Can Endowments Explain Regional Inequality? State Governments and the Provision of Public Goods in Brazil, 1889-1930

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Abstract

Economists and economic historians believe that much of the inequality we observe today in Brazil is a byproduct of the colonization pattern followed by the Portuguese at the time of arrival. In particular, there is a growing literature arguing that the endowments of a country may have caused an institutional system that favored a small elite. In this paper we contribute to the debate by arguing that endowments did matter to determine the inequality we observe in state expenditures and living standards across states in Brazil. Yet, instead of looking at endowments and institutions at the time of colonization, we argue that it was during the first republican period (1890-1930) that inequality among states got accentuated as a consequence of the asymmetric effects of the commodity boom of the late nineteenth century. The Brazilian constitution of 1891 decentralized revenues and expenditures, giving states the capacity to collect taxes on exports and to pay for most public goods. We show that this institutional set up accentuated the asymmetric effects of the commodity boom and let to significant differences in the level of exports per state and, consequently, in revenues per capita. The variation in revenues then ended up determining differences in expenditures in public goods, such as education, police, and public works. We use a newly created database of state level fiscal and trade data for the period 1900 to 1930 and show, using OLS, that there is a positive and significant relation between export revenues per capita at the state level and expenditures on public goods (per capita). To correct for possible endogeneity and serial correlation we use state export price indices as instrumental variables (IVs). Our results in the IV regression confirm the idea the variation in commodity prices explains part of the variation in expenditures on public goods per capita.

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Introduction

For economists and economic historians much of the inequality we observe today in the Americas, and even within Brazil, is a byproduct of colonial institutions (Acemoglu, Johnson, and Robison, 2001; Sokoloff and Engerman, 1997; Naritomi, Soares, and Assunção, 2007; Bruhn and Gallego, 2007). According to this literature the endowments of labor and land as well as the disease environment the Portuguese found upon their arrival determined a set of political institutions that ended up perpetuating an unequal distribution of land, wealth, and political power. Since endowments and the disease environment varied by region within Brazil as well, colonial institutions also seem to have varied significantly across provinces and even municipalities (Naritomi, Soares, and Assunção, 2007; Bruhn and Gallego, 2007). One of the most important implications of colonial institutions was that with political power concentrated in the hands of elites there were no incentives to tax themselves to pay for public goods like education for all. This is why, for this literature one way in which colonial institutions can have persistent effects is through their effect on repressing expenditures on public goods that benefit the population at large.

In contrast to what could be a static or path-dependent view, in this paper we document a reversal of fortune for some states in Brazil in the period 1890 and 1930 as a product of two events: the global commodity boom of the late nineteenth century and Brazil's republican revolution, which established a federalist system with extreme fiscal decentralization. In our view, the boom in certain commodities allowed some states to increase their revenues and expenditures on public goods, such as education, infrastructure, and police. Surprisingly, we find that during this period, and despite bad colonial institutions, Brazil as a whole had the largest increase in literacy rates in Latin America, going from a literacy rate of 14.8% of the population in 1890 to 38% in 1940. We attribute this improvement to the progress that the winners of the commodity boom made in improving education.

If colonial institutions determined the relative inequality among states in Brazil we would expect to find some continuity or persistency of the differences in development indicators since the nineteenth century. For instance, we would expect to find that measures of prosperity in 1872 (the year of the first census) were highly correlated with measures of prosperity in the twentieth century. Also, we would expect to find that the relative distribution

of human capital across states, originally distributed unevenly across states because of the effects of colonial institutions, should not change that much over time.

The evidence we have, however, points in a different direction. Basic measures of economic prosperity by states such as exports per capita in 1872 are not correlated with GDP per capita in the 1990s or in 2005. In contrast, either exports per capita or GDP per capita in 1920 are highly correlated with GDP per capita at the state level today (see Table 1 Panel A).[1] We find the same pattern when we look at literacy rates. Literacy rates across states in 1872, a very basic measure of human capital, are not correlated strongly with literacy rates in the second half of the twentieth century, while literacy rates after 1900 are highly correlated with literacy rates in 1991 or 2007 (see Table 1 Panel B). The evidence, therefore, suggests that something altered the relative inequality among states between 1890 and 1930 that then had persistent effects in the second half of the twentieth century. What explains the change in the relative inequality among Brazilian states between 1890 and 1930? And, what explains the persistency of those changes for the next one hundred years?

