tordesillas line and slave per capita in 1872



The map shows the distribution of slaves per capita in 1872 at municipal level. The Tordesillas line (48.7^0) is plotted in black.

Figure 3: Dutch Brazil and slave distribution in 1872

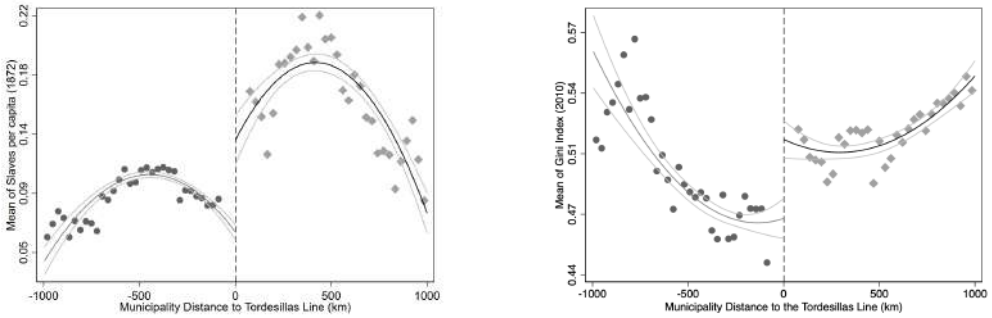


(a) Dutch Brazil

(b) Dutch Brazil

Map (a) shows the intensity of the slaves presences by municipality in 1872. Map (b) exhibit in orange the area colonized by the Dutch (Hettema Jr., 1920).

Figure 4: Regression Discontinuity Plots: Slaves per capita (1872) and Income Inequality (2010)

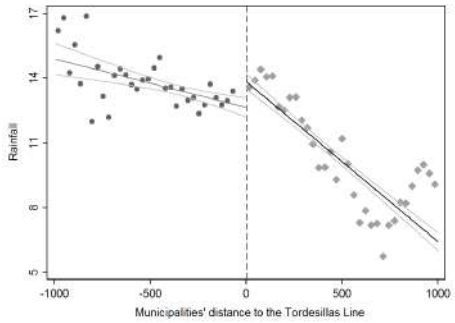


(a) Outcome: Slaves per capita (1872)

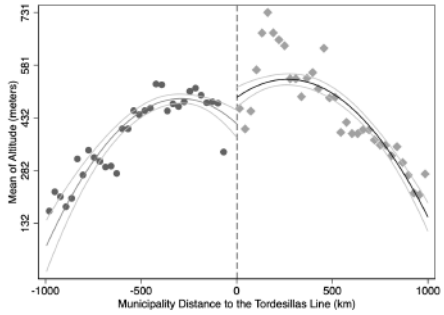
(b) Outcome: Gini Index (2010)

Regression discontinuity plots with the municipality' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent the local averages of slaves as share of population in 1872 (Panel A) or the Gini index of monthly per capita household income in 2010 (Panel B). Averages are calculated using 33 equally-wide bins on each side of the cutoff (horizontal axis). Continuous lines are a quadratic fit over the original (unbinned) data and its 95% confidence interval.

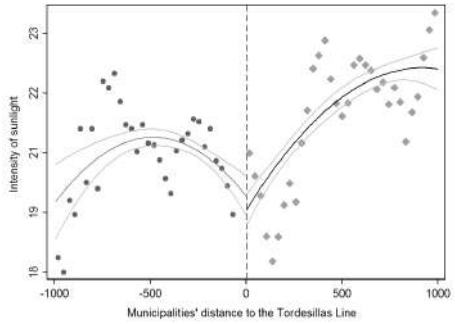
Figure 5: Regression Discontinuity Plots: Covariates



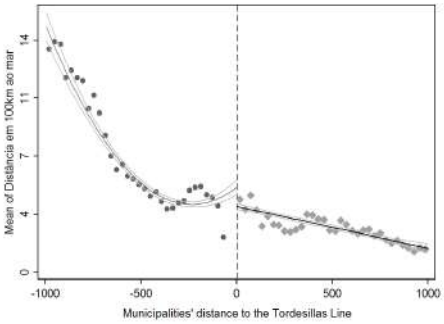
(a) Covariate: Rainfall



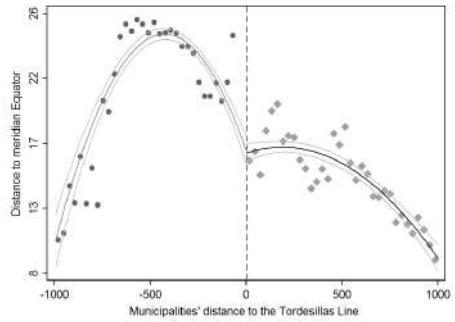
(b) Covariate: Altitude



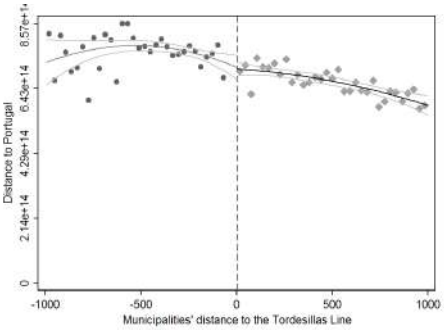
(c) Covariate: Sunlight



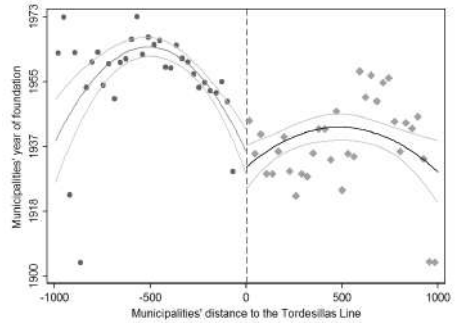
(d) Covariate: Distance to the coast



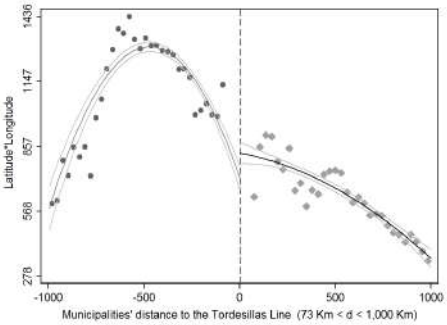
(e) Covariate: Distance to Equator



(f) Covariate: Distance to Portugal

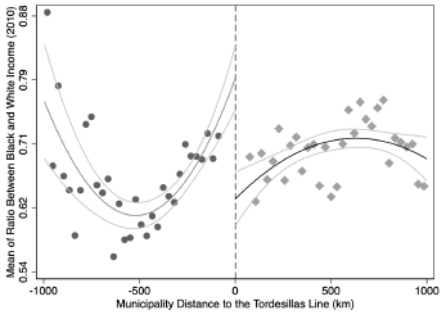


(g) Covariate: Year of Foundation



(h) Covariate: Latitude and Longitude

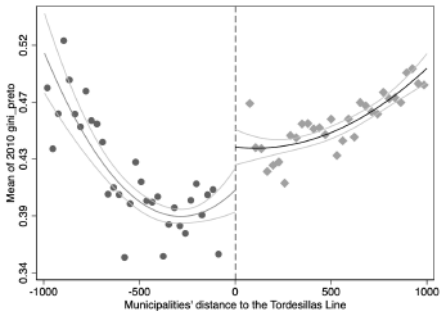
Figure 6: Regression Discontinuity Plots: Racial Income Gap



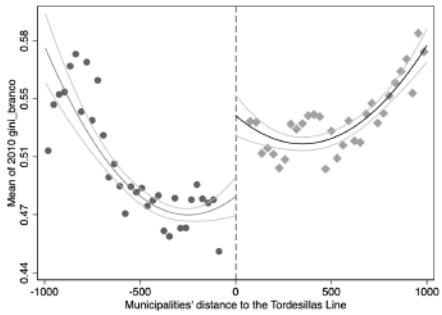
(a) Outcome: Ratio Between Average Black and White Income (2010)

Regression discontinuity plots with the municipality' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent the local averages of the ratio between average income of blacks and whites. Averages are calculated using 33 equally-wide bins on each side of the cutoff (horizontal axis). Continuous lines are a quadratic fit over the original (unbinned) data and its 95% confidence interval.

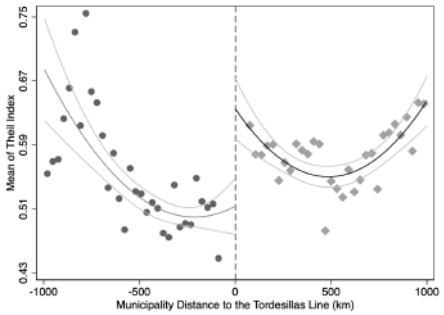
Figure 7: Regression Discontinuity Plots: Gini and Theil Index Decomposition (2010)



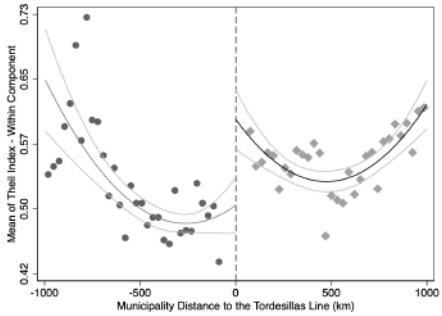
(a) Outcome: Gini Index - Blacks



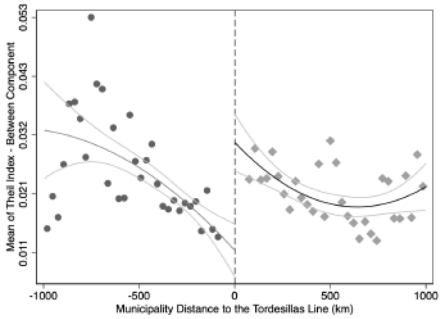
(b) Outcome: Gini Index - Whites



(c) Outcome: Theil Index



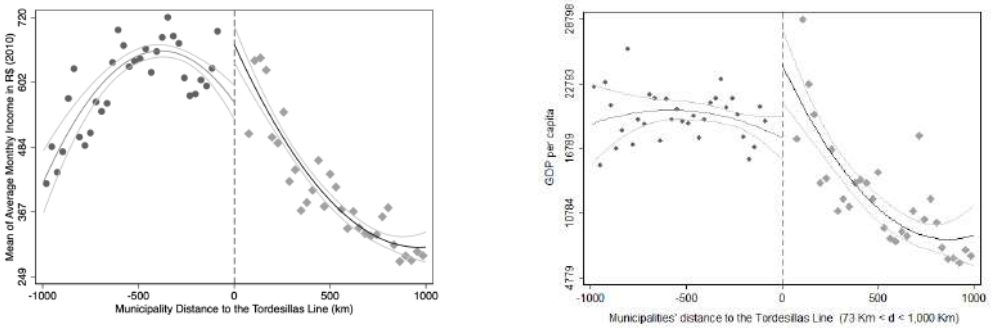
(d) Outcome: Theil Index - Within Race Component



(e) Outcome: Theil Index - Between Race Component

Regression discontinuity plots with the municipality' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent local averages of the Theil index for per capita household in come in 2010 and its different components. See text for further details on the decomposition. Averages are calculated using 33 equally-wide bins on each side of the cutoff (horizontal axis). Continuous lines are a quadratic fit over the original (unbinned) data and its 95% confidence interval.

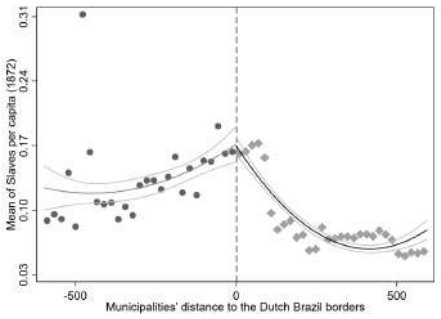
Figure 8: Regression Discontinuity Plots: Income and GDP



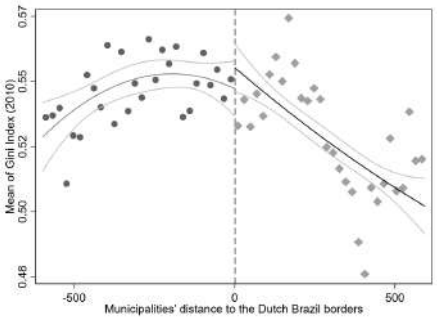
(a) Outcome: Average Income (2010) (b) Outcome: GDP per capita (2012)

Regression discontinuity plots with the municipality' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent the local averages of average income in reais (Panel A) and GDP per capita (Panel B). Income is measured as monthly per capita household income in Brazilian reais (R$). Averages are calculated using 33 equally-wide bins on each side of the cutoff (horizontal axis). Continuous lines are a quadratic fit over the original (unbinned) data and its 95% confidence interval.

