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**How Bodo Became Brazilian:
European Migration to Southern Brazil Before World War I**

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Abstract:

This paper studies the long-term consequences of the government-sponsored programs of European immigration to Southern Brazil before the Great War. We find that the municipalities closer to the original sites of nineteenth century government sponsored settlements (*colônias*) have higher per capita income, less poverty and dependence on *Bolsa Família* cash transfers, better health and education outcomes, less homicides; and for the areas close to German colonies, also less inequality of income and educational outcomes than otherwise. Since that is a reduced form relationship, we then attempt to identify the relative importance of more egalitarian landholdings and higher initial human capital in determining those outcomes. Our findings are suggestive that more egalitarian land distribution played a more important role than higher initial human capital in achieving the good outcomes associated with closeness to a *colônia*.

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I. INTRODUCTION

The persistence of economic development has spurred a growing literature on the long-term, slow-moving determinants of economic and social outcomes, and how they are shaped by endogenous processes and historical accidents (e.g. Engerman and Sokoloff 1997; Acemoglu, Johnson and Robinson 2001, 2002; Nunn 2007; Banerjee and Iyer 2010). During the first century since independence in 1822, both government and wealthy private citizens in Brazil struggled to attract immigrants to populate the vast unoccupied lands in the subtropical areas in Southern Brazil. Between 1824 and 1918, the Brazilian government subsidized the settlement of non-Iberian European immigrants (colonists) in the rural areas of the southern and southeastern provinces/states, of which a lion's share of those colonists headed to the province/state of Rio Grande do Sul, the southernmost one in Brazil. In this paper, we explore the government sponsored programs (official colonies) for settlement of European immigrants in the extreme south of Brazil as a natural experiment in history.

It has long been argued that the local economies and societies that emerged from those colonization programs were different in many dimensions from those in other parts of Brazil: those official colonies had more equitable land distribution, received larger transfers from the central government, and the colonists in general had a higher level of human capital than the typical backlander Brazilian (sometimes referred as the *caboclo*). Almost two hundred years after the first group of German immigrants settled in Colônia São Leopoldo in 1824, the state of Rio Grande do Sul (henceforth, RS) is one of the most prosperous in the Brazilian federation and one of the most developed areas in Latin America. While its per capita income has fluctuated in between 13 and 46 percent higher than the Brazilian average for the recent period (1985-2007) for which a consistent series of annual state GDP series is available, in many welfare indicators (e.g. life expectancy) it holds the lead amongst all Brazil states (PNUD, 2003). Moreover, within the state of Rio Grande do Sul (exclusive of the state capital), there is a 19 percent gap in log relative incomes between the counties (*municípios*) that were sites of government sponsored colonies and the ones that were not, or a gap of 7¼ percentage points after we control for population size (in a linear regression). The relative success of those local economies may hold clues to understanding the process of economic development and the factors that have held back other parts of Brazil and the developing world.²

In this paper, we contrast the experience of counties (*municípios*) where official colonies were installed with those without them; and whether there were differences between the colonies populated by Germans, Italians and other Europeans (mostly Poles, Austrians, Frenchmen and Russians). We identified 49 official settlements (*colônias*) in that state,

² In 2009, Brazil's GDP per capita was about US\$10,500 (PPP in current dollars, source: IMF/WEO).

established between 1824 and 1918, of which some bore fruit and laid the ground work for prosperous middle sized towns, while others failed miserably, surviving only in the historical records (for details on our database of colonies, see the appendix). Of those official colonies, 18 were settled exclusively by German colonists, 21 by a combination of colonists of German and other nationalities; and 10 without the German element. For each settlement, we identified the present-day municipality where it was located and its date of inception. From its geographical location, we know the temperature, soil quality, altitude, rain patterns and distance to the capital for each municipality, which we use to control for environmental factors affecting long-term development outcomes.

While the settlers in the areas around the official colonies had to live under the Brazilian laws and institutions, their success or failure relative to other areas and the differences among different colonies inform us about the importance of the features that made them different. First, the government sponsorship may have given an initial advantage that set in motion cumulative processes, perhaps related to agglomeration economies, which made those locations more productive even in the long-run. Second, colonists may have started off with more human capital than other peoples in 19th century Brazil. Enrollment rates of children age 5-14 were more than 70 percent in Germany as early as the 1860s (as early as the 1830s for Prussia for which earlier data is available); about 30 percent in Italy in 1870 when the first Italian colonies were settled in RS (Lindert 2004, pp. 91-93). The same source has enrollment rates of 10 percent for Brazil in 1900.³ Third, the land grants may have generated a more equitable distribution of land property or a different agrarian structure more conducive to development than the one found in other parts of the country.⁴ Data from the Census of 1920 shows a marked difference in land concentration between municipalities with official colonies and those without. The (unweighted) average land gini for the 30 municipalities with official colonies was 0.57 (and as low as 0.25 in the municipality of São Leopoldo, the first German colony); and 0.67 for the 41 municipalities without an official colony. Finally, colonists may have brought to Brazil different civic traditions (Putnam, 1993, Knack and Keefer, 1997), culture (Guiso, Sapienza and Zingales, 2006), or preferences or opinions about the importance of a formal education (Kreutz 2000).

Thus the experience of official colonies in Southern Brazil provides an interesting natural experiment in history for inferring the importance of different mechanisms posited to play a

³ Easterly and Levine (2009) argue in favor of an important role for human capital in long-term development of former colonies. De Carvalho Filho and Colistete (2010) find that in the state of São Paulo, immigrant farm-laborers from countries where public schooling was already established may have played an important role in the early development of locally-funded public instruction, with long-lasting consequences for human capital and income levels.

⁴ The title of this paper is a reference to Riegelhaupt and Forman (1970) "*Bodo Was Never Brazilian...*" about the historical absence of the small holder in the Brazilian rural areas.

role in long-term development in the literature. The colonies were different than other parts of the country in human capital, ethnic and religious composition, preferences towards education, and agrarian structure. Among themselves, the colonies were also diverse in terms of the quality of the infrastructure, soil quality, environmental conditions (rain, climate, altitude, access to navigable rivers etc) of the colonies, and the ethnic and religious composition of colonists.

This study relates to a growing literature on historical determinants of local institutions and economic performance. Naritomi, Soares and Assunção (2007) study the colonial origins of institutions in Brazil looking back to the sugar-cane and gold cycles of the seventeenth and eighteenth centuries. Martínez-Fritscher, Musacchio and Viarengo (2010) study the political economy of education in Brazil during the period of increased decentralization of revenues after the proclamation of the Republic. De Carvalho Filho and Colistete (2010) study the connections between the coffee cycle, European immigration of farm laborers and the establishment of public instruction institutions in the state of São Paulo.

We will proceed as follows. In the next section, we will introduce the history behind the official settlements in RS; in section II, we present the data underlying our empirical work; in section III, we discuss our empirical strategy and reduced form results relating a wide array of outcomes to proximity to an official colony; in section IV, we attempt to disentangle the roles played by two distinctive characteristics of official colonies: a more egalitarian land distribution; and greater human capital of the immigrants. Finally in section V we conclude.

II. THE HISTORY BEHIND THE OFFICIAL SETTLEMENTS IN THE RIO GRANDE DO SUL

Twenty or thirty years ago, the life of a German labouring man was not what it now is, or is fast becoming. Small states had stern laws, and, in the larger ones, multitudinous restrictions gave little room for free expansion. Trade, throttled in its medieval swathing-clothes, was often dull, prices and wages low, manufactures, in some states, in something like to infancy; thereto came political dissensions, military service, bad harvests, with hunger-typhus in the rear; so that a poor man might ell come, and that not seldom, to feel pinched. Thus the devil drove; the desire of those who ruled the councils of Brazil to replenish their land opened a way. After the formal denunciation, followed, about 1850, by the practical suppression of the slave trade, this dilettante desire became an imperative necessity; hence forward agents were constantly at hand in Europe, with all their paraphernalia of puffs, placards, and pamphlets, to assist the harassed German in his attempt to escape a bitter present, to allure him with sunny pictures of the future.

In sooth it was a real case of needs must, and the two necessities played perfectly into each other. Ship after ship disembarked its human cargo, colony followed colony into the bowers of the Eldorado.

(Jacaré-Assú, 1873)

A. History

In 1808, the province of São Pedro do Rio Grande do Sul (later to become a state, with the promulgation of the Republic in 1889; henceforth also referred as RS) was inhabited by 87,000 people spread in a territory with an area similar to modern day Italy. In 1830, population had doubled and by 1872 it reached 446,000 people. Among those, 16% were slaves, not unlike the Brazilian average (Marcílio 1974).

Given its remoteness, its economy was little connected to the rest of the Brazilian territory until the first half of the 19th century as the production of dried salted meat (called *charque*, similar to jerked beef) for export to the coffee producing areas in the Brazilian southeast transformed the southernmost part of the state, the Campanha region, into a dynamic export center. Large landholdings were then the norm on the fields of the Campanha, and the production of *charque* was carried out by African slaves and their descendents. In 1861, $\frac{3}{4}$ of the province exports were accounted for by *charque* and hides; while in 1868, slaves accounted for 40% of the population of Pelotas, the main commercial center of the Campanha (Herrlein 2004).

The peculiarities of Rio Grande do Sul go a long way explaining why statesmen in the Portuguese and later Brazilian Imperial court were concerned with the occupation of the empty lands.

First, the province had strategic importance due to its location in the border between the original Portuguese and Spanish dominions in the Southern Cone (Figure 1). This is highlighted in its recurrent history as a site of military clashes and skirmishes before and after Brazil and its neighboring countries became independent, as well as a history of long and bloody internal conflicts.⁵ Second, there was an economic rationale for immigration as RS shared the low labor/land density characteristic of most other parts of nineteenth century Brazil. For a long time, the importation of African slaves was crucial for the expansion of the Brazilian economy as it mitigated the problem referred at the time as “lack of arms” (*falta de braços*).⁶ During the 19th century, the growing pressure against slavery and the slave traffic called for alternative means to supply the labor force.⁷ Third, the formation of *colônias* served well the interests of the Emperor as it increased his relative power vis-à-vis the large landowners in the province. This rationale may also be valid for the later Republican era until the First World War, because the hegemonic political party during the first decades of the republican period, the Partido Republicano Riograndense, also saw the large landholding interests from the south of the state as rivals (Targa 1991). Last but not the least, there may have been also racist considerations (Andrews 1988 argues that after abolition, Afro-Brazilian were not offered less opportunities than newly arrived European immigrants) or what one may call more benign Teutonic sympathies by Emperor Pedro II, himself a fluent German speaker and son of a Viennese princess.

The first official colony in RS was established only two years after the Brazilian independence, in 1824, when a first batch of 126 German immigrants settled in the old Royal flax factory in the newly established colony of São Leopoldo in the valley of the Rio Sinos some 50 miles from the provincial capital of Porto Alegre (for our list of government sponsored colonies in RS, see Table 1). In the first experiments with official settlements, immigrants were promised generous support: free transport from an European port to the colony, 77 ha of land for each family, livestock and cash support for one year (Roche 1969,

⁵ During the 19th century, modern-day Uruguay was invaded twice (1811-12 and 1816-18), and the Cisplatina War (1825-28), the River Plate War (1851-52), and the Paraguay War (1864-1870) were fought. Internal conflicts were not less frequent or deadly. The Farroupilha Revolution (1835-1845), a separatist insurrection, caused thousands of deaths and split the province for a decade. In the aftermath of the end of Monarchy, violent conflict again erupted with the Federalist Revolution (1893-1895) as groups jockeyed for greater state autonomy.