We argue that one of the main drivers of change in relative inequality among states between 1891 and 1930 is the effect of the commodity boom of the late nineteenth century and the fact that Brazil adopted an extremely decentralized fiscal system in the Constitution of 1891. In the Constitution of 1891 Brazil was divided into 20 states with very autonomous spending powers and with the capacity to collect export taxes. The fact that states could tax commodity exports allowed states that could export more valuable commodities to collect higher revenues per capita and spend more on public goods, while those states that had low exports per capita collected lower revenues and lagged behind in terms of expenditures in things like education, infrastructure, and police.

With the Constitution of 1891 in place, the exogenous shock that altered the relative economic prosperity of states in Brazil was the commodity boom of the late nineteenth century. This shock affected states asymmetrically because only the prices of a few commodities had booms and farmers, who were price takers (except in the case of coffee from 1906 to 1914 and

[1] In fact, when we look at the correlation of exports per capita by state in 1910, 1900, and 1890 excluding the rubber-exporting states we find strong correlations with today's levels of GDP per capita (this is because rubber states were relatively rich before 1912 and had a rapid decline in prosperity in the 1920s until they became as rich as the average state, something that persists until today).

for some years in the 1920s when they set international prices), were constrained in terms of what they could produce by the natural "endowments" of their states. The commodity boom had an asymmetric effect on Brazilian states because each commodity had a boom and bust of different magnitude and duration. This generated a divergence among states because some became relatively richer (or poorer) according to how much tax revenues they could obtain from commodity exports. Thus, the commodity boom is our main exogenous shock, but without the Constitution of 1891 allowing the decentralization of export tax revenues the boom would have modified relative inequality in a less stark way. The shock ended over the 1930s as the boom faded away and because expenditures continued to be decentralized the outcomes of 1930 tended to have a persistent effect in the twentieth century.

While this explanation helps us account for how inequality among states increased between 1890 and 1930, it does not answer our second question. How is it that inequality among states persisted throughout the twentieth century if the trade shock disappeared in the first decades of the century? Using a newly created database of trade and fiscal variables we run simple OLS estimates and show that between 1901 and 1926 states with higher export tax revenues per capita had higher expenditures on public goods (per capita) such as education, infrastructure, and police. Since those are the kinds of public goods that generate growth in the long run (e.g., by increasing labor productivity), we argue that what happened in the period 1891 to 1930 may explain the persistency we see in the twentieth century in terms of inequality across states. Because there could be endogeneity and serial correlation in our OLS estimates, we use instrumental variables (IV) techniques to instrument for export revenue per capita using a set of state export price indices that exploit the variation in the crop mix per state and in international commodity prices. Our findings using IVs also confirm that there are strong correlations between our estimated exogenous variation on export revenue per state and the expenditures on public goods per capita.

We end the paper by addressing our most puzzling result and asking: why did elites in the different Brazilian states allowed their governments to tax them between 1890 and 1930 in order to finance expenditures on public goods such as infrastructure, police, and education? In the case of expenditures on infrastructure and public security the explanation is straightforward since elites benefited more than the masses from those services. What is not clear, however, is why the same elites that restricted the franchise, through income requirements until 1891 and

literacy requirements from 1891 on, would allow state governments to tax them in order to pay for free elementary education. In fact, according to Sokoloff and Mariscal (2000) and Lindert (2004) we would expect the opposite: the more restricted the franchise the less we would expect to find an expansion of free, public education. We argue that the literacy requirements introduced in the Constitution of 1891 generated incentives for local elites to invest in education. Rather than working as a device to exclude people from the electoral process, the literacy requirement coupled with a more competitive electoral system led local and state elites to battle over votes by spending public money in teaching voters (adult males) how to read.

The paper is divided into five sections. Section II explains how fiscal federalism evolved in Brazil after 1891 and describes how the commodity boom affected different Brazilian states. Section III explains the data and methodology. Section IV presents the findings and Section V concludes.

Fiscal Federalism, the Commodity Boom, and Inequality across States in Brazil

Fiscal Centralization From independence to the Republic (1821–1889)

After independence, in 1821, Brazil adopted a constitutional monarchy with a clear division of power. During the imperial period (1821-1889), the executive power rested on the emperor and the council of ministers, while an elected parliament took over the legislative tasks. Parliamentarians (both senators and deputies) were elected by state electoral colleges and electoral participation was limited by income requirement (the income requirement represented at least the income of the average worker for over a full year, thus providing a binding constraint on who could vote). Within this political arrangement the provincial governments were extremely weak and had little control over fiscal revenues.