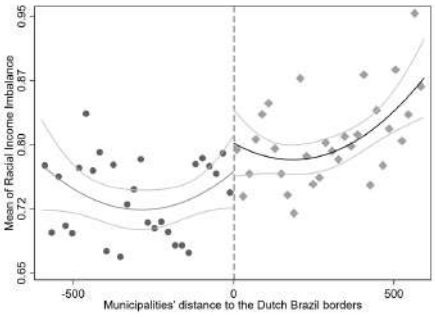
Figure 9: Regression Discontinuity Plots: Dutch Brazil



(a) Outcome: Slaves per capita (1872)

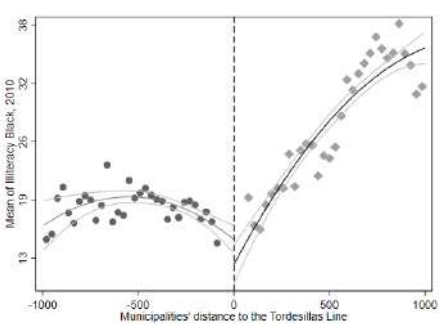


(b) Outcome: Gini Index (2010)

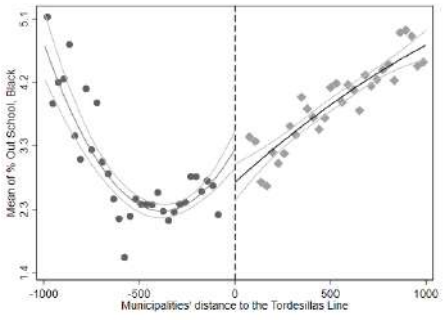


(c) Outcome: Income Racial Gap (2010)

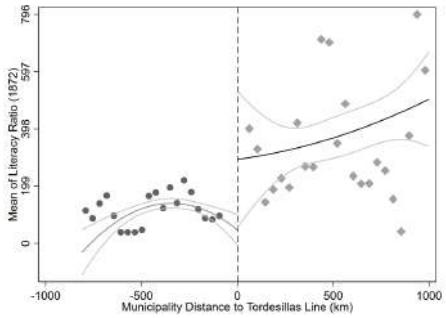
Figure 10: RD plots - Education in 1872 and 2010



(a) Illiteracy for Blacks in 2010



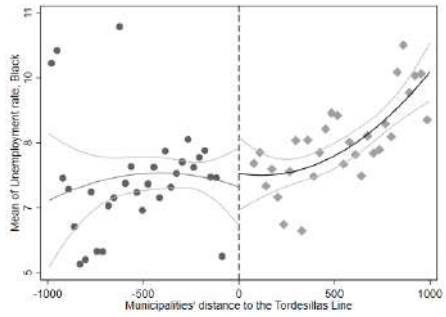
(b) Black Children out of School in 2010



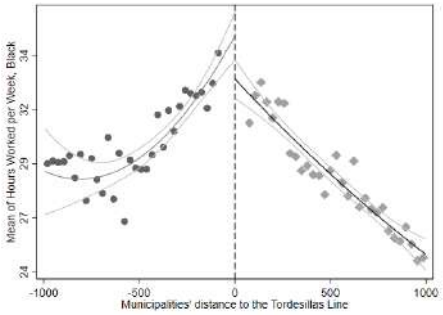
(c) Literacy Ratio: Free literacy rate over slave literacy rate

Regression discontinuity plots with the municipalities' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent local averages of (a) Illiteracy Rate of Blacks and (b) % of Black children out of school. Averages are calculated using 33 equally-wide bins on each side of the cutoff (horizontal axis). Continuous lines are a quadratic fit over the original (unbinned) data and its 95% confidence interval.

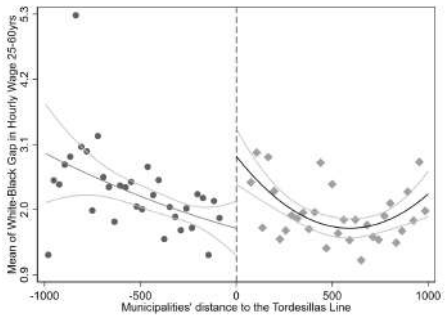
Figure 11: RD plots - Labor Outcomes for Blacks



(a) Unemployment for Blacks in 2010



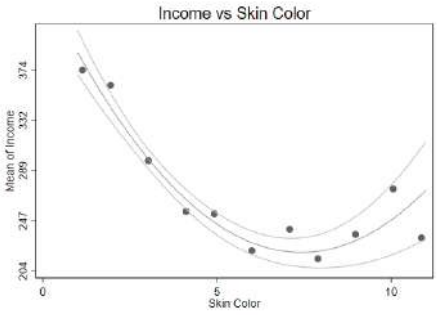
(b) Hours Worked in 2010



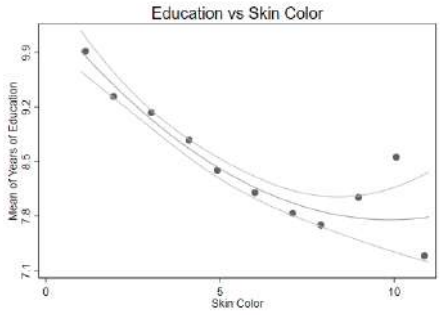
(c) White-Black Hourly Wage Gap in 2010

Regression discontinuity plots with the municipalities' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent local averages of Black workers' (a) Unemployment Rate of Blacks, (b) Hours Worked per Week and (c) White-Black Hourly Wage Gap. Averages are calculated using 33 equally-wide bins on each side of the cutoff (horizontal axis). Continuous lines are a quadratic fit over the original (unbinned) data and its 95% confidence interval.

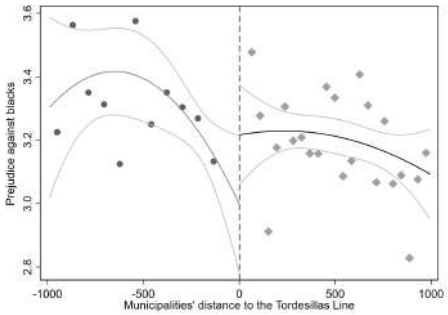
Figure 12: Skin Color: Binned Scatteplots and Regression Discontinuity Plot



(a) Income vs. Skin Color



(b) Education vs. Skin Color



(c) Prejudice against black people in the labor market

Panels (a) and (b) show correlations between individual income and education, and skin color. Markers represent local averages for each value on the PERLA scale (higher values mean darker skin tone), continuous lines are a quadratic fit, and 95% confidence intervals.
Panel (c) shows a regression discontinuity plot with the municipalities' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent local averages of a composite index capturing racial attitudes towards blacks (higher values represent more prejudice against them). Continuous lines are a quadratic fit over the original (unbinned) data and its 95% confidence interval.

Tables

Table 1: Summary Statistics: Portuguese and Spanish Brazil

Portuguese Brazil					
	N	Mean	SD	Min	Max
Year of Foundation	2,799	1,936	64.8	1,534	1,997
Population (1872)	467	17,690.7	19,090.38	1,331	274,972
Number of Slaves (1872)	467	2,788.1	4,174.5	63	48,939
Slaves per Capita	2,929	0.139	0.101	0.012	0.939
Population (2012)	2,982	41,748	266,369	807	11,376,685
GDP per Capita (2012)	2,982	11,110.41	18,130.98	2,727.13	511,967.22
Gini Index (2010)	2,982	0.516	0.056	0.329	0.797
Racial Income Gap	2,982	0.730	0.219	0.096	2.364
Spanish Brazil					
	N	Mean	SD	Min	Max
Year of Foundation	2,038	1,959	40.2	1,635	1,997
Population (1872)	94	10,067.68	8,109.59	876	43,998
Number of Slaves (1872)	94	1,202.7	1,345.6	4	8,155
Slaves per Capita	2,092	0.094	0.036	0.006	0.254
Population (2012)	2,111	23,916.92	82,094.79	807	1,861,838
GDP per Capita (2012)	2,111	19,293.68	13,085.81	2,720.32	230,483.69
Gini Index (2010)	2,113	0.486	0.075	0.284	0.808
Racial Income Gap	2,109	0.664	0.265	0.042	8.110

The table shows Portuguese (east) and Spanish (west) Brazil divided by the Tordesillas line with a 73 kilometers donut on both sides. Population and number of slaves are the counts for 1872 municipalities. Slaves per capita is the number of slaves per capita in 1872 for a 2010 municipality. We imputed the value in a 1872 municipality to all 2010 municipalities that composed a 1872 municipality. Racial Income Gap is the ratio of the income of black people over the income of white people.

Table 2: Slavery, Income inequality and Tordesillas

	Dependent variable: Slaves per capita				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0548***	0.104***	0.0440***	0.110***	0.0514***
	(0.00785)	(0.00522)	(0.00553)	(0.0227)	(0.0139)
	Panel B: RD order 2				
Distance to Tordesillas	0.0473**	0.0658***	0.0305***	0.0772	0.152***
	(0.0184)	(0.00884)	(0.00946)	(0.0809)	(0.0409)
	Panel C: Local Randomization RD				
					All
Distance to Tordesillas	0.083***	0.066***	0.073***	0.059***	0.045***
Observations	2,468	4,036	2,692	788	1,226
Mean Dep. Variable	0.130	0.131	0.129	0.108	0.120
	Dependent variable: Income inequality - Gini Index (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0403***	0.0450***	0.0391***	0.0958***	0.0421***
	(0.00695)	(0.00449)	(0.00565)	(0.0185)	(0.00966)
	Panel B: RD order 2				
Distance to Tordesillas	0.0431***	0.0444***	0.0370***	0.140*	0.121***
	(0.0150)	(0.00782)	(0.0109)	(0.0714)	(0.0250)
	Panel C: Local Randomization RD				
					All
Distance to Tordesillas	0.038***	0.038***	0.037***	0.038***	0.030***
Observations	2,493	4,072	2,717	788	1,601
Mean Dep. Variable	0.484	0.497	0.485	0.483	0.504

The dependent variables are the number of slaves per capita in 1872 and 2010 Gini index. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Panel C presents the estimates for local randomization RD. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Income Inequality and Tordesillas: Theil Index

	Theil (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
			Panel A: RD order 1		
Distance to Tordesillas	0.0748***	0.0797***	0.0741***	0.169***	0.0568***
	(0.0135)	(0.00866)	(0.0105)	(0.0348)	(0.0170)
			Panel B: RD order 2		
Distance to Tordesillas	0.0728**	0.0852***	0.0686***	0.0686***	0.201***
	(0.0285)	(0.0151)	(0.0195)	(0.0195)	(0.0403)
Observations	2,493	4,072	2,717	788	1,842
Mean Dep. Var.	0.417	0.443	0.417	0.406	0.458

The dependent variable is 2010 Theil index. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Tordesillas and Racial Income Gap

	Racial Income Gap - Ratio between average income of blacks and whites (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	-0.0794***	-0.0256	-0.0843***	-0.0836	-0.0837**
	(0.0268)	(0.0183)	(0.0229)	(0.0537)	(0.0329)
	Panel B: RD order 2				
Distance to Tordesillas	-0.114**	-0.164***	-0.0850**	-0.0850**	-0.0962
	(0.0519)	(0.0321)	(0.0381)	(0.0381)	(0.0636)
Observations	2,490	4,068	2,714	787	1,860
Mean Dep. Var.	0.673	0.679	0.672	0.692	0.703

The dependent variable is ratio between the income of black population over the income of white population. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas Meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table 5: OLS estimates of skin color on individual income