⁶ Holloway (1974) studies the problem of lack of arms in the coffee plantations of Southeast Brazil; for a contemporaneous account, see Grossi (1905).

⁷ Reis and Reis (1988).

p.95). The combination of push factors in the origination countries and the rich incentives generated a remarkable flow. Before the Farroupilha Revolution (1835-1845) interrupted immigration for ten years, 4856 colonists had arrived to that colony alone.⁸ Table 2 shows the proportion of foreigners in RS and Brazil for 1872 through the present – in 1900, the foreigners accounted for 12% of the population of that state and about 6% of Brazilian population.

Between 1824 and 1848, official settlement was financed by the Empire and coordinated erratically. After the end of the Farroupilha Revolution, the provincial government started to take part in the settlement project and there was a gradual reduction in the incentives. In 1851, provincial legislation established that land grants would be reduced to 48 ha lots; in 1854, incentives were further weakened by legislation determining that lots would not be granted anymore, but sold to the settlers with subsidized credit, while the transportation from the port of Rio Grande to the *colônia* remained free (Roche 1969, p.102).

For the first 50 years since the establishment of Colônia São Leopoldo, each one of the official settlements was occupied by German colonists. The first official colony with non-Germans was only established in 1870 in present-day Bento Gonçalves with Italians, Austrian and Frenchmen. From that date on, the flow of Italian settlers came to outnumber the German settlers and other Europeans (mostly Poles, but also Frenchmen and Austrians) started to become more common (Korndörfer 2009).

The typical German agricultural settlement in southern Brazil was organized around a *Schneiss* or *Pikade* (*picada* in Portuguese). That is a long, straight cut through the virgin forest along which individual settlers would receive long, narrow plots of land of one to two hundred acres at right angles of the road (James 1940; Luebke 1990). While some rural colonies organized by private entrepreneurs, such as Blumenau and Joinville (in the neighboring state of Santa Catarina), had roads and basic infrastructure waiting for the settlers, in the typical colony settlers would have to spend the first one or two years clearing the land before he could farm it (thus the need for a government stipend). Many those farmers soon adopted the native agricultural technique of slash and burn and planting indigenous crops such as manioc and maize (James 1940; Waibel 1950; Luebke 1990). There were also other adaptations to local customs: while the regulations that supported the creation of official settlement stipulated that immigrants were banned from owning slaves, enforcement of this provision was weak and ownership of slaves by colonists was not rare –

⁸ To bring some perspective, total immigration to Brazil between 1820 and 1929 was 4.5 million while the United States received during the same period 37.5 millions. In terms of ethnic composition, Germans accounted for 205,000 immigrants, less than 5 percent of total migration to Brazil, but almost 6 million or more than 15 percent of the total to the United States (Luebke 1990).

the first code of regulations of the São Leopoldo colony even stipulated that slaves could not suffer physical punishment after certain hours of the day (Tramontini 2000).

In the Republican period, starting in 1889, there was a diversification of the sources of migrants beyond the traditional source countries of Germany and Italy. As a matter of rhetoric, the state government advocated spontaneous voluntary migration, but its deeds heavily subsidized immigration. The state government would generally pay for the trip from the European port to the final destination (Roche 1969, p. 122). In 1865, Brazilian consulates in Europe would offer to cover the additional maritime transport cost to Brazil to attract immigrants that otherwise would have gone to the United States (Roche 1969, p. 101). Timmer and Williamson (1996, 1998) construct an index of immigration policy with the goal of measuring immigration policy stance, covering the period from 1860 to 1930, that highlights a very favorable policy stance in Brazil from the 1890s to World War I. Subsidies to other services such as hostelling, feeding the settlers while in transit and financing the acquisition of seeds were introduced and phased out every few years probably highlighting a combination of some hesitancy by policymakers (Roche 1969, p. 123) and the vagaries of the budget process. The legal and de facto instability of the system of subsidies may have played a role in limiting the flow of migrants to RS to a fraction of the contingents that flowed to Argentina or the United States – contemporaneous observers seemed to agree about Brazil's lack of attractiveness relative to the United States (Jacaré-Assu 1873) and immigration to Brazil was actively opposed by some European governments based on the grounds of poor treatment to immigrants. (e.g. Grossi 1905; Holloway 1980, pp.37).

B. The official settlements as a natural experiment

What were the criteria to determine where official settlements would be located? According to Roche (1969 p. 112), the European settlements were expected to be “seeds” of development, examples of prosperity to the locals. So, in the less populated areas, the expectation was that scattered agricultural nuclei would attract the settlement of Brazilians. The settlements in the Serra region were located in forested areas (Amstad 1924). Many of those settlements were created in the lower parts of the Serra as an *entrepôt* for the occupation of the region of the Plateau and to connect preexisting urban centers. There were also settlements which Roche (1969 p.177) calls *islands*, that were established in isolated areas as beachheads to occupy a surrounding region.⁹ Table 3 lists the distribution of official settlements according to the regional classification and Figure 2 shows the main regions of Rio Grande do Sul (Fonseca, 1983).

⁹ Some anecdotal evidence suggests that the settlements were not located in the best possible settings. Amstad (1924 p. 87) tells that migrants to the Santo Ângelo colony (created in 1855) were taken by boat to the vicinity of the site of the colony. Upon disembarking, they felt disappointed with the quality of the land and decided to return. To their surprise, the boat had departed leaving behind their belongings. Hence they settled there.

As Bandeira (1994) argues, there were considerable contingents of foreign migrants in all regions of RS, but the population growth of the descendants of immigrants from the Serra region stemmed from a larger fertility rate among the settlers. According to Roche (1924 p. 162) the average number of children in the German Catholic families that arrived between 1826 and 1828 was 8½ children in the first generation and 10.4 in the second one.¹⁰

In later generations, the descendants of the migrants moved to occupy other lands. Roche (1969) analyzed this phenomenon and pointed to the depletion of land productivity and the parceling out of plots among heirs.¹¹ In search of new land, the offspring of the first settlers moved first to the west of the state and later to the Plateau. Often they would seek vacant land, but close to other official colonies yet to develop further. Even before 1890, the immigrants' offspring sometimes traveled hundreds of kilometers to find their land (Roche, 343).

Until 1870 the settlements were, in general terms, ethnically homogeneous. After the German unification, however, there was a growing opposition to the establishment of homogeneous settlements, out of fear that a nascent German nationalism would jeopardize the territorial and cultural unity of Rio Grande do Sul. That fear was not completely unfounded. A German author published in 1864 a book with the title "Rio Grande do Sul oder Neudeutschland" in which the Province is called the "true Germania Nova" (Epp 1864, p.5). Thus the focus of policy shifted to seeking the formation of settlements combining immigrants from a diverse mix of country of origins.¹²

III. DATA

The sources for locating the colonies are the publications by Amstad (1924), Roche (1969) and Korndörfer (2009). The two first authors provide the names of the official settlements and the name of the municipality at the time of their creation. Korndörfer (2009) is a database developed with the help of researchers interested in genealogy and provides further information about the ethnic composition of each colony

¹⁰ According to Bandeira (1994), the early urbanization of the Campanha region made it an attractive magnet for the descendants of colonists, which upon establishing themselves in that new setting, would have much lower fertility rates than the ones left behind in the Serra region.

¹¹ For some authors, this loss of productivity was inherent to the system of cultivation based on 'land rotation', e.g. Waibel (1950).

¹² Amstad (1924, p.100), a German priest and prominent historian of German migration in Brazil, did not see with good eyes the mixing of families of different ethnic or religious groups in the same colony. This view was also shared by other observers such as Waibel (1950).

The matching of official colonies to meaningful political units was a challenge. In 1872, the first year of a reliable census in Brazil, there were only 33 municipalities in RS; in 2007, there were 496. Some of the official colonies blossomed and originated their own municipalities; others failed and their colonists dispersed. From a total of 52 official colonies, we could identify their present day municipality and ethnic composition of colonists for all but 3. The list of official colonies, with their establishment dates, current municipalities and ethnic composition is in Table 1.

IV. EMPIRICAL STRATEGY AND REDUCED FORM RESULTS

To begin with, we construct for each municipality, a set of measure of closeness to an official (or German, Italian or other European official) colony, given by the function $close_i$:

$$close_i^A = \begin{cases} \exp\left(-\alpha \min_{j|I_j^A=1} \langle i, j \rangle\right) & \text{if } I_i^A = 0 \\ 1 & \text{if } I_i^A = 1 \end{cases}$$

where the function $\langle i, j \rangle$ denotes the distance in miles between the centers of the municipalities i and j ; I_j^A is an indicator function equal to 1 if municipality j was the site of a colony of type A ; and α is a spatial discount factor, similar to a non-parametric kernel. For instance, the municipality of São Leopoldo, site of the first official German colony, has $close^{German} = close^{Any} = 1$, but $close^{Italian} = 0.19$ and $close^{Italian} = 0.17$ when the parameter α is set equal to $1/25$ (See Figures 4-5 for the geographical distribution of the municipalities with official colonies and the values of the closeness function for $\alpha = 1/25$).¹³ The results in this paper were obtained using α equal to $1/25$ but qualitative similar results could be obtained for a range of different choices of spatial discount factor.

The building block of our analysis is a simple linear econometric model relating an outcome of our interest Y to a set of proxies of closeness to an official colony and a set of exogenous time-invariant controls, using data at the municipal level:

$$Y = closeness \beta + Z \gamma + u \quad (1)$$

where Y is the outcome of interest; $closeness$ stand for measures of closeness to an official colony; Z includes natural geographic characteristics such as temperature, rain incidence and

¹³ When α is set to infinity, the function closeness equals to an indicator function for the municipalities with official colonies.

soil quality and u is an error orthogonal to X_T and Z . That is the regression specification reported in column (1) of Table 4.¹⁴

We also compare the results of regression (1) above with a specification where we introduce additional controls (population, population density, per capita income levels) to examine whether the association between official colonies and the variables of interest are robust (results reported in column 2 of Table 4).

Finally, we estimate a regression where we differentiate between closeness to German, Italian and other European colonies (see Table 4 (3)):

$$Y = \text{closeGerman} \beta_1 + \text{closeItalian} \beta_2 + \text{closeOther} \beta_3 + Z \gamma + u \quad (1a)$$

A. Does the location of settlement matter for present day distribution of cultural and ethnical attributes?

The premise behind this paper is that the location of colonies of immigrants from different ethnic or cultural backgrounds matter for the present day distribution of different ethnic or national origin groups in RS. That is not a moot question because colonists were very mobile, their fertility rate was very high, and their offspring often left their original plots behind to settle somewhere else in the agricultural frontier.¹⁵

To measure persistence of cultural and ethnical composition of the regions around colonies, the ideal would be to use some direct measure of ethnic heritage (such as in the U.S. Census). However, the Brazilian census does not collect information on ethnic heritage. The shortcut that we take is to proxy ethnic heritage through religion affiliation. There are sharp differences in religion between the two major ethnic groups of colonists: while Germans were either Catholic or Protestant, Italian settlers were in almost totality Catholic. Since the original populations of RS were in almost totality Catholic, one would expect that persistence would manifest through a higher prevalence of mainline Protestantism in the areas around German colonies, but not in the areas around Italian ones.

The results are promising. We find no evidence that closeness to a generic colony increases the proportion of Catholics (Table 4, row 1, columns 1-2), but we find that a significant negative (positive) effect of closeness to a German (Italian) colony, as one would expect if the prevalent religion when the colonies were established still persisted nowadays. In

¹⁴ Notice that those results rely on the assumption that the original location of official settlements and ethnic distribution of immigrants was exogenous to the outcomes of interest, conditional on the vector of natural characteristics Z .