	Spanish Brazil					Portuguese Brazil				
	Dependent variable: Individual income (log)					Dependent variable: Individual Income (log)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Skin Color	-0.093***	-0.170***	-0.087***	-0.071	-0.065	-0.059***	-0.188***	-0.074**	-0.084***	-0.081***
	(0.010)	(0.033)	(0.033)	(0.072)	(0.040)	(0.009)	(0.032)	(0.031)	(0.024)	(0.029)
Skin Color sq.		0.008**	0.003	0.002	0.001		0.012***	0.005*	0.006*	0.005*
		(0.003)	(0.003)	(0.008)	(0.004)		(0.003)	(0.003)	(0.002)	(0.003)
Female			-0.152***	-0.158***	-0.160***			-0.255***	-0.259***	-0.259***
			(0.036)	(0.020)	(0.030)			(0.036)	(0.029)	(0.036)
Age			0.014***	0.014***	0.014***			0.011***	0.011***	0.011***
			(0.002)	(0.001)	(0.001)			(0.002)	(0.001)	(0.002)
Education			0.069***	0.069***	0.066***			0.060***	0.060***	0.059***
			(0.005)	(0.004)	(0.006)			(0.005)	(0.006)	(0.007)
Afro			0.159*	0.122*	0.121			-0.096	-0.083	-0.093
			(0.089)	(0.061)	(0.087)			(0.087)	(0.059)	(0.088)
Indigenous			-0.251*	-0.184	-0.173			-0.092	-0.091	-0.094
			(0.142)	(0.195)	(0.173)			(0.137)	(0.137)	(0.144)
Mulata			0.036	0.072	0.083			-0.061	-0.074	-0.076
			(0.074)	(0.116)	(0.085)			(0.075)	(0.065)	(0.063)
White			0.104	0.067	0.075			0.078	0.026	0.003
			(0.076)	(0.113)	(0.078)			(0.077)	(0.061)	(0.072)
Wave F.E.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State F.E.				✓					✓	
Municipality F.E.					✓					✓
Covariates* F.E.			✓	✓	✓			✓	✓	✓
Observations	1,739	1,739	1,708	1,708	1,708	1,943	1,943	1,906	1,906	1,906
Adjusted R^2	0.08	0.08	0.33	0.37	0.39	0.03	0.04	0.31	0.33	0.34

Covariates* include employment, location, marital status, and religion fixed-effects.
The dependent variable is log of individual income. Each panel includes separate estimates for municipalities on the Spanish and Portuguese sides of the Tordesillas line. The data pools 4 waves of the AmericasBarometer Survey data LAPOP (2012, 2014, 2016, and 2018).
Standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Appendix

Description of the variables

1. **Slavery** The main variable used is number of black slaves over total population measured by the Imperial census of 1872. The data sources is IBGE, 2011.IBGE also provides the 2010 municipality code that we can calculate slave per capita for the current Minimum Comparable Areas (AMC) (Ehrl, 2017), increasing the number of observations. We also report results for the slavery population according to the Fiscal Census in 1873.

2. **Income inequality** Gini index of household income per capita. Source: Census 1991, 2000 and 2010, DataSUS (https://datasus.saude.gov.br/). We also redid the variable using Census micro-data from 1970 to 2010 (IBGE). We also use Theil Index to capture income inequality. They are produced based on the Census micro-data from 1970 to 2010 (IBGE).

3. **GDP per capita** Municipal GDP divided by estimated population in 2012. Source: IBGE (www.ibge.gov.br).

4. **Income racial gap** The ratio average household income between blacks and white. The source is DataSUS (https://datasus.saude.gov.br/). We also redid the variable using Census micro-data from 1970 to 2010 (IBGE).

5. **Distance to the Tordesillas line** Municipalities' (center of the city) geodesic distance to the Tordesillas line (48.7^o)in Km. We calculated the distance using ArcGis.

6. **Free population** The number of people that were not enslaved in 1872. The source is the Census 1872.

7. **Black slave population** The number of enslaved people that were black in 1872. The source is the Census 1872.

8. **Sex ratio** Sex ratio in 1872. The source is the Census 1872.

9. **Share of married people** The share of married people in 1872. The source is the Census 1872.

10. **Literacy rate** Literacy rate in 1872. The source is the Census 1872.

11. **Literacy Rate difference between free and slavery population** Ratio of literacy rate between free people and slaves. The source is the Census 1872.

12. **Free literacy rate over slave literacy rate** Literacy ration between free people and slaves in 1872. The variable is based on the 1872 Census (IBGE).

13. **Black Population in 1890** Ratio of black over total population in 1890. The variable is based on the 1890 Census (IBGE).

14. **Manufacturing** Percentage of workers in Manufacturing in 1920. The variable is from the 1920 Census (IBGE).

15. **Agriculture** Percentage of workers in Agriculture in 1920. The variable is from the 1920 Census (IBGE).

16. **Year of Foundation** The year of the municipality foundation reported by the Municipal Information System, considering the year 2000 as reference.

17. **Unemployment for blacks** The average unemployment rate of black households. Source: Census 1991, 2000 and 2010, The source is DataSUS (https://datasus.saude.gov.br/).

18. **Hours worked per week for blacks** The average hours worked per week for black households. Source: Census 1991, 2000 and 2010, The source is DataSUS (https://datasus.saude.gov.br/).

19. **Black illiteracy** The average household illiteracy rate of blacks. DataSUS (https://datasus.saude.gov.br/). We also redid the variable using Census micro-data from 1970 to 2010 (IBGE).

20. **Black children out of school** Percentage of black children out of school in 2010. The variable using the 2010 Census micro-data (IBGE).

21. **Existence of Racial Equality Councils** Municipal Profile (Perfil Municipal), 2014, IBGE (www.ibge.gov.br).

22. **Inequality of land distribution** Gini Index of the land distribution, constructed with data from 1920 and 2010 Census.

23. **Voting Turnout** Percentage of the population who were voters in 1910 and 2010.

24. **Access to Justice** Average of three binary variables indicating the existence of: (i) Small Claims Courts ("Tribunal de Pequenas Causas"), (ii) Youth Council ("Conselho Tutelar") and (iii) Consumer Commission ("Comissão de Defesa do Consumidor"). It was constructed using information available in 2001 (IBGE) and compiled by Naritomi et al. (2012).

25. **Judicial Backlogs per Judge** It is the number of pending cases in a court at the beginning of the year over the number of judges working in that court over the year. The data is from Ponticelli and Alencar (2016).

26. **Human Development Index (HDI)** Composite of average achievement in key dimensions of human development: health, education and income. The HDI is the geometric mean of normalized indices for each of the three dimensions. The data source is the United Nations Development Programme (UNDP) from 2010.

27. **Skin color** Eleven skin tones that go from 1 which is lighter to 11 which is darkest.This survey is part of the PERLA project (Telles, 2014).

28. **Public institutions** Simple average of four qualitative indicators, normalized from 1 to 6: the year in which the database of the tax on urban property ("IPTU") was updated, the IPTU payment rate in 1999, the number of administrative instruments, and the number of planning instruments; from the Brazilian Census Bureau; calculated using data between 1997 and 2000. Source: Ministry of Planning.

29. **SAEB Children Test Scores** Mean of student's test scores in Portuguese and Mathematics in 2011. SAEB is the Evaluation System of Basic Education and it is a set of external and large-scale evaluation program led by the Ministry of Education (INEP). Among other variables, they also include students' parents education in the questionnaire.

30. **Trust** Latinobarometer survey (216-2017) captures generalized trust, trust in the Police, trust in the Government and trust in the Judiciary.

31. **Candomblé** Percentage of people practicing camdomblé, a traditional religion based on African beliefs. The data source is the Census 2010 (IBGE)

32. **Geographical variables**[42]

- *Rainfall* The average quantity of water precipitation in each municipality for the period of 1931-1990, expressed in 100 millimeters per year, obtained from the National Institute of Geology (INGEO).
- *Altitude* The average altitude of each municipality, reported in the "Cadastro de cidades e vilas" published by the Brazilian Census Bureau in 1998.
- *Distance to the coast* Distance (in kilometers) from the municipality center to the Brazilian coast, calculated by the Federal University of Rio de Janeiro (UFRJ).
- *Distance to Portugal* Absolute value of the latitude coordinate of each municipality center, obtained from the National Institute of Geology (INGEO).
- *Interaction Latitude and Longitude* Interaction of latitude and longitude of the municipalities.
- *Sunlight* The average quantity of water precipitation in each municipality for the period of 1931-1990, expressed in 100 millimeters per year, obtained from the National Institute of Geology (INGEO).
- *Distance to Equator* Absolute value of the latitude coordinate of each municipality center, obtained from the National Institute of Geology (INGEO).
- *Temperature* A set of 12 variables indicating the average monthly temperatures (degrees Celsius) in each municipality, obtained from the Brazilian Agricultural Research Institute (EMBRAPA). We use only the months of June and December in our controls.
- *Region* A set of 5 dummy variables indicating the Brazilian macroregions: North, Northeast, Central-West, Southeast and South. We use this variable as a cluster the standard errors.

[42]We thank Naritomi et al. (2012) for sharing those variables with us. The variables' descriptions are consistent with their original paper.

History of Dutch Brazil

The Dutch invaded the second richest region of Brazil – Pernambuco - and installed there from 1531 to 1651. The Dutch occupation negatively affected the colonial economy because they started competing in the international sugar cane market and drove the slave prices up (Klein and Luna, 2009).

The Netherlands were at war against Spain from 1568 to 1648. Both countries disputed maritime supremacy. Portugal and the Netherlands were trade partners. In 1580 the Spanish Habsburg Crown incorporated Portugal after the death of Dom Sebastiao in the north of Africa. Until 1640, the Portuguese empire became a target for the Dutch as well.

In 1604 the Netherlands attacked Salvador, the center of Colonial Brazil, counting with a potential collaboration of the Portuguese. The endeavour failed. Between 1609 and 1621 Habsburg rulers of Spain, the Southern Netherlands and the Dutch Republic ceased their mutual hostilities. The Twelve Years' Truce ended in the same year that the Dutch West India Company (WIC), a chartered company of merchants, was launched. The WIC secured trade monopoly in the Caribbean and the jurisdiction over the Atlantic slave trade in the Americas.

The WIC attacked Salvador again in 1624 for 24 hours. In 1628, the maritime fleet led by Piet Heyn attacked Salvador twice, stealing boats loaded with local products. The captain also stole a Spanish fleet loaded with Silver in Cuba, raising 8 million florins that paid dividends for the shareholders and also financed a new project in Brazil: the invasion of the DC of Pernambuco and neighboring areas of Itamaraca, Paraiba and Rio Grande do Norte (De Mello, 2010; Schwarcz, 2015). The Dutch had many reasons to attack Brazil (De Mello, 2010). First, the Portuguese America was the fragile bond of the Spanish Crown. Second, the opportunity to make considerable profits exploring both brazilwood and sugar cane. The WIC calculated an investment of 2.5 million florins to conquer Pernambuco and a return of 8 million florins per year (or 77 tons of gold). Third, the population in Brazil was based on the coast making it easier and cheaper to conquer than the Spanish colonies located in the altiplanos. Finally, Brazil was an excellent operation base to fight against the Spanish fleets in the Caribbean and the Portuguese in the Orient.

The Pernambuco area in 1630 was the most important area for sugar cane production in the world. The region produced 659 thousands tons of sugar. There were 160 sugar cane mills in operation (De Mello, 2010). Pernambuco was the first DC to have sugar cane plantation in 1535.

The 67 ships transporting seven thousand men of the WIC left the Netherlands in 1629 and arrived in February 1630. Until 1637, the Dutch expanded their area of influence between Ceara and Sao Francisco River. The Dutch colonization in the Brazilian Northeast lasted until 1654, and the Dutch West India Company (WIC) installed their headquarters in Recife.

The most prosperous period of the Dutch Brazil period was between 1637 and 1644, when John Maurice of Nassau acted as governor. When Nassau arrived in Pernambuco, he found several sugar cane mills destroyed, a debilitated economy and unsatisfied population with the Dutch command (Schwarcz, 2015). Nassau sold the abandoned sugar cane mills and provided loans for the buyers, reestablished the slave trade, guaranteed credit for the purchase of new machinery in the sugar cane mills, incentivized farmers to grow manioc to fight the lack of food in the region. The Calvinist governor also promoted religious freedom and invited artists and scientists to the colony to help promote Brazil and increase immigration.

Nassau also substantially improved the infrastructure of Recife that had an estimated population of seven thousand inhabitants. He built new public buildings, bridges, channels and gardens in the then Dutch style. Nassau invested in sanitation. He established representative councils in the colony for local government, and developed Recife's transportation infrastructure. The governor prohibited the citizens to throw garbage in the streets or throw sugarcane bagasse in lakes and rivers that prevented the procreation of fishes (Schwarcz, 2015).

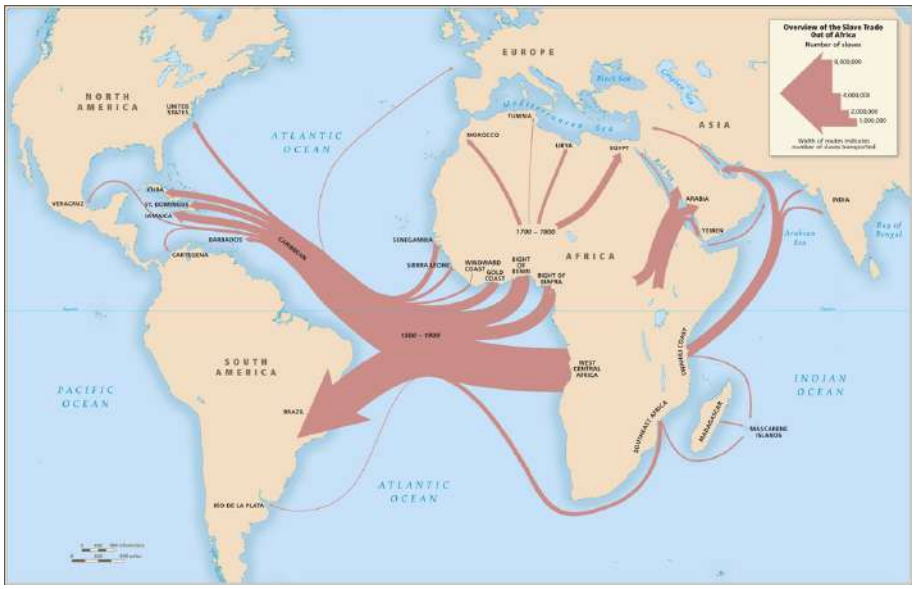
The local population used to refer to Nassau as "the Brazilian", evidencing his popularity. But the Board of the WIC argued that he was overspending and requested his return to Holland in 1644.

The Dutch Brazil decayed after the departure of Nassau. By 1648 and 1649, the Portuguese, indigenous people and slaves joined forces to fight against the Dutch. They were defeated in Guararapes, 10 Km south of Recife. There are historians who call this war the "ground zero" of Brasil because the war involved a "racial mix". The Dutch controlled Recife until 1654, when the Portuguese took over the city. The conflict between Portugal and the Dutch Republic finally ended in 1661 when both parties signed the Treaty of Hague.

Additional Figures

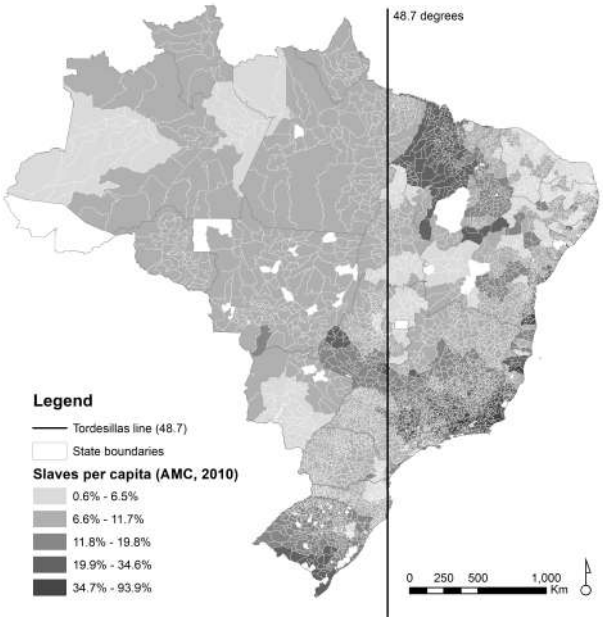
Figure A1: Early Tordesillas Line: Cantino (1502)

Figure A2: The Transatlantic Slave Trade Flows, from Eltis and Richardson (2010)



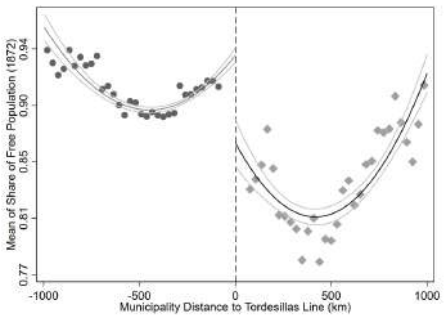
Source: Eltis and Richardson (2010).

Figure A3: Slaves per capita in 2010 Municipalities boundaries (AMC)

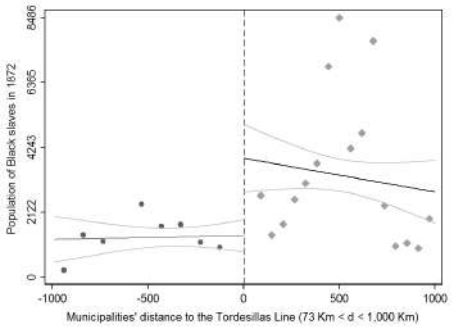


Source: Census 1872, Cintra et al. (2012), Ehrl (2017) and Authors' calculation and elaboration.

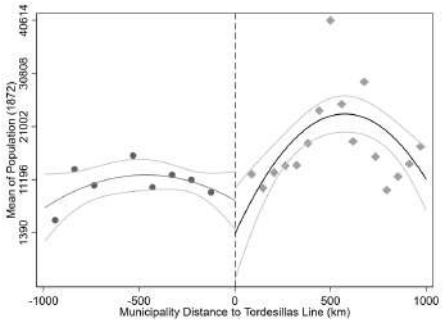
Figure A4: Donut RD plots: Free and black slave population (Tordesillas Line)



(a) Outcome: Share of Free population

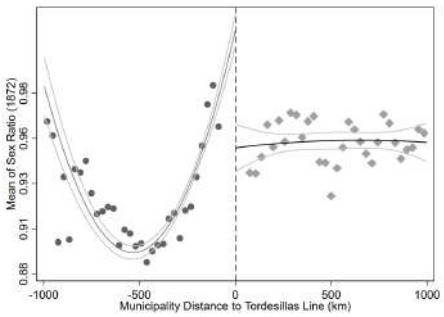


(b) Outcome: Black slave population

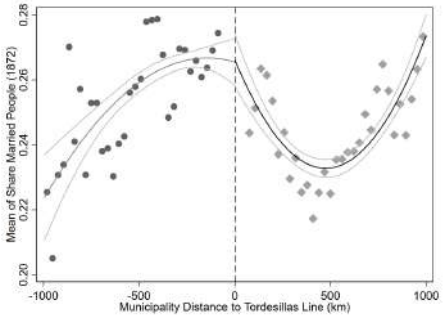


(c) Outcome: Total population

Figure A5: Donut RD plots: Sex Ratios and Share of Married

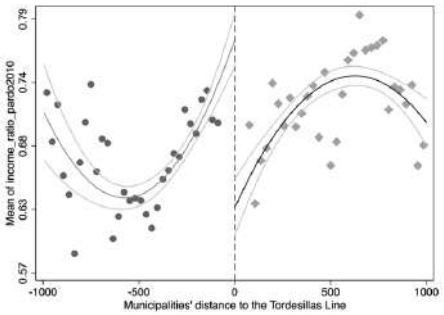


(a) Outcome: Sex Ratio in 1872

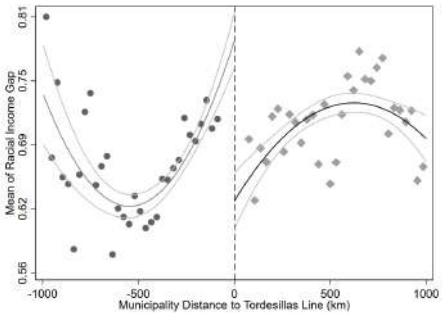


(b) Outcome: Share of married people in 1872

Figure A6: Racial Income Gap: Ratio average income between 'pardos' and non-whites and whites

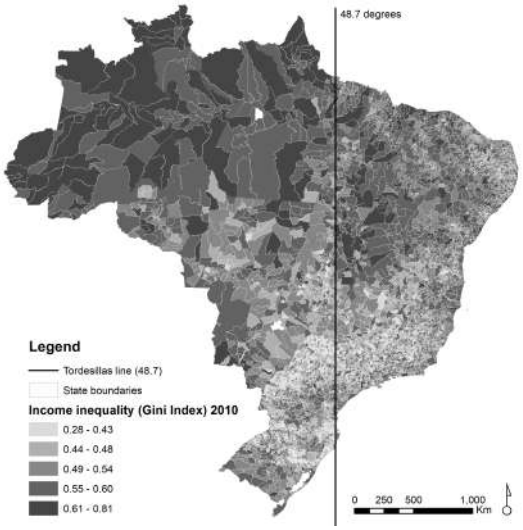


(a) Outcome: Average income of 'pardos' over whites' income (2010)

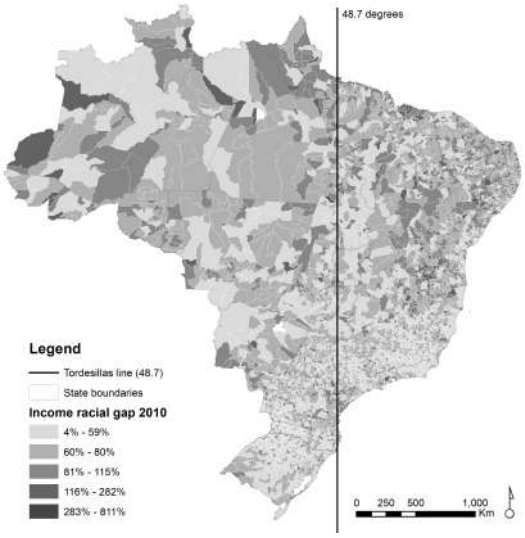


(b) Outcome: Average income of non-whites over whites income (2010)

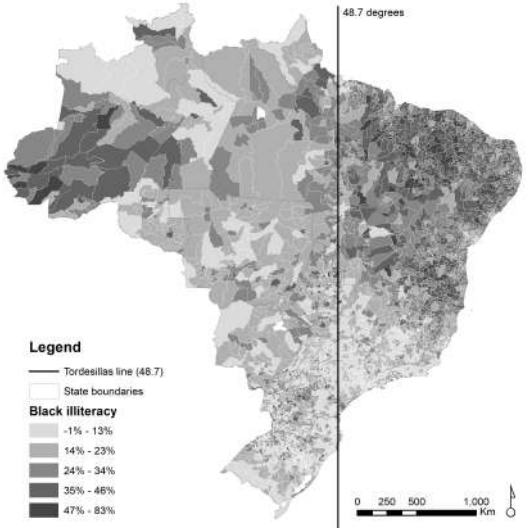
Figure A7: Gini Index, income racial gap, and Black illiteracy (2010)



(a) Income inequality (Gini Index) 2010



(b) Income racial gap (Ratio of average income between Blacks and Whites) 2010



(c) Black illiteracy 2010

Figure A8: Human Development Index

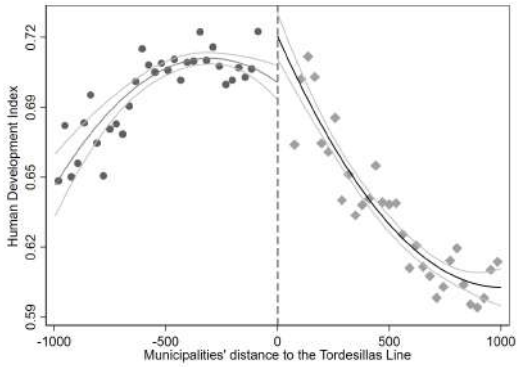
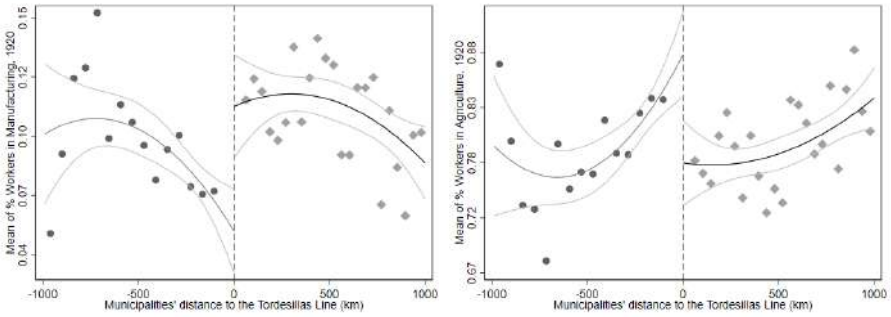
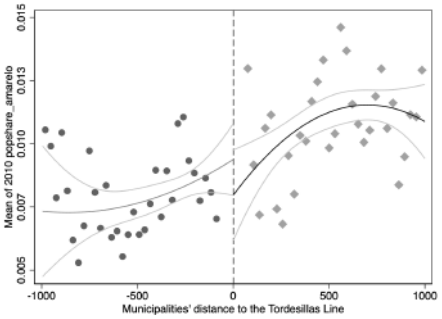