¹⁵ Roche (1954) documents the rural-to-rural migration among settlers in RS

quantitative terms, a municipality that hosted a German colony has 12 percent less Catholics than one away from any such colony; on the other hand, presence of an Italian colony increases the proportion of Catholics by almost 20 percentage points. We could not find evidence of difference between “other Europeans” and German colonies.

The effect on prevalence of mainline Protestants (Lutherans, Presbyterians, Methodists, Baptists, Congregationalists, Evangelicals, Adventists, Anglicans and Mennonites) confirms the general pattern. Since Protestants settled in RS in colonies, closeness to any colony is correlated positively with proportion of Protestants; German colonies more so, but Italian colonies are negatively correlated with Protestantism (row 2).

Thus we have established that while migrants were undeniably footloose and their offspring dispersed in the agricultural frontier, colonists left their footprints behind: the closer a county is from an official colony populated by Germans, the more prevalent is mainline Protestantism nowadays.

B. Effects of official colonies on present-day macroeconomic variables

Proximity to a colony site is correlated with **population density** in 2000 (row 4), the more so for German colonies. This indicates that colonies played the role of seeds for regional economic development (Roche 1969). The regression where we attempt to distinguish the effect of German colonies from the others show a somewhat stronger effect of closeness to a German colony, which we may attribute to German colonies being on average older than non-German ones.

The **Human Development Index (HDI)** is also higher nearby official colonies (row 5). The magnitude of the effect is such that if that if the Brazilian average HDI (78th in the 2009 UNDP rank) increased by the magnitude of the effect on HDI of maximum closeness to a colony, it would climb 9 positions in the HDI ranking of countries. The effect of the colonies on the HDI index vanishes once we control for population, population density and per capita income, but that is likely due to the direct effect of per capita income on the HDI. We also do not find any significance difference related to the origin of colonists.

Per capita income is significantly higher nearby official colonies (row 6). Municipalities that were the site of colonies are 16½ percent richer than those away from a colony. This effect is significantly stronger for the sites of colonies with non-German, non-Italian colonists. In line with the findings on per capita income, **poverty rates** (row 7) are also lower the closer a municipality is from an official colony – while the average unweighted municipal poverty rate is 26 percent, sites of colonies have poverty rates almost 10 percentage points lower than municipalities away from any colonies.

The lower poverty rate in the neighborhood of colonies, however, is not only due to higher income levels, but more equitable **income distribution** plays a role (row 8). While the average unweighted municipal Gini index is 0.52, the colony effect reduces the Gini by 0.045 (column 1). To add credibility to claims of causality directly stemming from the presence of immigrant colonies, the coefficient on closeness to a colony is robust to adding ‘endogenous controls’ such as population density and per capita income to the regression.

In summary, the neighborhoods of colonies have higher per capita income, more dense population and less poverty than other areas of the state. Moreover, the evidence seems to favor the hypothesis that there is a direct effect from existence of a colony to a more equitable income distribution in the present.

C. Effects on health, education and other social indicators

Effects on **health outcomes and inputs** are reported in rows 9-12. Closeness to a colony has a significant effect reducing child mortality, increasing life expectancy and increasing the availability of physicians (column 1) – but no effect on the proportion of nurses with a higher degree, an indicator of quality of health providers. However, each of these effects is not robust to including controls for population, population density and income, which suggests that those variables may be the proximate causes of the better health indicators (while not denying the possibility that population, population density and income levels are themselves influenced by proximity to a colony). As regards differences between colonies across ethnic origins, we could find no significant difference.

The **effects on education** are also strongly significant and favorable to the areas close to colonies (rows 13-18). Closeness to an official colony is negatively correlated to **illiteracy** rates (average of 9.2 percent in the baseline), but unlike the health related variables, most of this effect vanishes when we add controls for population, population density and income to the equation. When assessing separately the effects of colonies of different origins, we find a significant difference between German and Italian colonies, with the former being associated with 5 percentage points less illiteracy than the latter.

The effect on **high school test scores (ENEM)** show a large significant effect of closeness to an official colony (row 14).¹⁶ While the (unweighted) standard deviation of average scores by municipality is 0.07, the effect of a colony site is 0.057 without controls for population, population density and income, and 0.04 when those controls are added. When separating the effects by origin of colonists, closeness to German colonies is again associated with significantly better education outcomes than the other origins.

¹⁶ ENEM is a nationwide exam for concluding high school students with a very high take-up rate. To construct mean scores, we run a regression of individual Z-scores on interactions of age, gender and latest degree concluded; save the residuals; and aggregate them by municipality or minimal comparable area.

We next examine whether there is any effect on the intra-municipality dispersion of test scores. If one of the distinguishing consequences of official colonies is to bequeath a more equitable society, one would expect a smaller dispersion of test scores, just as well as we found smaller Gini coefficients around the colonies. The results are reported in row 15, which shows a small negative but significant effect of closeness on the dispersion of scores. Moreover, this result seems robust to adding controls for population, population density and income (column 2) and we also find significant differences between German and other European colonies – with German colonies associated with less dispersion in test scores.

We then look at two measures of **school enrollment** we build from the Census of 2000: the net enrollment rate ages 10-14 and the private school enrollment ages 7-17 (rows 16-17). The choice of the age range for the net enrollment rate follows the literature on child labor and school enrollment in Brazil (the minimum legal age for working in Brazil is 14).¹⁷ The effects on 10-14 enrollments are small but not robust to including additional controls. As regards enrollment in private schools, one could expect that the culturally isolated nature of some of the official colonies would be fertile ground for private institutions of learning that would preserve specific cultural or religious heritages. To our surprise, although we find a relatively large effect of closeness to colonies, this effect all but vanishes once controls for population, population density and income are included in the regression, which suggests that while children living close to colonies are more likely to attend a private school, that might be related to them being richer or living in a more densely populated municipality.

The findings of lower illiteracy rates, higher average and lower dispersion of test scores in the areas around German colonies may be explained as a long-term effect of early introduction of rural primary instruction and a higher initial human capital in the nineteenth century. Since the early years of immigration, European immigrants demanded public instruction (Kreutz 2000, pp. 161). Even when the government did not provide it, they often organized community schools along confessional lines. Among all immigrant groups, the importance of community school was more salient for German-Brazilians, who organized a network of rural schools to maintain their links with *Deutschtum* and *Gospel* (Willems 1955), and even to this day some of the towns with the highest education indicators in Brazil were originally sites of German settlements – 33 of the 50 municipalities with the highest literacy rates in 1991 were located in RS (Kreutz 2000, 2005).¹⁸

¹⁷ E.g. de Carvalho Filho, 2008.

¹⁸ In a study of the early years of public instruction in the state of São Paulo, de Carvalho Filho and Colistete 2010 found a positive relationship between the proportion of farm hands that were foreign-born and locally-financed educational expenditures in the first decade of the twentieth century; and that those variables are also correlated with test scores today. Bezerra (2001) studies the history of the German rural school in the state of São Paulo.

The **proportion of Bolsa Família recipients** is both a measure of dependence from federal government transfers and also incidence of poverty – the Bolsa Família is a means tested cash transfer aimed at poor families with children.¹⁹ As one would expect considering the higher income and lower inequality in the surroundings of the official colonies, there is a significant negative effect of closeness to colonies on the incidence of Bolsa Família (row 18). This effect is about 1/3 of the baseline average. However, the results are suggestive that the bulk of the effect is indirect, channeled through higher income levels, instead of a direct effect related to extra-income characteristics of the colonies areas.

Finally, one of the most important policy problems in Brazil are high levels of violence, not only in the large urban centers, but also more recently even in small and medium-sized towns, such as most of the municipalities in our sample. We find a negative significant effect of proximity to colonies on homicide rates and this effect is robust to inclusion of additional controls.

In summary, closeness to an official colony is associated with better health indicators, illiteracy and educational outcomes, perhaps in large part because the areas close to colonies have greater population density and are richer than elsewhere in the state. They are also less dependent on transfers to families from the federal government and have lower homicide rates. Finally, German colonies are associated with a distribution of high school test scores with higher mean and lower dispersion.

D. Effects on local fiscal policy

We have found that closeness to official colonies is associated with some better educational outcomes. We now explore whether this might reflect different **patterns of municipal expenditure** (in Brazil, municipalities are usually responsible for elementary education, while secondary education falls under the wings of the state government). In rows 20-22 we report the results for per capita education expenditures, the share of the municipal budget dedicated to education and the share of the municipal budget allocated to overhead costs (a proxy for waste or inefficiency). Our results show no evidence that the municipalities close to official colonies have different expenditure patterns as far as those measures go.

E. Effects on culture

The literature on cultural differences across ethnic groups has focused on different attitudes towards families that are persistent across generations and that European immigrants seem to have carried to the New World (e.g. Alesina and Giuliano, 2007; Giuliano, 2007). We focus

¹⁹ For details of Bolsa Família, see Hall (2006).

on two variables: the **fertility rate**,²⁰ and the **share of adults of age 20-29 that are not heads of their own household or head spouses, and are related to the head of the household** (henceforth, housing dependency).

We find a negative significant effect of closeness to colonies on fertility rates, but the effect seems to be intermediated by the additional controls, not a direct effect of the official colonies. As regards housing dependency, we find significant positive effects of closeness to colonies on housing dependency. The effect is mitigated once we use additional controls, but remains strongly significant. Somewhat in line with the literature on living arrangements across European ethnic groups (e.g. Giuliano 2007), we find a higher housing dependency associated with the municipalities close to Italian colonies than elsewhere in the state (but only marginally significant), but we could not find significant differences between German, Italian or other colonies.

V. UNBUNDLING THE *COLÔNIAS*

Recapitulating the results from the previous section, we have found that closeness to an official colony is associated with higher per capita income, less poverty and dependence on Bolsa Família transfers, better health and education outcomes, and less homicides; and less inequality of income and educational outcomes for areas close to German colonies. Those are reduced form relationships and the point of departure of this section.

The differences in outcomes between the areas near the official colonies from the others may be explained by a variety of factors. First, those communities may have benefited from an initial heads-up from the government subsidies. Second, the immigrants brought with them a tradition of education that was unprecedented to nineteenth century Brazil. Third, the egalitarian land distribution of the official colonies differed from the landholding patterns of other regions of Brazil and the state.

We would like to unbundle the effects of a more egalitarian land distribution and greater initial human capital, taking advantage of the wide dispersion we find in those variables within Rio Grande do Sul state in 1920.²¹

There were indeed wide differences in landholding inequality and literacy rates across Rio Grande do Sul municipalities in 1920 (See Figure 6). Across 71 municipalities, the mean land

²⁰ That is the total fertility rate of women over 30.

²¹ Acemoglu and Johnson (2005) unbundled the “property rights” and “contracting” institutions by exploiting exogenous variation that plausibly affected each one of the types of institution separately.

gini is 0.62 with a standard deviation of 0.19.²² For a comparison, the Colombian municipalities studied in Acemoglu et al. (2008) have a mean land gini of 0.65 with a standard deviation of 0.10. For literacy rates of those 15 and older, the mean is 0.52 with a standard deviation of 0.12 and they range from 0.274 to 0.837.