Figure A9: RD plots - Structural Transformation: 1920

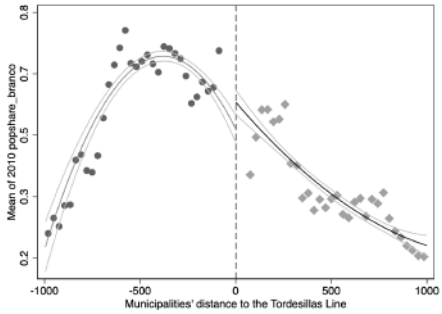


(a) Manufacturing in 1920 (b) Agriculture in 1920

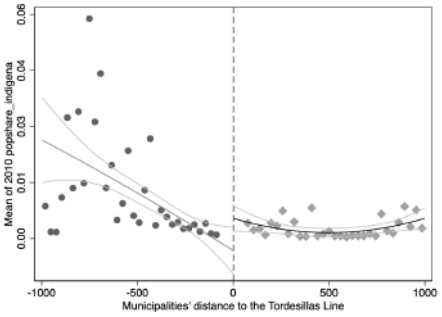
Figure A10: Modern Population by Race, 2010



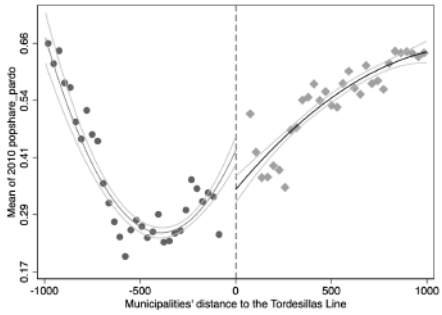
(a) Outcome: Asian Population (2010)



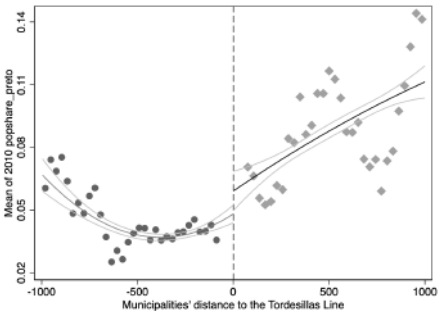
(b) Outcome: White Population (2010)



(c) Outcome: Indigenous Population (2010)



(d) Outcome: Pardo Population (2010)



(e) Outcome: Black Population (2010)

Figure A11: Slavery in Portuguese and Dutch Brazil

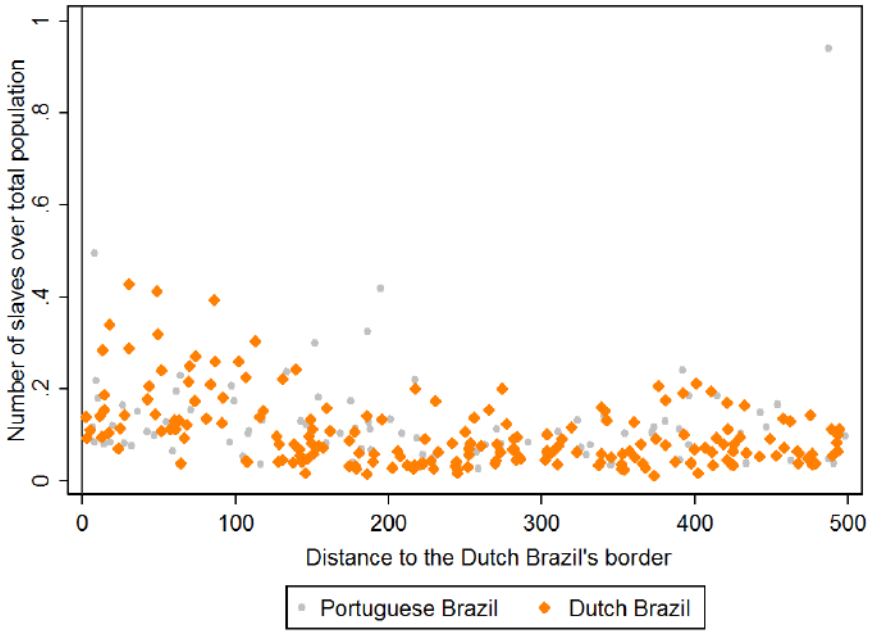
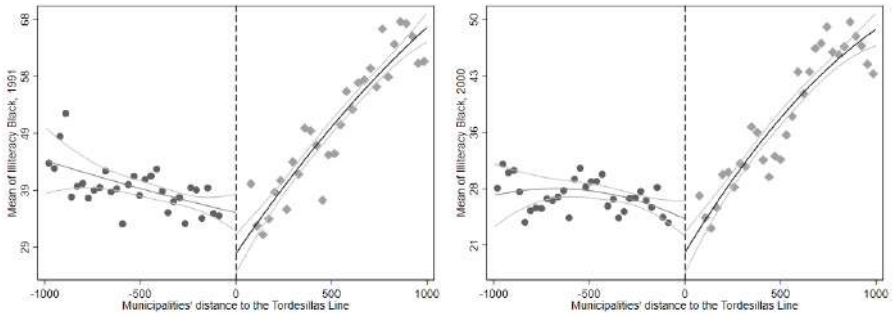
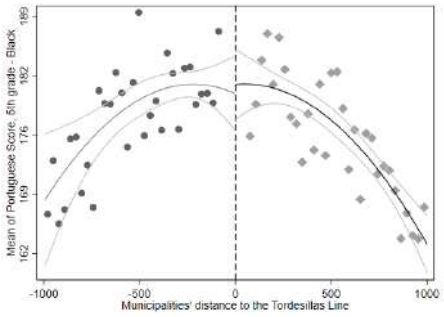


Figure A12: RD plots - Education for Blacks

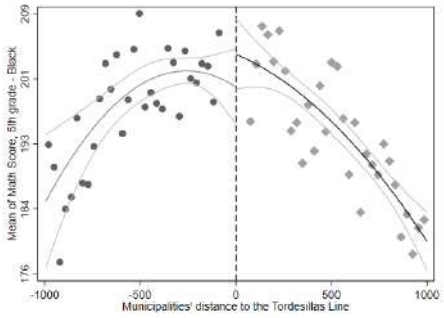


(a) Literacy for Blacks in 1991 (b) Literacy for Blacks in 2000

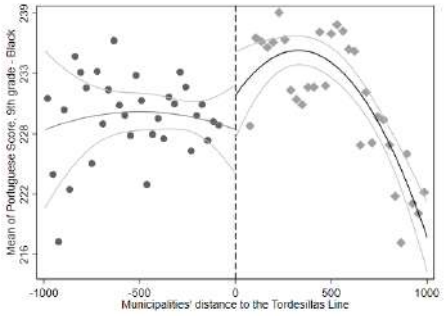
Figure A13: Education: SAEB Children Test Scores



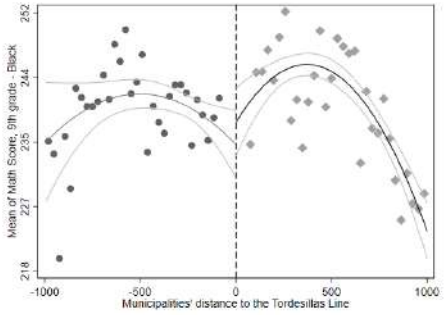
(a) Outcome: Portuguese 5th Grade



(b) Outcome: Mathematics 5th Grade

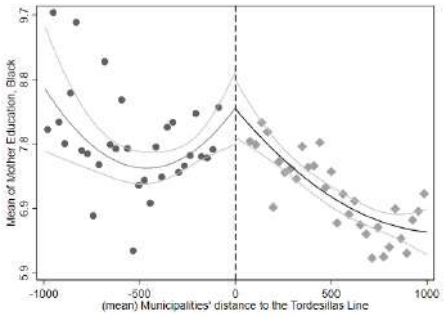


(c) Outcome: Portuguese 9th Grade

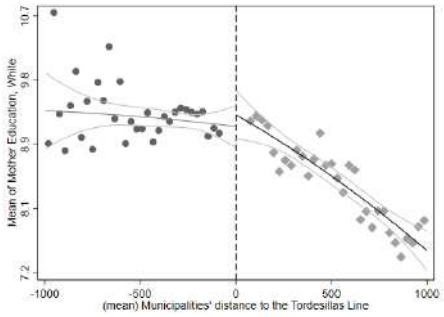


(d) Outcome: Mathematics 9th Grade

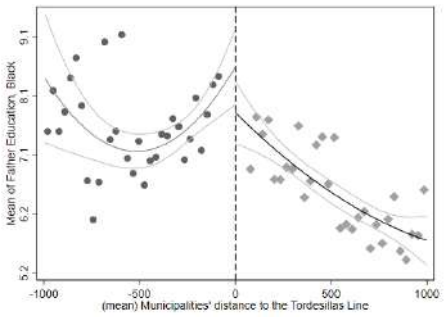
Figure A14: Education: SAEB Parents Education



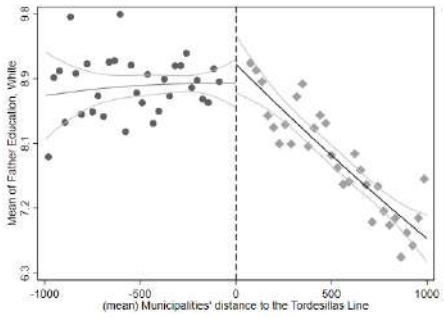
(a) Outcome: Mother's Education: Black



(b) Outcome: Mother's Education: White

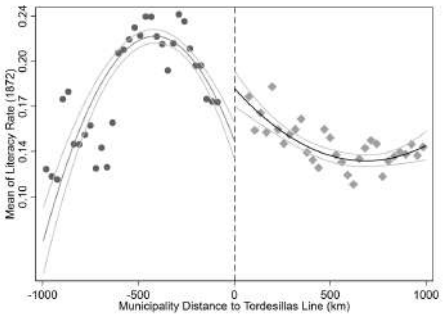


(c) Outcome: Father's Education: Black

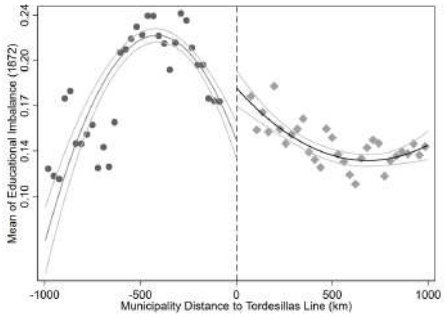


(d) Outcome: Father's Education: White

Figure A15: Donut RD plots: Literacy Outcomes



(a) Literacy Rate (1872)



(b) Literacy Rate difference between free and slavery population

Figure A16: Racial Equality Councils in 2014

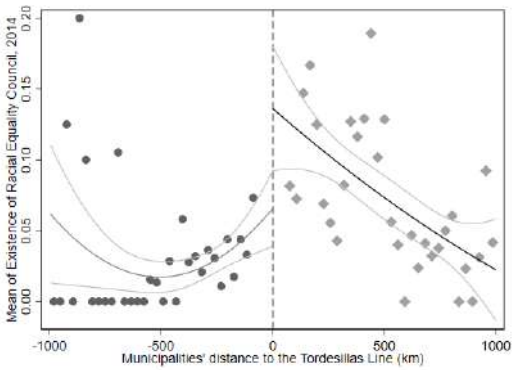
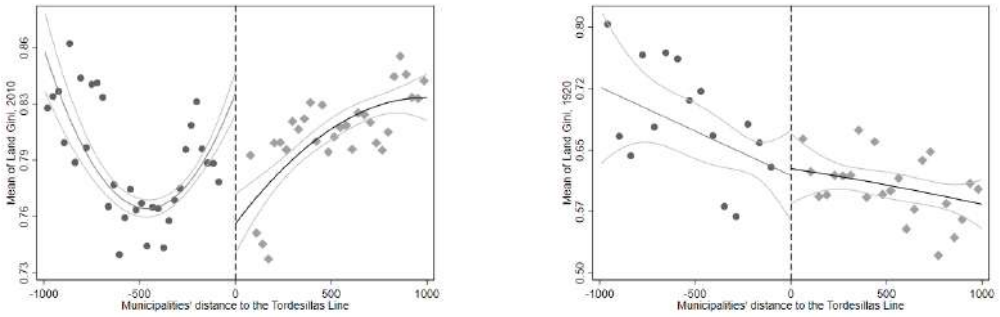
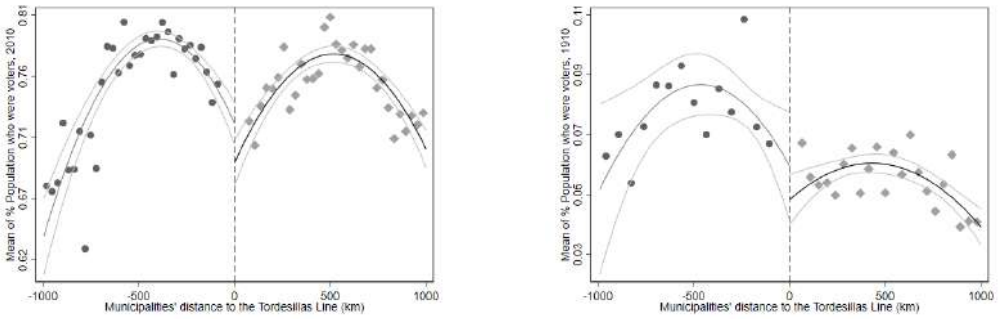


Figure A17: Donut RD plots: Land Inequality



(a) Outcome: Land Inequality in 2010 (b) Outcome: Land Inequality in 1920

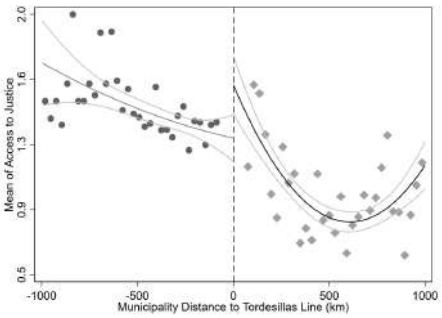
Figure A18: Voting Turnout in Historical and Modern Times



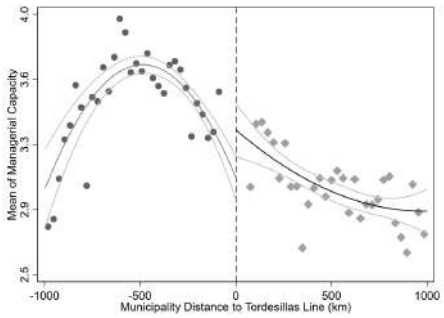
(a) Outcome: Voting Turnout in 2010 (b) Outcome: Voting Turnout in 1910

Regression discontinuity plots with the municipality' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent the local averages of % of the population who were voters in 1910 and 2010.

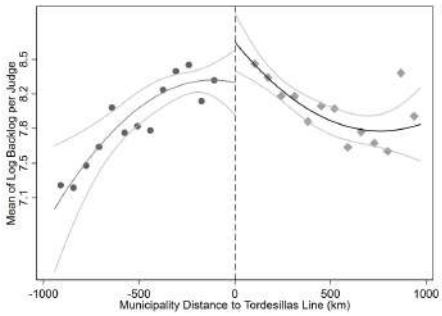
Figure A19: Institutional and Judicial Mechanisms



(a) Outcome: Access to Justice

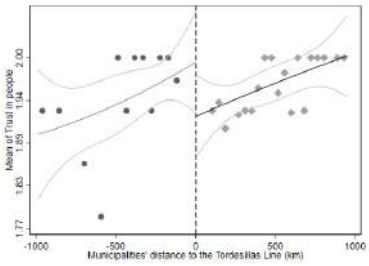


(b) Outcome: Managerial Capacity

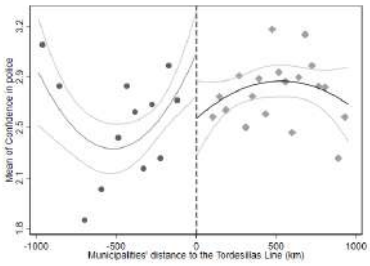


(c) Outcome: Judicial Backlogs

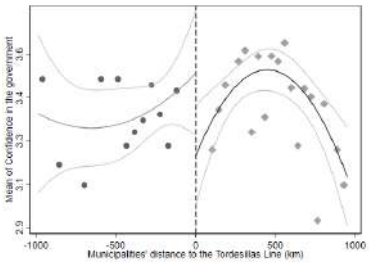
Figure A20: Trust



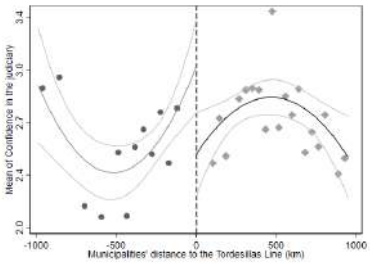
(a) Generalized Trust



(b) Trusts in the Police



(c) Trust in the Government



(d) Trusts in the Judiciary

Regression discontinuity plots with the municipality' distance to the Tordesillas line as the assignment variable. Sample is restricted to municipalities with distance greater than 73 km and smaller than 1,000 km. Markers represent the local averages of average trust scores in each institution as reported by participants of the Latinobarometer survey.

Figure A21: Traditional Religion: percentage of people practicing Candomblé

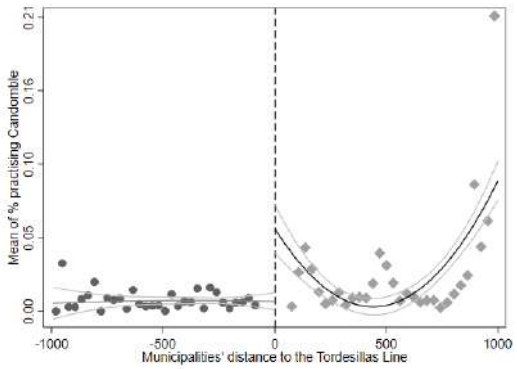
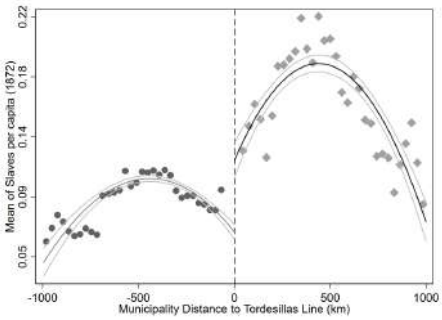
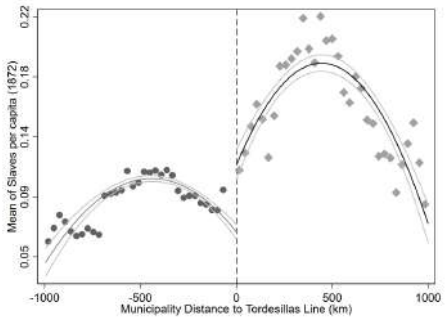


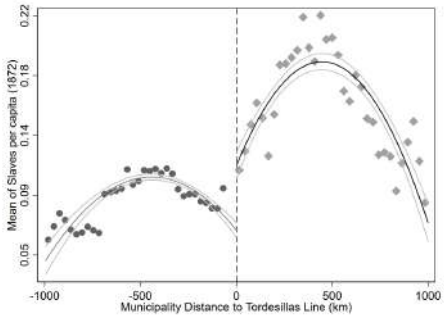
Figure A22: RD plots - Relative number of slaves with different donuts



(a) 36.5 kms donut

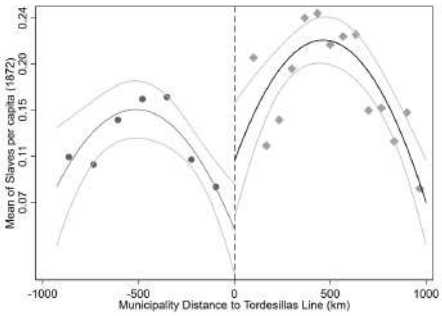


(b) 18.25 kms donut

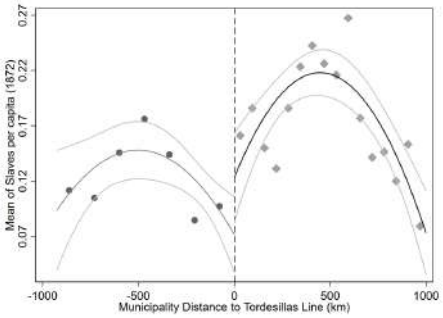


(c) 0 km donut

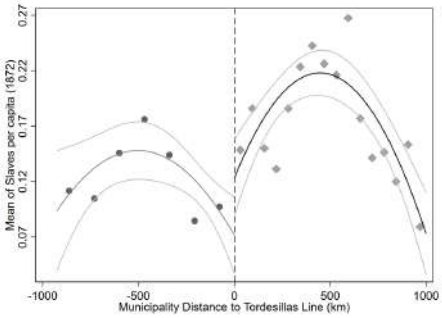
Figure A23: RD plots - Relative number of slaves with different donuts at AMC level



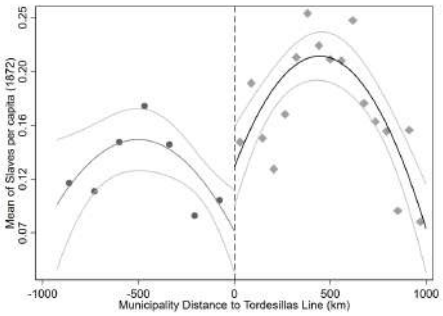
(a) 73 kms donut



(b) 36.5 kms donut

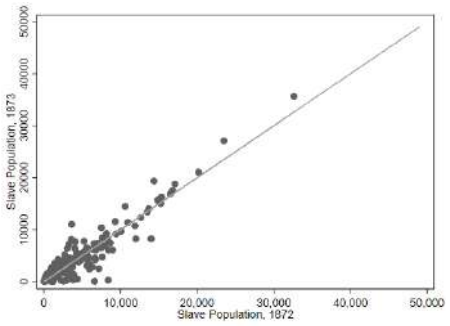


(c) 18.25 kms donut

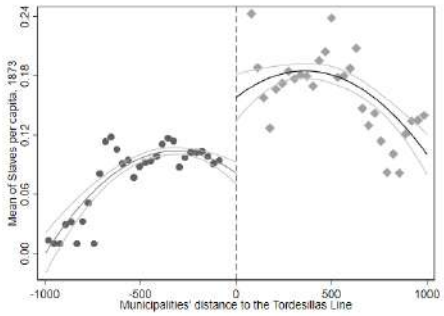


(d) 0 km donut

Figure A24: Slavery Measures: 1872 and 1873

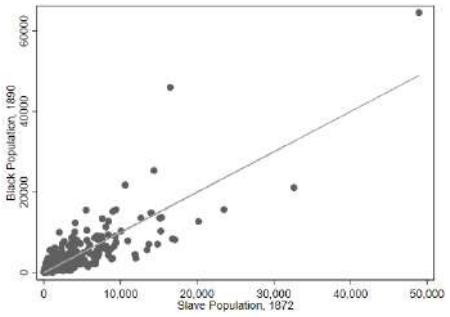


(a) Slavery in 1873 vs. Slavery in 1872

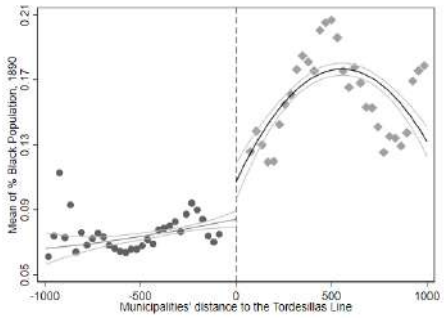


(b) Slavery in 1873

Figure A25: Black Population: 1890

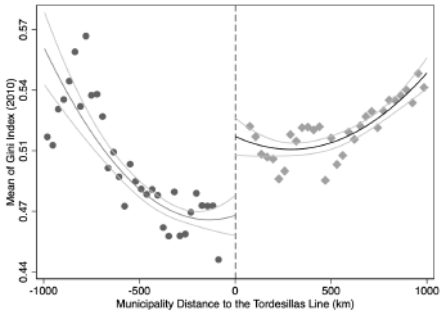


(a) Black Population in 1890 vs. Slavery in 1872

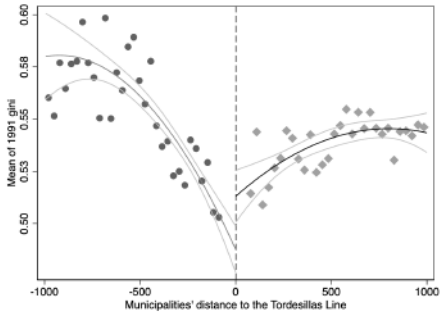


(b) Black Population in 1890

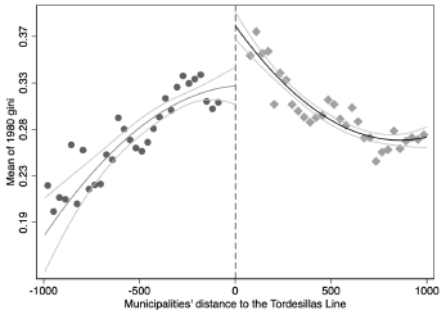
Figure A26: Inequality over Time: Gini 1970-2000