With the goal of uncovering the relative importance of human capital and landholding patterns, we identify a first-stage relationship between official colonies and land gini and literacy rates in 1920. We estimate the equations:

$$\begin{aligned} \text{land_gini}_{1920} &= \text{AnyColony} \alpha_{11} + v_1 \\ \text{literacy}_{1920} &= \text{AnyColony} \alpha_{21} + \text{GermanColony} \alpha_{22} + v_2 \end{aligned}$$

where *AnyColony* is the measure of closeness to any official colony *GermanColony* is the measure of closeness to a German colony. The results are presented in Table 5. We find a strong negative relationship between land ginis and closeness to official colonies and that this relationship is not conditional on the national origin of the settlers (columns I-II). For literacy rates, the results in column III show that the areas nearby German colonies were remarkably different in their literacy rates than other areas.

Then for the second-stage regression, we estimate the following specification, using *AnyColony* and *GermanColony* as instruments for land gini and literacy rates:

$$Y = \text{land_gini}_{1920} \beta_1 + \text{literacy}_{1920} \beta_2 + \mu \quad (2)$$

where Y is the outcome of interest; the land gini and literacy rates were taken from the Census of 1920 and μ is an orthogonal error term.²³

We present the reduced form regressions on Table 6. We find a negative effect of 1920 land ginis on population density, HDI, life expectancy and school enrollment 10-14; and a positive effect for poverty rates, income inequality, child mortality and incidence of *Bolsa Família* families. With the exception of the school enrollment measure, a more egalitarian land distribution in 1920 due to proximity to colonies is for all other significant specifications associated with good outcomes.

²² Land ginis for municipalities in Rio Grande do Sul in 1920 range from 0.201 to 0.840 (the 25th and 75th percentiles are respectively 0.492 and 0.751)

²³ Instead of using minimal comparable areas (MCA), we decided to rebuild the 1920 map of the state using the 1997 municipal boundaries. This technique is not as rigorous as the MCA procedure. Nevertheless, it was necessary to use it in order to obtain a more detailed and meaningful map of the state.

The results for the effect of 1920 literacy rates are statistically insignificant except a negative effect of literacy rates on present day fertility rates, in line with the known regularity that fertility rates tend to be lower for more educated societies. Somewhat surprisingly, literacy rates in 1920 do not seem to have caused test scores today, but the estimated coefficient at least have the expected sign (a higher literacy rate in 1920 being associated with higher test scores today).

In short, areas close to official colonies had less concentrated landholdings in 1920, and this may have resulted in greater population density, HDI and lower poverty rates and income inequality today. For the health and education outcomes, past land inequality again seems to dominate the human capital channel, but for the education outcomes standard errors are very wide and we cannot establish statistical significance. There is also a highly significant connection between past land inequality and the incidence of *Bolsa Família* transfers, but no connection to past literacy rates. Finally, the only contemporaneous variable that is significantly related to past literacy rates, conditional on past land inequality, is the fertility rate – the higher the literacy rate in 1920, the lower the fertility rate in 2000.

VI. CONCLUSION

The study of the mechanisms behind the long-term processes that determined the development successes or failures of countries and regions is crucial for formulating policies and shaping institutions likely to conduce to higher living standards in developing countries. In response to that demand, several recent works have drawn lessons from history to understand the forces of economic development (Engerman and Sokoloff 1997; Acemoglu, Johnson and Robinson 2001, 2002; Naritomi, Soares and Assunção 2007; Nunn 2007, 2010; Banerjee and Iyer 2010).

This paper draws from the historical natural experiment of government sponsored immigration to the southern state of Rio Grande do Sul in Brazil. We have assembled a unique database of official colonies in that state and matched their original sites to present-day municipalities. We found that municipalities in that state that were close to the site of a government subsidized settlement of European immigrants are different in several dimensions from the ones that are not: closeness to an official colony is associated with higher per capita income, less poverty and dependence on *Bolsa Família* transfers, better health and education outcomes, less homicides; and for the areas close to German colonies, also less inequality of income and educational outcomes.

Those differences may be explained by a variety of factors. First, those communities may have benefited from an initial heads-up from the government subsidies. Second, the immigrants may have brought with them a tradition of education that was unprecedented to nineteenth century Brazil. Third, the egalitarian land distribution of the official colonies differed from the landholding patterns of other regions of Brazil and the state.

We attempt to sort out the relative importance of those different mechanisms by estimating, using two-stage least squares, a model relating present-day development outcomes to land inequality and literacy in 1920, using the measure of closeness to a colony and to a German colony as instruments. We find that 1920 egalitarian landholdings appear in general more strongly associated with good outcomes today than the 1920 literacy measure.

These findings at a first glance appear at odds with those obtained in the influential paper a Colombian setting by Acemoglu et al. (2008). That paper finds that a higher concentration of landholdings in the past is associated with greater development, calling into question the near consensus in the profession that blames economic inequality for some development maladies (North 1959; Ferreira 1999). Nevertheless the comparison may be inappropriate due to the much wider range of observed land inequality in our sample if the long-run benefits from a more egalitarian landholding distribution accrue only when ginis are below a certain threshold.

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Table 1. List of government sponsored (official) colonies in Rio Grande do Sul (1824-1918)

Name of colony	Year of establishment	Name of current municipality	Germans	Italians	Other Europeans
São Leopoldo	1824	São Leopoldo	Yes		
São João das Missões	1825	N/A	Yes		
São Pedro das Torres	1826	Torres	Yes		
Sao Pedro de Alcantara	1826	Torres	Yes		
Três Forquilhas	1826	Três Forquilhas	Yes		
São José do Hortêncio	1827	São José do Hortêncio	Yes		
Feliz	1846	Feliz	Yes		
Santa Cruz	1849	Santa Cruz do Sul	Yes		
Santo Ângelo	1857	Agudo	Yes		
Nova Petrópolis	1858	Nova Petrópolis	Yes		
Monte Alverne	1859	Santa Cruz do Sul	Yes		
Dona Isabel	1870	Bento Gonçalves		Yes	Austrian, Frenchmen
Conde D'eu	1870	Garibaldi	Yes	Yes	Austrian, Frenchmen
São Feliciano	1874	Dom Feliciano			Poles, Frenchmen
Fundos de nova Palmira	1875	Caxias do Sul		Yes	
Silveira Martins	1877	Silveira Martins		Yes	
Col. Mil. Alto Uruguai	1879	Três Passos			
Municipal (Pelotas)	1882	Pelotas	Yes	Yes	Poles
Alfredo Chaves	1884	Veranópolis	Yes	Yes	Prussians, Poles
Antônio Prado	1885	Antônio Prado		Yes	Poles
Barão do Triunfo	1888	Barão do Triunfo	Yes		
Mariana Pimental	1888	Mariana Pimentel	Yes	Yes	Poles
Maciel	1888	Pelotas		Yes	Poles
Vila Nova de Santo Antônio	1888	Santo Antonio da Patrulha		Yes	
Vila Nova	1888	Turuçu	Yes		
Jaguari	1889	Jaguari	Yes	Yes	
São Vicente	1889	Jaguari	Yes		
São Xavier	1889	Porto Xavier	Yes		
Botucaraí	1890	Cachoeira do Sul	Yes		
Dona Francisca	1890	Dona Francisca	Yes	Yes	
Ijuí	1890	Ijuí	Yes	Yes	(*)
Ernesto Alves	1890	Santiago	Yes	Yes	
Toroqua	1890	São Francisco de Assis	Yes	Yes	
Toropi	1890	Toropi	Yes		
Marquês do Herval	1891	Maquiné	Yes	Yes	Poles
Guarani	1891	Guarani das Missões	Yes	Yes	Poles
Cerro Pelado	1891	Porto Xavier	Yes	Yes	Russians, Poles
Cascata	1892	N/A			
Guaporé	1892	Guaporé	Yes	Yes	Poles, Russians, Austrians
São Marcos	1892	São Marcos		Yes	Poles
Cerro Cadeado	1895	Augusto Pestana		Yes	
Chimarrão	1897	N/A			
Anta Gorda	1898	Anta Gorda	Yes	Yes	
Itapuca	1900	Itapuca		Yes	Austrians
Sobradinho	1901	Sobradinho	Yes	Yes	
Erechim	1908	Getúlio Vargas	Yes	Yes	Russians
São Bráz	1909	Chувиска	Yes		Poles
Pontão do Ijuizinho	1910	Jóia	Yes	Yes	
São João Batista	1912	Santo Ângelo	Yes		
Santa Rosa	1915	Santa Rosa	Yes	Yes	Poles
Guarita	1917	Sarandi	Yes	Yes	
Forquilha	1918	Lagoa Vermelha	Yes	Yes	Poles

(*) Poles, Latvians, Austrians, Dutchmen, Swedes, Spaniards, Lebanese, Arabs, Lithuanians, Rutenians, Czechs, Finns and Greeks

Source: Mulhall (1873), Amstad (1999), Roche (1954, 1969), Korndörfer (2009) and our own annotations.

Table 2- Population of Rio Grande do Sul per nationality in selected years.

Year	Rio Grande do Sul			Brazil		
	Total	Foreigners	% Foreigners	Total	Foreigners	% Foreigners
1872	434813	41725	9.60%	9930478	388459	3.76%
1890	897455	34765	3.87%	14333915	351545	2.39%
1900	1149070	135099	11.76%	17438434	1074511	5.80%
1920	2182713	151025	6.92%	30635605	1565961	4.86%
1950	4164821	78138	1.88%	51944397	1214184	2.28%
1970	6755458	51079	0.76%	94508583	1229128	1.28%
2000	10181749	26348	0.26%	169590693	510067	0.30%
Growth 1872-1920	3.4%	2.7%		2.4%	2.9%	
Growth 1872-2000	2.5%	-0.4%		2.2%	0.2%	

Source: Levy (1974) for 1872-1970; IBGE (2010, Banco de Dados Agregado – SIDRA. <http://www.sidra.ibge.gov.br/>) for 2000 figures. There is a small discrepancy between Levy (1974) and IBGE numbers for the previous years.

Table 3 – Distribution of the official settlements according to the regions of Rio Grande do Sul and year of settlement.

		Campanha	Planalto	Serra	Heterogeneous
Year of settlement	<= 1840	0	0	2	2
	1841 - 1870	0	0	5	1
	1871 - 1889	2	2	4	4
	1890 - 1900	1	6	1	5
	1901+	0	6	1	1

Note: The “Heterogeneous” region refers to municipalities that do not fit clearly in the previous regions because they are peculiar and/or are located in transition areas between regions

Table 4. OLS Regression results

Dependent variable			(1)		(2)		(3)			P-value Italian vs German	P-value Others vs German
			Closeness to colony Coeff. [S.E.]	R ²	Closeness to colony Coeff. [S.E.]	Closeness to colony					
Name	Mean / S.D.				German	Italian	Other				
Religion	1 % Catholic	0.82 [0.148]	-0.01 [0.027]	0.24	-0.018 [0.0272]	-0.123 [0.0419]	0.197 [0.0508]	-0.065 [0.0428]	0.00	0.33	
	2 % Mainline Protestant	0.091 [0.134]	0.066 [0.0259]	0.15	0.073 [0.0264]	0.185 [0.0402]	-0.187 [0.0488]	0.052 [0.041]	0.00	0.02	
	3 % Atheist	0.018 [0.036]	-0.017 [0.0052]	0.52	-0.019 [0.005]	-0.028 [0.0081]	0.006 [0.0098]	0.006 [0.0082]	0.03	0.00	
Macroeconomics	4 Population density, in logs	3.365 [1.106]	0.646 [0.1609]	0.50	N/A	0.757 [0.2553]	-0.336 [0.31]	0.057 [0.2609]	0.03	0.05	
	5 HDI 2000	0.783 [0.036]	0.026 [0.0067]	0.21	0.008 [0.0031]	0.005 [0.0104]	0.008 [0.0126]	0.031 [0.0106]	0.86	0.07	
	6 Per capita income, in logs	5.455 [0.31]	0.164 [0.0539]	0.29	N/A	0.001 [0.0837]	0.047 [0.1016]	0.253 [0.0855]	0.78	0.03	
	7 % Poor	26.185 [13.142]	-9.445 [2.0544]	0.44	-4.181 [1.0913]	-4.117 [3.1832]	-0.437 [3.865]	-10.673 [3.252]	0.57	0.15	
Health	8 Gini	0.521 [0.058]	-0.045 [0.0092]	0.42	-0.048 [0.009]	-0.038 [0.0146]	0.003 [0.0178]	-0.013 [0.0149]	0.16	0.23	
	9 Child mortality under 5	16.59 [5.445]	-3.034 [1.0376]	0.17	-1.773 [0.9411]	0.208 [1.6283]	-2.85 [1.9771]	-1.709 [1.6635]	0.35	0.40	
	10 Life expectancy	72.525 [2.572]	1.468 [0.4881]	0.18	0.888 [0.4433]	0.042 [0.767]	1.235 [0.9313]	0.75 [0.7836]	0.44	0.51	
Education	11 Physicians/'000 people	0.395 [0.615]	0.377 [0.1136]	0.05	0.252 [0.0974]	0.36 [0.1795]	-0.177 [0.2179]	0.252 [0.1833]	0.14	0.67	
	12 % Nurses with higher degree	15.348 [14.866]	1.804 [2.9707]	0.08	1.095 [2.9818]	5.552 [4.6802]	-0.052 [5.6826]	-2.545 [4.7813]	0.55	0.22	
	13 Illiteracy	9.212 [4.216]	-3.37 [0.7911]	0.19	-1.593 [0.5619]	-3.763 [1.2287]	1.496 [1.4919]	-3.038 [1.2553]	0.03	0.68	
	14 Mean Score ENEM	-0.039 [0.077]	0.057 [0.0142]	0.23	0.04 [0.013]	0.085 [0.0223]	-0.015 [0.0271]	-0.018 [0.0228]	0.03	0.00	
	15 SD Score ENEM	0.263 [0.038]	-0.012 [0.0077]	0.09	-0.01 [0.0078]	-0.036 [0.0119]	0.001 [0.0145]	0.027 [0.0122]	0.12	0.00	
	16 % Enrollment 10-14	0.97 [0.027]	0.012 [0.0053]	0.13	0.006 [0.0051]	-0.009 [0.0082]	0.023 [0.01]	0.002 [0.0084]	0.05	0.33	
Social	17 % Enroll 7-17, private	0.039 [0.045]	0.022 [0.0086]	0.11	0.009 [0.0064]	0.009 [0.0135]	-0.016 [0.0164]	0.045 [0.0138]	0.35	0.06	
	18 # Bolsa Familia/Pop	0.149 [0.076]	-0.057 [0.0117]	0.45	-0.031 [0.0085]	-0.033 [0.0185]	-0.012 [0.0224]	-0.023 [0.0189]	0.58	0.72	
	19 Homicide rate	3.838 [0.657]	-0.296 [0.1449]	0.14	-0.302 [0.1413]	0.14 [0.2315]	-0.41 [0.2785]	-0.209 [0.2305]	0.24	0.29	
Fiscal	20 Education Exp, per capita	6.27 [0.386]	0.112 [0.0731]	0.18	0.086 [0.0615]	0.111 [0.1151]	0.131 [0.1397]	-0.151 [0.1176]	0.93	0.11	
	21 % Mun. Exp. In education	0.289 [0.048]	0.002 [0.0088]	0.23	0.009 [0.0085]	-0.019 [0.0138]	0.023 [0.0168]	-0.007 [0.0141]	0.13	0.53	
Culture	22 % Mun. Exp. In overhead	0.234 [0.081]	-0.009 [0.0162]	0.08	-0.005 [0.016]	-0.015 [0.0255]	0.005 [0.031]	0.013 [0.0261]	0.70	0.44	
	23 Fertility rate	3.323 [0.487]	-0.277 [0.0835]	0.32	-0.126 [0.0659]	-0.133 [0.1307]	-0.156 [0.1587]	-0.129 [0.1335]	0.93	0.98	
	24 % Living with relatives, 20-29	0.497 [0.097]	0.061 [0.0174]	0.26	0.044 [0.0164]	0.019 [0.0272]	0.06 [0.033]	0.016 [0.0278]	0.46	0.94	
Exogenous controls			Yes		Yes		Yes				
Additional controls?			No		Yes		No				

Note: All the regressions have 494 observations and are unweighted. Exogenous controls include functions of temperature (max, range), soil quality, altitude, rain patterns and distance to the capital for each municipality. Additional controls include per capita income, population and population density.

Table 5. Reduced Form Estimates of the Effects of Official Colonies on Land Inequality and Literacy Ratio in 1920

	I	II	III
	Gini 1920	Gini 1920	Literacy 1920
Closeness to:			
Any Colony	-0.00512	-.171**	-.175**
German Colony	-0.178		.32***
Number of Observations	495	495	495
R-squared	0.0567	0.0491	0.113
F-stat	2.97	6.1	4.03

Note: Regressions have 495 observations and are weighted by population in 2000 and standard errors are clustered by 1920 municipality (71 clusters).

Table 6. IV Estimates of the Long-Run Effects of Land Inequality and Literacy Ratio in 1920.

			(1)	(2)	
Dependent variable			Gini 1920	Literacy 1920	
Name		Mean / S.D.	Coeff. [S.E.]	Coeff. [S.E.]	
Macroeconomics	4	Population density, in logs	3.377 [1.09]	-11.442 [5.6354] *	-5.293 [6.5511]
	5	HDI 2000	0.785 [0.035]	-0.254 [0.12] *	-0.05 [0.1056]
	6	Per capita income, in logs	5.478 [0.308]	-1.27 [0.7936]	0.422 [0.8241]
	7	% Poor	25.728 [12.812]	85.698 [41.5435] *	-6.682 [41.5434]
Health	8	Income gini 2000	0.523 [0.057]	0.592 [0.3235] *	0.262 [0.3337]
	9	Child mortality under 5	16.623 [5.303]	35.939 [18.3821] *	13.565 [17.3414]
	10	Life expectancy	72.507 [2.502]	-17.73 [9.0458] *	-7.2 [8.5354]
	11	Physicians/'000 people	0.421 [0.606]	-2.306 [1.7031]	-0.742 [1.5207]
Education	12	% Nurses with higher degree	15.238 [14.324]	50.877 [61.3444]	58.048 [55.2124]
	13	Illiteracy	9.063 [4.109]	24.43 [16.0097]	-3.548 [16.8765]
	14	Mean Score ENEM	-0.035 [0.076]	-0.315 [0.2537]	0.225 [0.2603]
	15	SD Score ENEM	0.264 [0.037]	-0.045 [0.126]	-0.217 [0.1592]
	16	% Enrollment 10-14	0.971 [0.026]	-0.148 [0.0858] *	-0.129 [0.0809]
Social	17	% Enroll 7-17, private	0.043 [0.047]	-0.254 [0.1652]	-0.108 [0.1553]
	18	# Bolsa Familia/Pop	0.147 [0.074]	0.671 [0.3038] *	0.197 [0.3177]
Fiscal	19	Homicide rate	2.944 [1.744]	3.594 [5.242]	2.02 [5.2531]
	20	Education Exp, per capita	6.246 [0.384]	-0.303 [1.0644]	0.048 [1.0082]
	21	% Mun. Exp. In education	0.288 [0.046]	0.065 [0.1154]	0.076 [0.1036]
Culture	22	% Mun. Exp. In overhead	0.231 [0.079]	0.184 [0.2451]	0.247 [0.2395]
	23	Fertility rate	3.296 [0.481]	-0.358 [0.9636]	-3.039 [0.7236] *
	24	% Living with relatives, 20-29	0.494 [0.094]	-0.363 [0.3235]	-0.135 [0.3288]
RHS variables		Mean	0.6249	0.519	
		Standard Deviation	0.193	0.121	
		Min - Max	0.201-0.840	0.274-0.837	

Note: Regressions have 494 observations and are weighted by population in 2000 and standard errors are clustered by 1920 municipality (71 clusters). They were estimated by two-stage least squares using measures of closeness to any colony and closeness to German colonies are instruments for the land gini and literacy rates in 1920.

The homicide rate is transformed by $f(x) = \ln(1+x)$ to deal with zeros.

Data Appendix

Variables	Description
Rain (mm per month)	Trimester averages of rain, in millimeters per month (December to February; March to May; June to August; September to November) over a 30 year period (1961-1990). These estimates were built based on the database CRU CL 2.0 10' of the Climate Research Unit at University of East Anglia (CRU-UEA) in the UK (New et al. 2002 e http://www.cru.uea.ac.uk). Downloaded from www.ipeadata.gov.br
Temperature (°C)	Trimester averages of temperature, in Celsius, per month (December to February; March to May; June to August; September to November) over a 30 year period (1961-1990). These estimates were built based on the database CRU CL 2.0 10' of the Climate Research Unit at University of East Anglia (CRU-UEA) in the UK (New et al. 2002 e http://www.cru.uea.ac.uk). Downloaded from www.ipeadata.gov.br
Quality of soil	"Quality of Soil" is an ordered categorical variable made up of information of on topography, soil fertility, and physical constraints to agriculture (such as risk of floods, or occurrence of rocks or sand). It has been built through the overlapping of a map of quality of soil (IBGE, 2010b) and the grid of current municipalities. The shares of each ten types of soil in each municipality were then calculated using GIS tools. We thank Vanessa Nadalin (IPEA) for her help on this task.
Religion	
% Catholic % Mainline Protestant % Atheist	Calculated by the authors based on the Census of 2000. The percentages are calculated among the adult (older than 18) population. Catholic refers to codes 110-199; mainline protestant to codes 210-289 and atheist to codes 0 for the religion variable.
Macroeconomics	
Population density, in logs	Source: IPEADATA
Human Development Index (HDI 2000)	The HDI is the arithmetic average of three sub-indices, referring to longevity (HDI Longevity), education (HDI Education) and Income (HDI Income). To obtain more methodological informations about this index, Access www.undp.org.br .
Per capita income, in logs	That is the log of the average per capita household income in a municipality, monthly and measured in Reais of August 1 st , 2000.
Gini	Source: IPEADATA
Health	