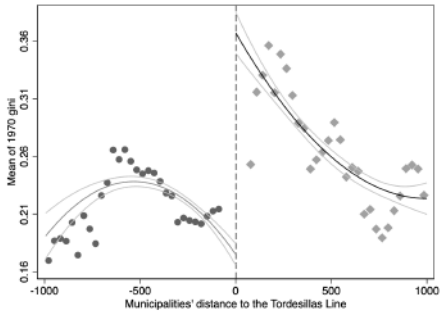
(a) Outcome: Gini (2000)



(b) Outcome: Gini (1991)



(c) Outcome: Gini (1980)



(d) Outcome: Gini (1970)

Figure A27: Robustness: Gini Index

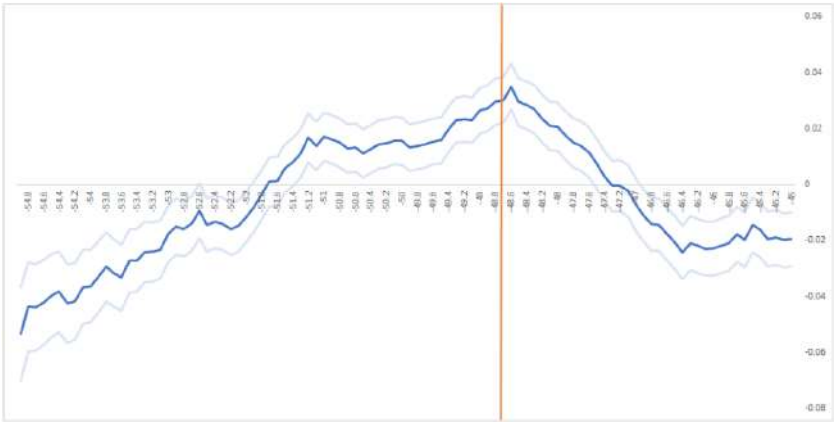
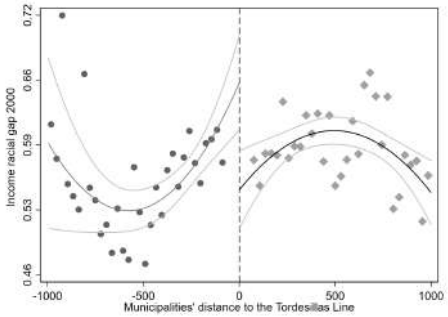
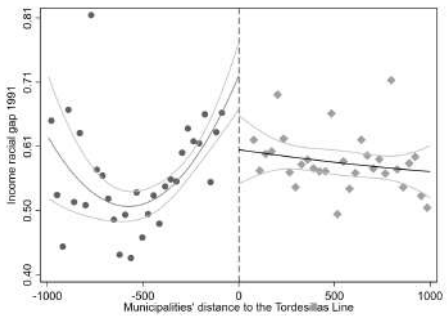


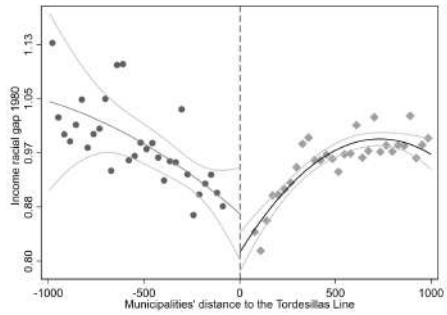
Figure A28: Inequality over Time: Ratio between average income of blacks and whites (Income Racial Gap) between 1980 and 2000



(a) Outcome: Income Racial Gap (2000)

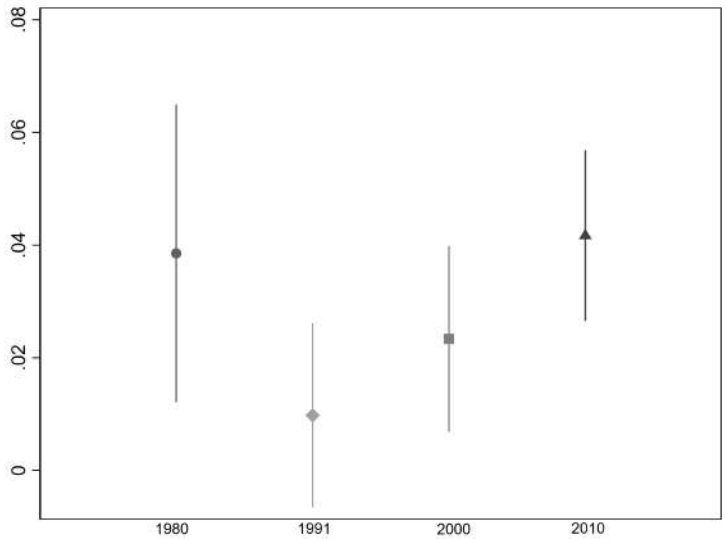


(b) Outcome: Income Racial Gap (1991)



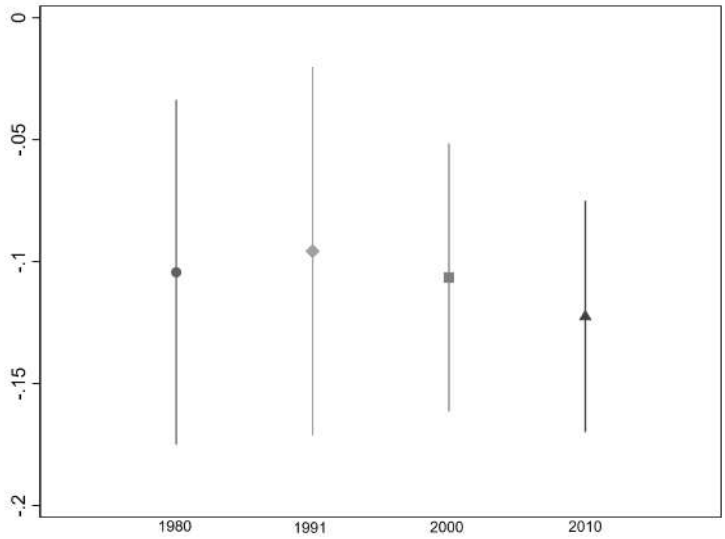
(c) Outcome: Income Racial Gap (1980)

Figure A29: Coefficient Plot: Gini Index from 1980 to 2010



The graph shows the average treatment effects of the Gini Index in the years 1980, 1991, 2000, and 2010. The assignment variable is the Municipalities' distance to the Tordesillas line. The 'donut' used is the distance between 73 and 1,000 Km from the centroid of the Municipality to the colonial boundary.

Figure A30: Coefficient Plot: Income Racial Gap from 1980 to 2010



The graph shows the average treatment effects of the income racial gap (ratio of average income between blacks and whites) in the years 1980, 1991, 2000, and 2010. The assignment variable is the Municipalities' distance to the Tordesillas line. The 'donut' used is the distance between 73 and 1,000 Km from the centroid of the Municipality to the colonial boundary.

Additional Tables

Table B1: Abolition of slavery in the Americas

Country	End of Slave Trade	"Free Birth" Law	Abolition
Chile	1811	1811	1823
Mexico	1824	-	1829
Uruguay	1825	1811	1842
Ecuador	1821	1821	1851
Colombia	1821	1821	1852
Argentina	1813	1813	1853
Peru	1821	1821	1854
Venezuela	1821	1821	1854
Bolivia	1840	1831	1861
Paraguay	1842	1842	1869
Brazil	1850	1871	1888

Source: Andrews (2004)

Table B2: Slavery population and Economic activities: change in relative importance of the slave population by province from 1819 to 1886/87

Province	1819	1872	1886/87
Minas Gerais	15.2	24.5	26.5
Rio de Janeiro	13.2	22.6	23.5
Sao Paulo	7.0	10.4	14.8
Bahia	13.3	11.1	10.6
Pernambuco	8.8	5.9	5.7
Maranhao	12	5	4.6
Other	30.5	20.5	14.3
Total	100	100	100

The table shows the change in relative importance of the slave population by province from 1819 to 1886/87. These changes are directly related to the economic activities in the colony during this period. Source: Klein and Luna (2009), pag. 76.

Table B3: Slavery and Development Outcomes: OLS and Fixed Effects estimates - $73 < d < 1,000$

	Dependent variables							
	Gini Index				Income Racial Gap			
Slaves per capita (1872)	0.0281***	0.0147	0.0170	0.0143	-0.261***	-0.363***	-0.279***	-0.273***
	(0.0107)	(0.0133)	(0.0146)	(0.0224)	(0.0370)	(0.0539)	(0.0626)	(0.0779)
Observations	4,036	4,036	3,500	3,500	4,032	4,032	3,498	3,498
R-squared	0.001	0.317	0.353	0.387	0.009	0.068	0.071	0.086
State FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Geographic Controls	No	No	Yes	Yes	No	No	Yes	Yes
AMC Cluster	No	No	No	Yes	No	No	No	Yes
Mean Dep. Var.	0.497	0.497	0.497	0.497	0.679	0.679	0.679	0.679

The table shows the correlation of slavery - measured by the ratio of number of slaves in 1872 over total population - with current development outcomes (income inequality (Gini Index), and income racial gap (ratio between average income of blacks and whites (2010). We used the numbers from the interval of distance to the Tordesillas line greater than 73 Km and smaller than 1,000 Km to compare with the Donut RD estimates. The first estimate of each dependent variable is OLS, while the other three equations are state fixed effects estimates. The geographic variables used are longitude, latitude, rain, distance to the coast, altitude, distance to the federal capital, sunlight, average monthly temperature and types of soils. We also control for the foundation year of the municipality.

Table B4: Slavery and Tordesillas: Clustered Standard Errors at AMC Level

	Dependent variable: Slaves per capita				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0548**	0.104***	0.0440***	0.110**	0.0514
	(0.0225)	(0.0186)	(0.0165)	(0.0523)	(0.0346)
	Panel B: RD order 2				
Distance to Tordesillas	0.0473	0.0658**	0.0305	0.0772	0.152*
	(0.0465)	(0.0281)	(0.0264)	(0.144)	(0.0884)
Observations	2,468	4,036	2,692	788	1,226
Cluster at AMC level	✓	✓	✓	✓	✓
Mean Dep. Var.	0.130	0.131	0.129	0.108	0.120

The dependent variable is the number of slaves per capita in 1872. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas Meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas Meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Standard errors are clustered at the AMC (*Áreas Mínimas Comparáveis*) level and are reported in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table B5: Slavery, Inequality and Tordesillas: State Fixed Effects

	Dependent variable: Slaves per capita (1872)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0519***	0.0571***	0.0404***	0.115***	0.0518***
	(0.00728)	(0.00622)	(0.00497)	(0.0205)	(0.0126)
	Panel B: RD order 2				
Distance to Tordesillas	0.0332**	0.0758***	0.0145*	0.162**	0.206***
	(0.0169)	(0.00833)	(0.00830)	(0.0747)	(0.0374)
Observations	2,468	4,036	2,692	788	1,226
State FE	✓	✓	✓	✓	✓
Mean Dep. Variable	0.130	0.131	0.129	0.108	0.120

	Dependent variable: Income inequality - Gini Index (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0417***	0.0467***	0.0307***	0.0365**	0.0454***
	(0.00605)	(0.00498)	(0.00493)	(0.0154)	(0.00819)
	Panel B: RD order 2				
Distance to Tordesillas	0.0323**	0.0425***	0.0139	-0.0920	0.0455**
	(0.0125)	(0.00693)	(0.00941)	(0.0598)	(0.0209)
Observations	2,493	4,072	2,717	788	1,601
State FE	✓	✓	✓	✓	✓
Mean Dep. Variable	0.484	0.497	0.485	0.483	0.504