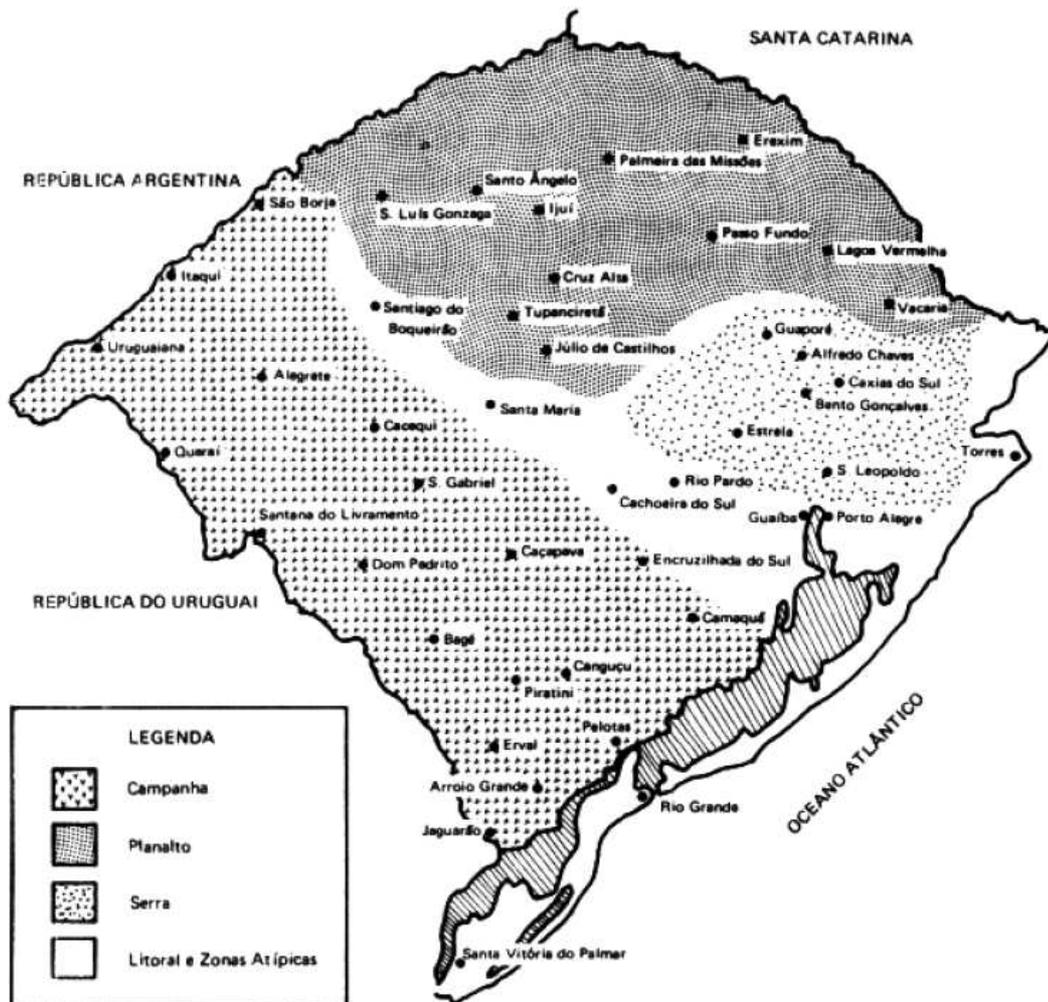
Child mortality under 5	Source: IPEADATA
Life expectancy	Source: IPEADATA
Number of physicians per 1000 inhabitants	Ratio between the number of physicians residing in a municipality and its total population, including resident physicians, times 1000. Source: www.undp.org.br
Proportion of nurses with a higher degree (%)	Proportion of nurses with a higher degree working as nurses in the municipality. Source: www.undp.org.br
Education	
Illiteracy	Source: IPEADATA
ENEM Scores (mean, standard deviation)	ENEM is a nationwide exam for concluding high schoolers with a very high take-up rate. To construct mean scores, we run a regression of individual Z-scores on interactions of age, gender and latest degree concluded; save the residuals; and aggregate them by municipality or minimal comparable area.
% Enrollment 10-14	Calculated by the authors based on the Census of 2000. The percentages are calculated for children ages 10-14, enrollment is denoted by codes 1-2 in the variable V0429.
% Enrollment 7-17, private school	Calculated by the authors based on the Census of 2000. The percentages are calculated for children ages 10-14, enrollment is denoted by code 1 in the variable V0429
Social	
Bolsa Família program- number of families receiving benefits in December	Number of families receiving Bolsa Família benefits in December, downloaded from www.ipeadata.gov.br
Number of homicides	Original data comes from SIM-DATASUS (see http://tabnet.datasus.gov.br/cgi/deftohtm.exe?sim/cnv/obtbr.def and http://tabnet.datasus.gov.br/cgi/sim/obtdescr.htm), but we downloaded the data from www.ipeadata.gov.br The homicide rate is calculated based on the average yearly homicide count in 1998-2002 for each minimal comparable area, divided by the population of the minimal comparable area in 2000. Since we take logs, we deal with the zeros by adding 1 to the homicide rate before taking logs.
Fiscal	
Education Expenditure, per capita	Source: IPEADATA
% Municipal Expenditure in Education	Source: IPEADATA

% Municipal Expenditure in Overhead	Source: IPEADATA
Culture	
Fertility rate	Source: IPEADATA
% Living with relatives, 20-29	Calculated by the authors, from the micro data from Census of 2000,

Figure 1. Rio Grande do Sul and Brazil



Figure 2. Regions of Rio Grande do Sul



Source: Fonseca (2003, p. 28)

Figure 3. Creation of Official Settlements by decade (Rio Grande do Sul 1820-1920)

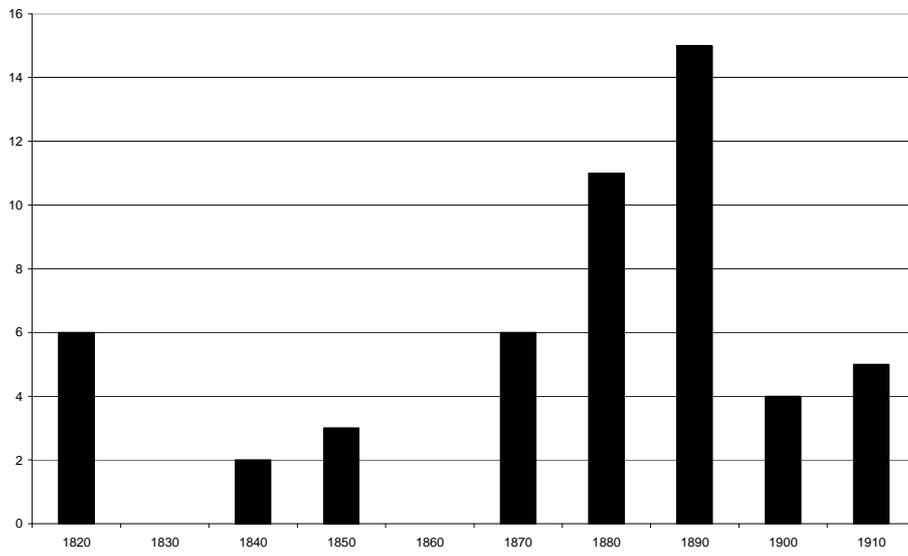


Figure 4

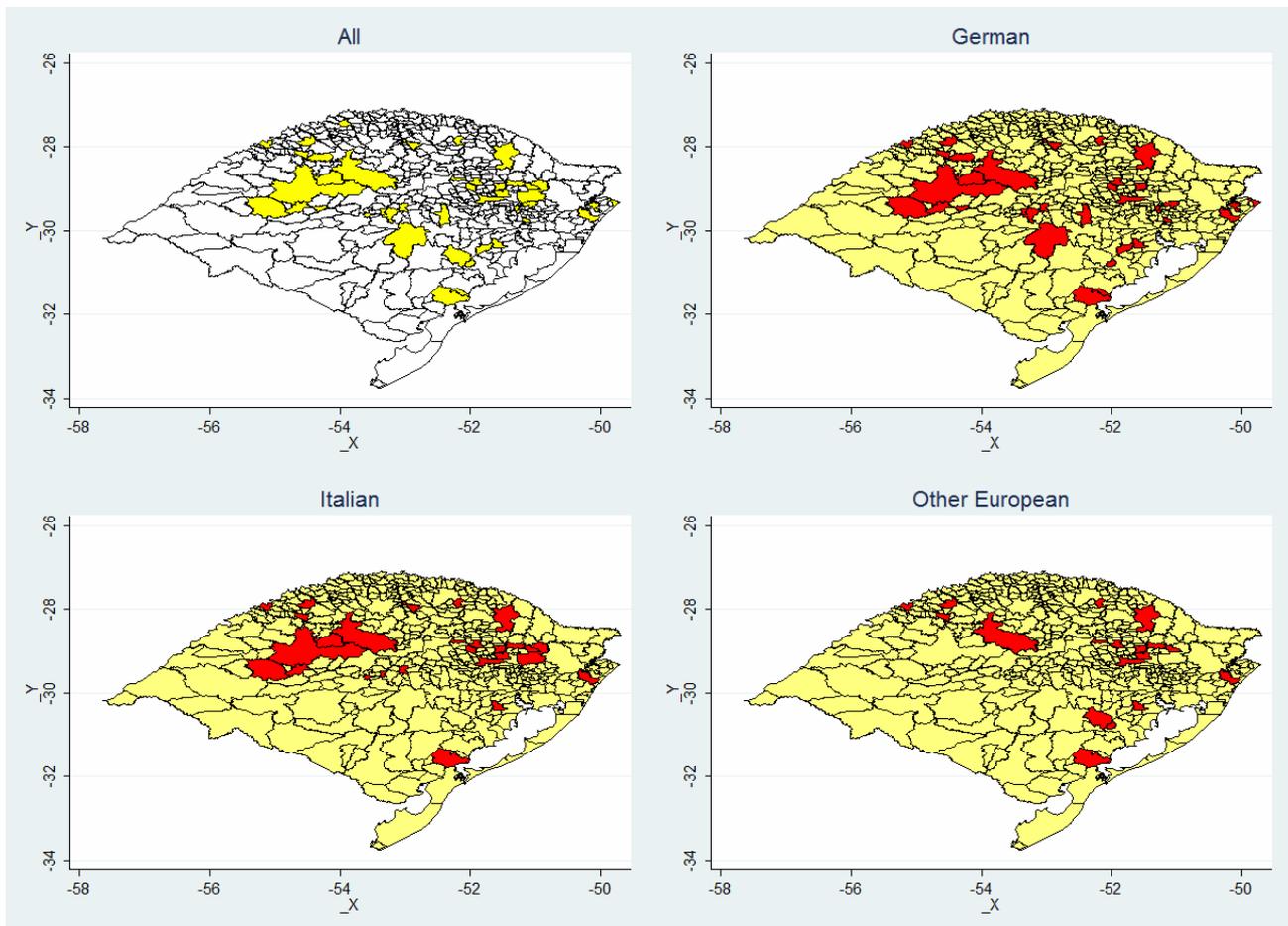


Figure 5. Closeness to Official Colonies

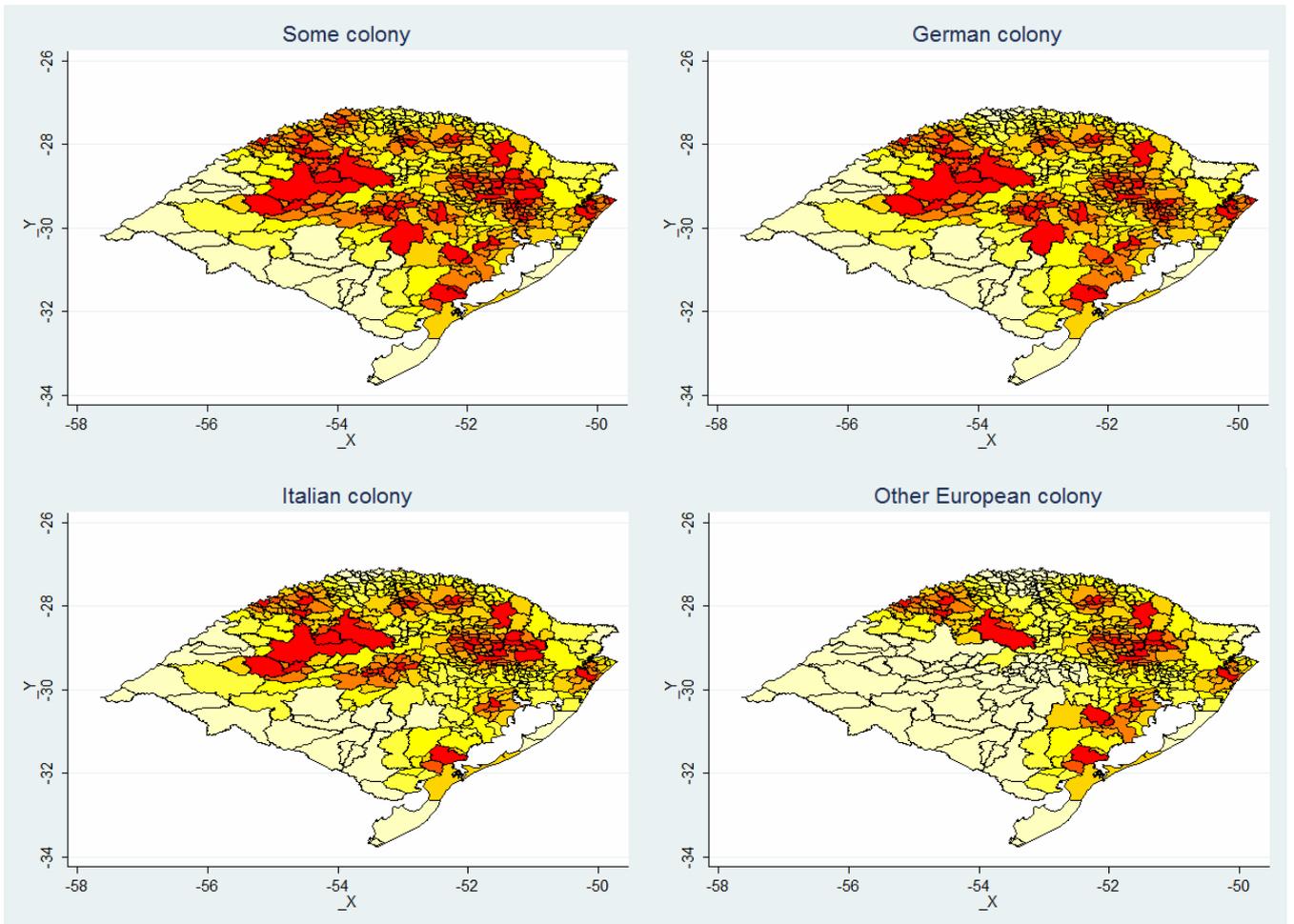
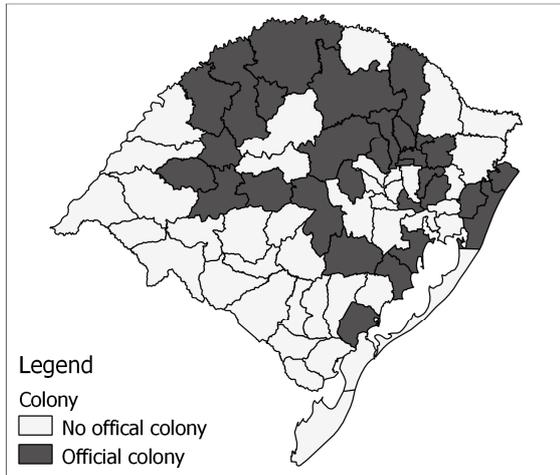
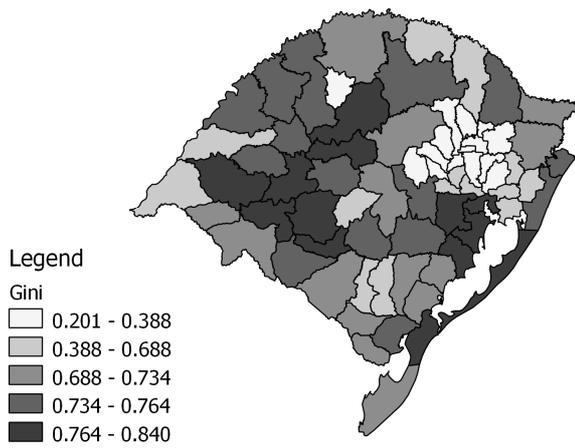


Figure 6

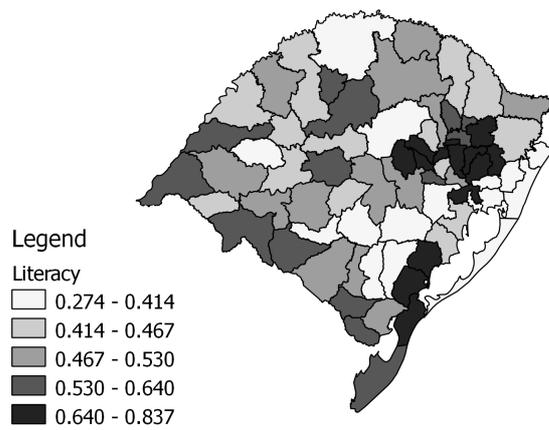
I. Rio Grande do Sul: 1920 Municipalities with an Official Colony



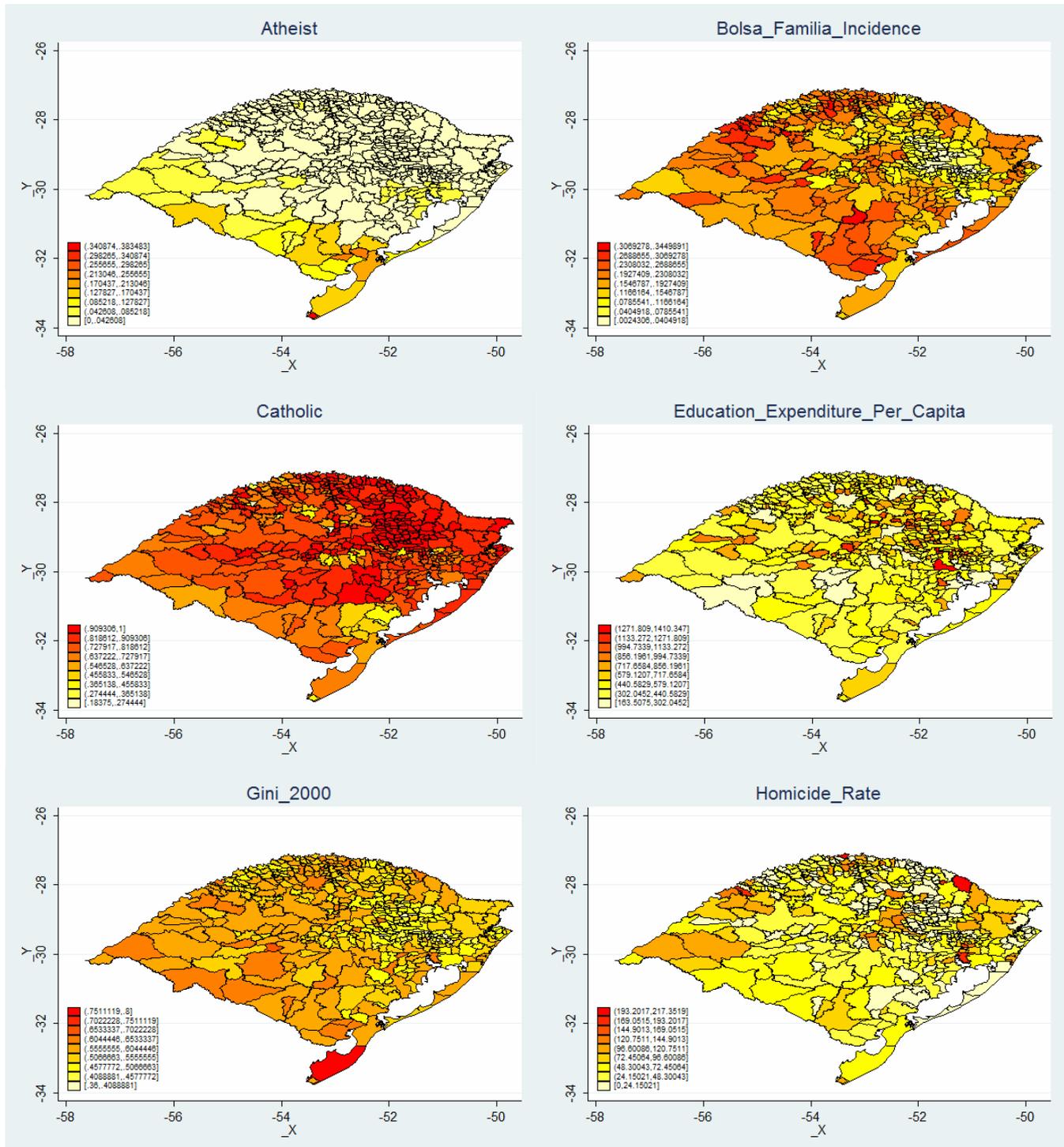
II. Rio Grande do Sul: Land Gini 1920



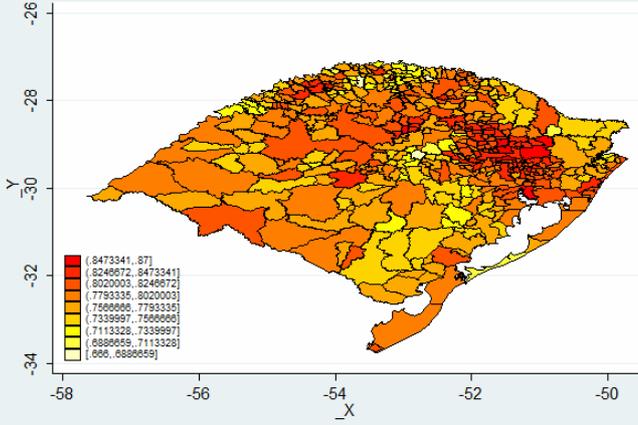
III. Rio Grande do Sul: Literacy Ratio, 15 and Older in 1920