The dependent variables are the number of slaves per capita in 1872 and 2010 Gini index. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. All specifications are state fixed effects. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table B6: Slavery, Inequality and Tordesillas: AMC Cluster and State Fixed Effects

	Dependent variable: Slaves per capita (1872)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0519**	0.0571***	0.0404***	0.115**	0.0518
	(0.0225)	(0.0201)	(0.0154)	(0.0491)	(0.0329)
	Panel B: RD order 2				
Distance to Tordesillas	0.0332	0.0758***	0.0145	0.162	0.206**
	(0.0409)	(0.0260)	(0.0196)	(0.140)	(0.0863)
Observations	2,468	4,036	2,692	788	1,226
State FE		✓	✓	✓	✓
Cluster at AMC Level	✓	✓	✓	✓	✓
Mean Dep. Variable	0.130	0.131	0.129	0.108	0.120

	Dependent variable: Income inequality - Gini Index (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0417***	0.0467***	0.0307***	0.0365**	0.0454***
	(0.00605)	(0.00498)	(0.00493)	(0.0154)	(0.00819)
	Panel B: RD order 2				
Distance to Tordesillas	0.0323**	0.0425***	0.0139	-0.0920	0.0455**
	(0.0125)	(0.00693)	(0.00941)	(0.0598)	(0.0209)
Observations	2,493	4,072	2,717	788	1,601
State FE	✓	✓	✓	✓	✓
Mean Dep. Variable	0.484	0.497	0.485	0.483	0.504

The dependent variables are the number of slaves per capita in 1872 and 2010 Gini index. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas Meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. All specifications have state fixed effects. Standard errors are clustered at the AMC (*Áreas Mínimas Comparáveis*) level for Slaves per capita (1872) and are reported in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table B7: Tordesillas and Racial Income Gap: Pardos

	Racial Income Gap - Ratio between average income of pardos and whites (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	-0.0826***	-0.0242**	-0.0806***	-0.0568	-0.0890***
	(0.0152)	(0.0101)	(0.0121)	(0.0431)	(0.0201)
	Panel B: RD order 2				
Distance to Tordesillas	-0.109***	-0.145***	-0.0667***	-0.0667***	-0.0523
	(0.0324)	(0.0175)	(0.0227)	(0.0227)	(0.0520)
Observations	2,493	4,072	2,717	788	1,646
Mean Dep. Var.	0.686	0.696	0.685	0.698	0.714

The dependent variable is the ratio between the income of the pardo population over the income of the white population. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table B8: Theil Index: Between

	Theil Between (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0131***	0.0110***	0.0118***	0.0194***	0.0140***
	(0.00314)	(0.00216)	(0.00236)	(0.00627)	(0.00344)
	Panel B: RD order 2				
Distance to Tordesillas	0.0173***	0.0193***	0.0110***	0.0110***	0.0144**
	(0.00566)	(0.00355)	(0.00387)	(0.00387)	(0.00719)
Observations	2,493	4,072	2,717	788	2,175
Mean Dep. Var.	0.0214	0.0218	0.0214	0.0201	0.0210

The dependent variable is the 2010 between Theil index. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table B9: Theil Index: Within

	Theil Within (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
			Panel A: RD order 1		
Distance to Tordesillas	0.0796***	0.0781***	0.0737***	0.167***	0.0954***
	(0.0226)	(0.0149)	(0.0187)	(0.0608)	(0.0302)
			Panel B: RD order 2		
Distance to Tordesillas	0.0811*	0.103***	0.0785**	0.0785**	0.212***
	(0.0455)	(0.0253)	(0.0345)	(0.0345)	(0.0788)
Observations	2,493	4,072	2,717	788	1,586
Mean Dep. Var.	0.510	0.525	0.513	0.518	0.535

The dependent variable is the 2010 within Theil index. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table B10: Dutch Brazil and Portuguese Brazil: Summary Statistics

	Dutch Brazil				
	N	Mean	SD	Min	Max
Year of Foundation	1,025	1,934.8	63.7	1,537	1,997
Population (1872)	210	14,867.7	11,293.7	2,843	116,671
Number of Slaves (1872)	210	1,383.6	1,541.5	120	15,136
Slaves per Capita (1872)	1,119	0.085	0.058	0.012	0.393
Population (2012)	1,135	31,741.0	111,867.3	1,633	2,500,194
GDP per Capita (2012)	1,135	6,847.0	6,776.3	2,727.1	138,273.0
Gini Index (2010)	1,135	0.528	0.048	0.368	0.705
Racial Income Gap	1,135	0.801	0.220	0.284	2.112

	Portuguese Brazil: 600 Km distance to the Dutch Brazil border				
	N	Mean	SD	Min	Max
Year of Foundation	679	1,945.7	65.3	1,534	1,997
Population (1872)	88	17,485.7	19,545.1	1,331	129,109
Number of Slaves (1872)	88	2,125.6	2,894.8	41	16,468
Slaves per Capita (1872)	700	0.132	0.106	0.034	0.939
Population (2012)	732	28,418.0	107,452.4	1,236	2,710,968
GDP per Capita (2012)	732	7,460.2	8,642.3	2,720.3	107,164.4
Gini Index (2010)	732	0.546	0.051	0.406	0.789
Racial Income Gap	732	0.739	0.231	0.096	2.715

Summary statistics are calculated for municipalities located inside Dutch Brazil and for those outside Dutch Brazil and located up to 600 kilometers from the border. Population and number of slaves are the counts for 1872 municipalities. Slaves per capita is the number of slaves per capita in 1872 for a 2010 municipality. We imputed the value in a 1872 municipality to all 2010 municipalities that composed a 1872 municipality. Racial Income Gap is the ratio of the income of black people over the income of white people.

Table B11: Slavery, Income inequality and Dutch Brazil

	Dependent variable					
	Slave per capita			Income Inequality - Gini Index (2010)		
	0 < d < 600	0 < d < 400	0 < d < 200	0 < d < 600	0 < d < 400	0 < d < 200
	Panel A: RD order 1					
Distance to Dutch Brazil	-0.0254***	-0.0232***	0.0143	-0.00109	0.00890*	-0.0162**
	(0.00664)	(0.00727)	(0.0104)	(0.00434)	(0.00510)	(0.00709)
	Panel B: RD order 2					
Distance to Dutch Brazil	-0.00151	0.0201*	0.000537	0.00730	-0.0191**	-0.0187
	(0.00898)	(0.0107)	(0.0149)	(0.00644)	(0.00763)	(0.0114)
Observations	1,880	1,386	678	1,928	1,431	695
Mean Dep. Var.	0.105	0.110	0.136	0.535	0.540	0.547

The dependent variables are the number of slaves per capita in 1872 and 2010 Gini index. Distance to Dutch Brazil is the distance, in kilometers, to the Dutch Brazil border. Each column has a different sample based on the municipality's absolute distance to the border. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. When *** p<0.01, ** p<0.05, * p<0.1.

Table B12: Dutch Brazil and Racial Income Gap

	Racial Income Gap - Ratio between average income of blacks and whites (2010)		
	0 < d < 600	0 < d < 400	0 < d < 200
	Panel A: RD order 1		
Distance to Dutch Brazil	0.0297	0.0259	0.0154
	(0.0198)	(0.0226)	(0.0309)
	Panel B: RD order 2		
Distance to Dutch Brazil	0.0335	0.0132	-0.0137
	(0.0272)	(0.0313)	(0.0438)
Observations	1,928	1,431	695
Mean Dep. Var.	0.776	0.767	0.765

The dependent variable is ratio between the income of black population over the income of white population. Distance to Dutch Brazil is the distance, in kilometers, to the Dutch Brazil border. Each column has a different sample based on the municipality's absolute distance to the border. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table B13: Slavery, Income inequality and Tordesillas ($46^o37'$): Linear, Polynomial and Local Randomization RD estimates

	Dependent variable: Slaves per capita (1872)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	0.0479***	0.0879***	0.0432***	0.0390	0.0317***
	(0.00944)	(0.00561)	(0.00798)	(0.0275)	(0.0113)
	Panel B: RD order 2				
Distance to Tordesillas	0.0176	0.0537***	0.0174	-0.107	0.0900***
	(0.0179)	(0.0106)	(0.0132)	(0.106)	(0.0262)
	Panel C: Local Randomization RD				
					All
Distance to Tordesillas	0.060***	0.029***	0.060***	0.057***	0.026***
Observations	2,342	4,560	2,479	590	1,716
Mean Dep. Variable	0.141	0.120	0.144	0.175	0.115

	Dependent variable: Income inequality - Gini Index (2010)				
	73 < d < 500	73 < d < 1000	36.5 < d < 500	73 < d < 200	73 < d < Opt. BW
	Panel A: RD order 1				
Distance to Tordesillas	-0.0181**	0.0151***	-0.00679	0.0413*	0.0113
	(0.00737)	(0.00435)	(0.00639)	(0.0226)	(0.0116)
	Panel B: RD order 2				
Distance to Tordesillas	0.0128	-0.0475***	0.0287**	0.0399	0.0820**
	(0.0161)	(0.00834)	(0.0115)	(0.0921)	(0.0329)
	Panel C: Local Randomization RD				
					All
Distance to Tordesillas	0.025***	0.038***	0.025***	0.007	0.029***
Observations	2,374	4,608	2,513	611	1,249
Mean Dep. Variable	0.500	0.498	0.500	0.509	0.503

The dependent variables are the number of slaves per capita in 1872 and 2010 Gini index. Distance to Tordesillas is the distance, in kilometers, to the East side of the Tordesillas meridian. Each column has a different sample based on the municipality's absolute distance to the Tordesillas meridian. Each panel presents the estimates for a different specification. Panel A uses a linear RD, while Panel B uses a quadratic RD. Panel C presents the estimates for local randomization RD. Robust standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.

Table B14: SFD estimates of skin color on individual income

	Spanish Brazil					Portuguese Brazil				
	Dependent variable: Individual income (log)					Dependent variable: Individual Income (log)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Skin Color	-0.065***	-0.121***	-0.107***	-0.107	-0.107**	-0.052***	-0.185***	-0.129***	-0.129**	-0.129***
	(0.009)	(0.032)	(0.032)	(0.068)	(0.045)	(0.009)	(0.032)	(0.034)	(0.043)	(0.037)
Skin Color sq.		0.006*	0.006*	0.006	0.006		0.013***	0.010***	0.010**	0.010***
		(0.003)	(0.003)	(0.007)	(0.005)		(0.003)	(0.003)	(0.004)	(0.004)
Female			-0.138***	-0.138***	-0.138***			-0.265***	-0.264***	-0.264***
			(0.030)	(0.022)	(0.034)			(0.035)	(0.032)	(0.040)
Age			0.014***	0.014***	0.014***			0.012***	0.012***	0.012***
			(0.001)	(0.001)	(0.002)			(0.002)	(0.002)	(0.002)
Education			0.057***	0.057***	0.057***			0.057***	0.057***	0.057***
			(0.005)	(0.005)	(0.006)			(0.005)	(0.007)	(0.007)
Afro			0.186**	0.187**	0.187**			-0.119	-0.118	-0.120
			(0.078)	(0.079)	(0.087)			(0.090)	(0.079)	(0.113)
Indigenous			-0.007	-0.006	-0.006			-0.081	-0.081	-0.083
			(0.122)	(0.168)	(0.156)			(0.142)	(0.152)	(0.172)
Mulata			0.127**	0.127	0.127			-0.035	-0.034	-0.036
			(0.063)	(0.109)	(0.090)			(0.077)	(0.092)	(0.081)
White			0.112*	0.113	0.113			0.000	0.001	-0.000
			(0.066)	(0.117)	(0.095)			(0.080)	(0.097)	(0.093)
Wave F.E.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State F.E.				✓					✓	
Municipality F.E.					✓					✓
Covariates* F.E.			✓	✓	✓			✓	✓	✓
Observations	2088	2088	2034	2034	2034	1826	1826	1761	1761	1761
Adjusted R^2	0.02	0.02	0.26	0.26	0.25	0.02	0.03	0.23	0.23	0.21

Covariates* include employment, location, marital status, and religion fixed-effects.
The dependent variable is log of individual income. Each panel includes separate estimates for municipalities on the Spanish and Portuguese sides of the Tordesillas line. The data pools 4 waves of the AmericasBarometer Survey data LAPOP (2012, 2014, 2016, and 2018).
Standard errors in parentheses. When *** p<0.01, ** p<0.05, * p<0.1.