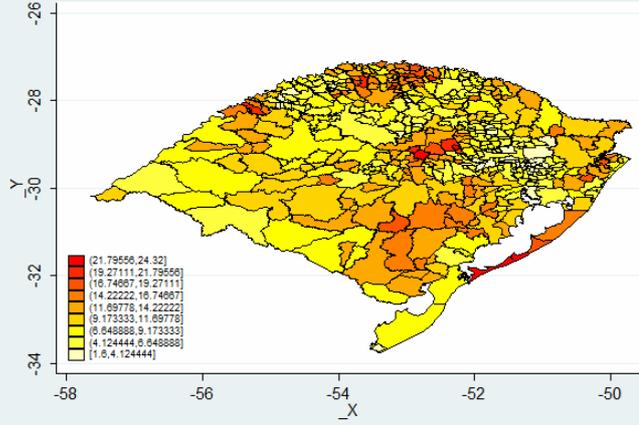
Data Appendix



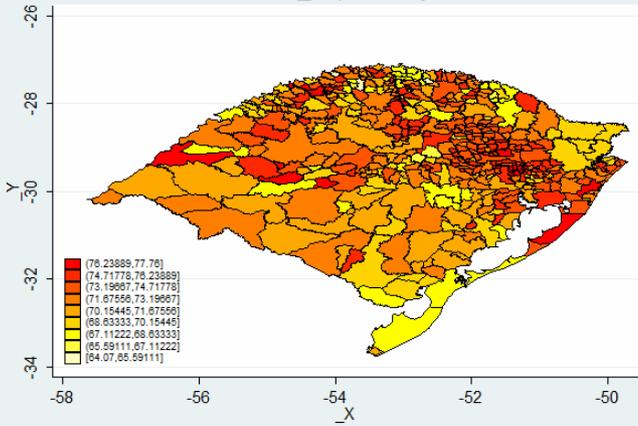
Human_Development_Index_2000



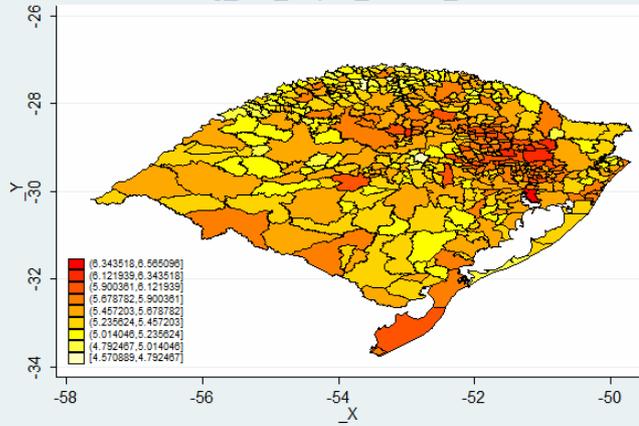
Illiteracy_2000



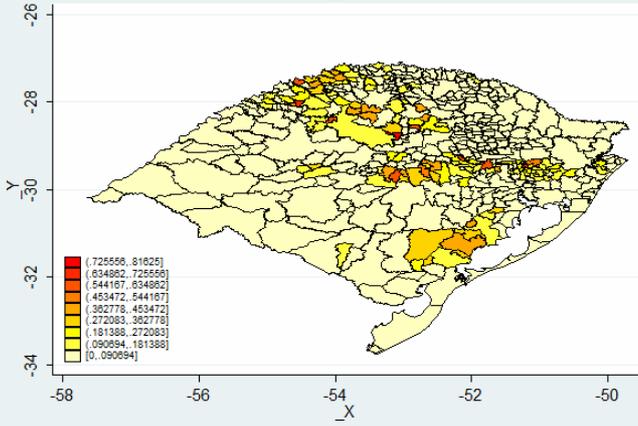
Life_Expectancy



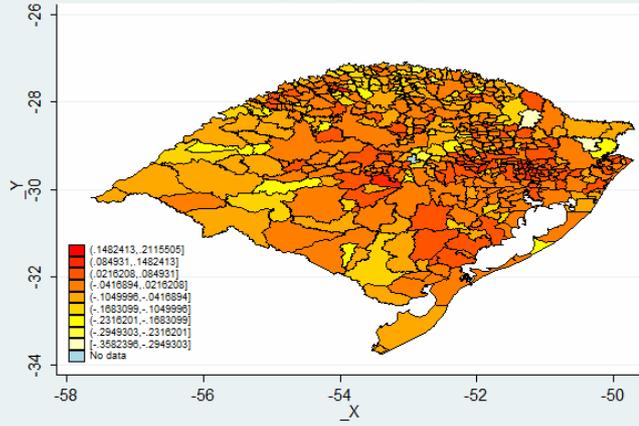
Log_Per_Capita_Income_2000



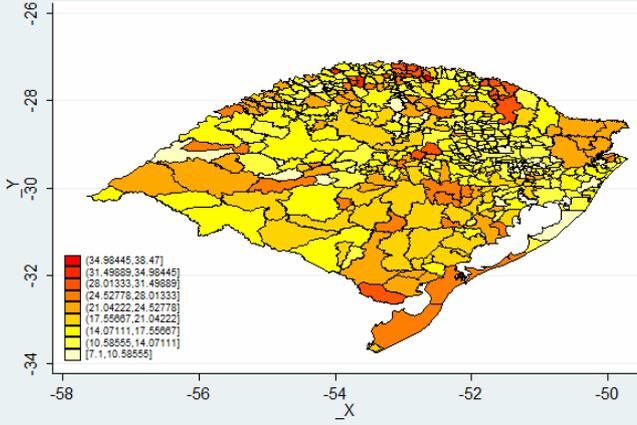
Mainline_Protestant



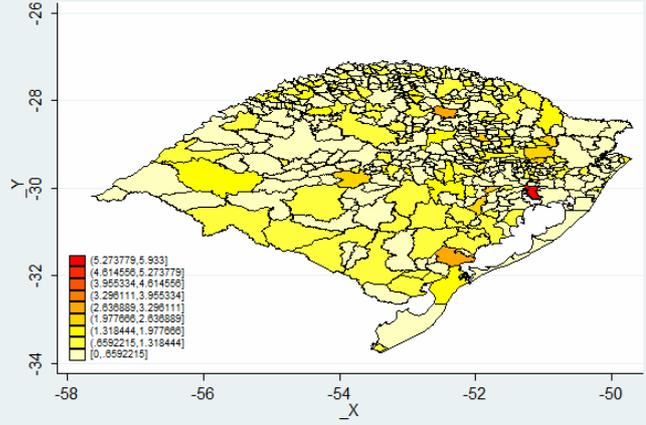
Mean_Test_Score_2007



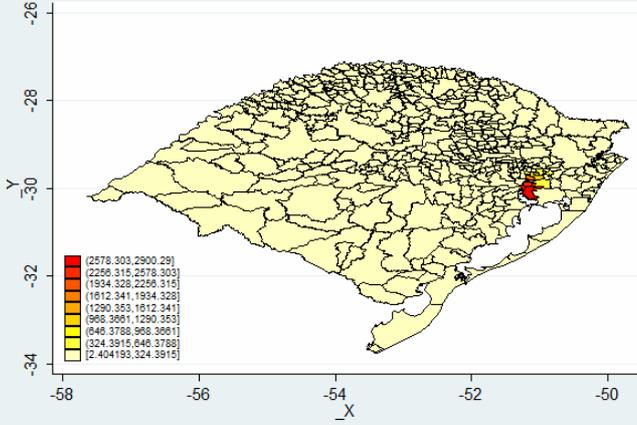
Mortality_Rate



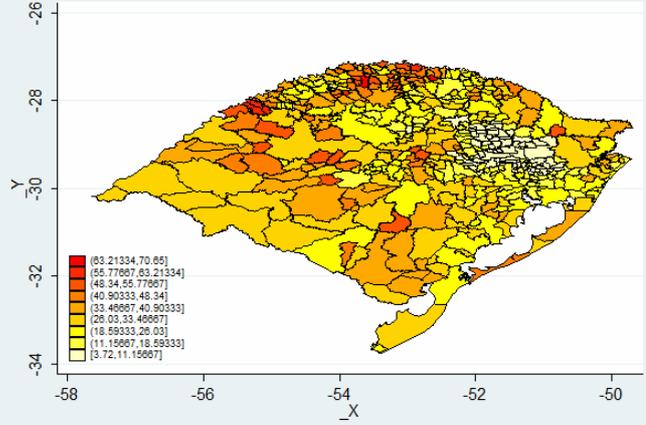
Physicians_Per_1000_People



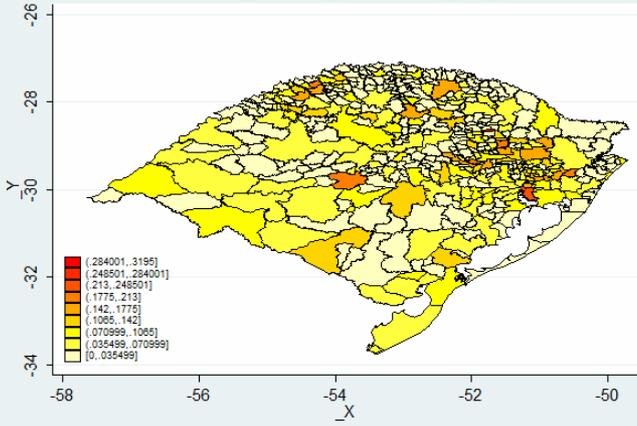
Population_Density_2000



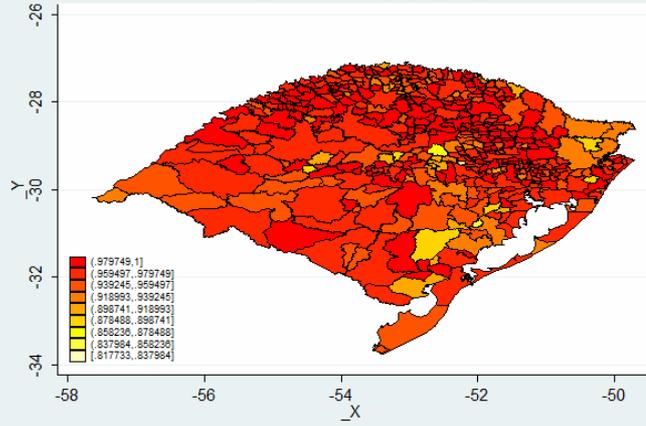
Poverty_Rate_2000



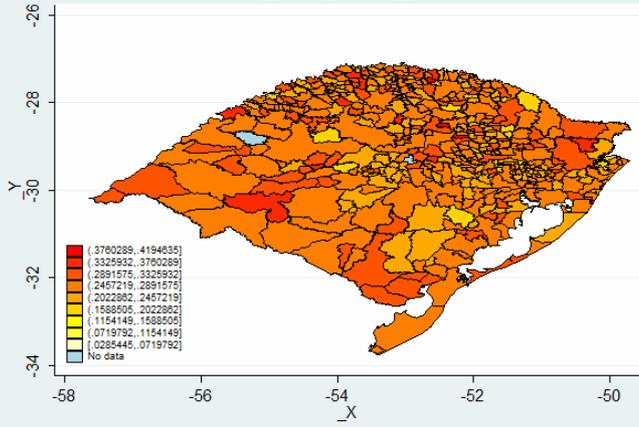
Private_School_Enrollment_10_17



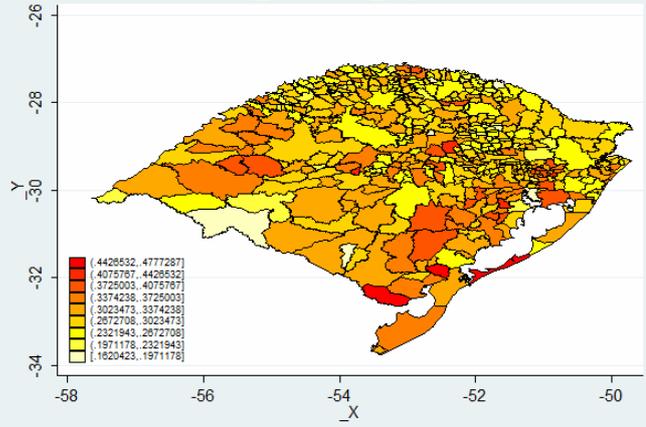
School_Enrollment_Age_10_14



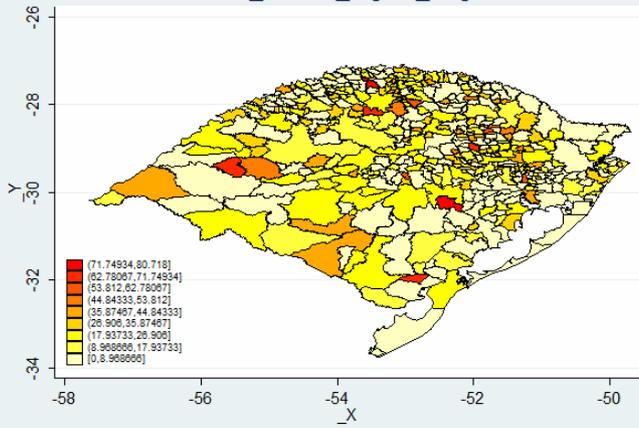
SD_Test_Score_2007



Share_Education_Expenditure



Share_Nurses_Higher_Degree



Share_Overhead_Expenditure