Fiscal centralization, therefore, was the norm in Brazil before 1889. The imperial government collected around 80-85% of the total public revenue in Brazil and spent most of the revenues in the capital of the country, the city of Rio de Janeiro (which received more than two thirds of total expenditure). As a consequence, most provinces in Brazil received less than what they contributed to the federal pool of tax revenues. São Paulo was the main contributor in this regard, sending more than three times of what it received in federal expenditure. For instance,

the Ministry of Agriculture and Public Works (responsible for "improvements" such as railroads, ports, colonization, etc) in 1888 spent 66% of its total budget in the Rio de Janeiro area and only 3.14% in the state of Sao Paulo (Villela, 2007). The northeast and northern regions also paid more than what they received, while the south was a net beneficiary, receiving large amounts of money to finance the military bases on the border with Argentina and Uruguay.

The bulk of fiscal revenues at all levels came from trade taxes. The constitution of 1824 gave the central government the right to tax imports and exports. Trade taxes accounted for more than two thirds of the public revenue during all the second part of the imperial period (1840-1889). This is partly explained by the fact that import duties were relatively large. Villela (2005) estimates that the federal import tax revenue as percentage of imports was around one third from 1869 to 1889. As in many Latin American countries, the Brazilian government relied on these taxes because the costs of collection were low and governments avoided the politically painful process of collecting land or income taxes from local elites.

Legally the provinces were implicitly allowed to collect export taxes, but were prohibited from collecting import taxes or inter-provincial trade taxes (Abreu and Correa, 1997). In practice, however, interstate taxes existed until the 1890s and throughout the imperial period (1821-1889) states collected small amounts of revenue from import and export taxes.[2] The Imperial export tax rate fluctuated between 5% and 9% of the value of exports and stabilized at 7% in the mid 1870s (after the war with Paraguay) and there was some variation in export taxes across states that may explain some of the initial differences in revenue per capita we observe at the end of the period. For instance, some of the coffee exporting provinces (Minas Gerais, Rio de Janeiro, and São Paulo) and Rio Grande do Sul charged a 4% tax rate, while the northern state of Para (later on a rubber exporter) charged 13% (Abreu and Correa, 1997).

The limited capacity of provincial governments to collect their own public revenue and the little effort of Imperial Government made to redistribute fiscal resources across regions generated permanent conflicts between the center and the provincial elites. For instance, in Sao Paulo (exporting one fifth of the Brazilian exports), elites complained that the "revenues in 1870's were totally inadequate to meet the provincial government's responsibilities for road

[2]For instance, in northeast provinces the import taxes represented between 20% and 33% of the provincial revenue, with tax rates of 30% in Pernambuco for inter-provincial imports. See Mello (1984).

construction and maintenance, public health and education." Moreover, "[t]he Republicans of Sao Paulo called for a distribution of revenues that would allow the province to meet the requirements of the expanding export economy, and for political autonomy to maximize Sao Paulo's economic potential". Elites in São Paulo also felt underrepresented in the congress, because only 7.25% of the deputies and 3 out of 69 senators came from that state.[3] By the 1880s there was discontent among state elites with the state of the union. There were significant separatist or republican movements in Pará, Rio Grande do Sul and Pernambuco (Mello, 1984; Viotti da Costa, 1989) and some elites in Sao Paulo were threatening with a similar course of action.

The First Republic and Fiscal Decentralization (1889–1930)

In 1889, a republican movement overthrew the sick emperor in a peaceful revolution and established a provisional government in charge of drafting a new constitution. One of the most important issues discussed during the constitutional congress was the distribution of tax revenues among the federation and the states. The debate did not revolve around the issue of whether Brazil should be a federalist republic, but how decentralized the federalist system was going to be. The federal Government made an initial proposal, in which it outlined that export taxes were the exclusive responsibility of the state governments, but only for a lapse of seven years (between 1891 and 1898). In addition, the proposal forbade states from taxing exports in transit from other states, but did not include an explicit prohibition of interstate taxes. Finally the central government's proposal allowed states to levy taxes on rural land and property transfers.

Yet when the central government's proposed constitution reached the commission in charge of drafting the constitution, state representatives modified it significantly, making all state export taxes perpetual and pushing for more fiscal autonomy for state governments. After a series of negotiations between those in favor of extreme decentralization, the commission reached a compromise on February 24, 1891. The exporter states of Sao Paulo, Minas Gerais, Rio de Janeiro, Bahia, Para, and Amazonas integrated the winning coalition, defeating a more

[3] Each Sao Paulo deputy represented 145 141 inhabitants, a Pernambuco deputy 85,488 and the ones from Amazonas 40, 327. The relative representation in the Senate had similar numbers. See Carvalho, 1980 and Viotti da Costa, 1989

disorganized opposition that included sugar exporting states from the Northeast and the cattle-exporting state of Rio Grande do Sul. The new constitution gave states the right to tax exports, to have their own armed forces, and to organize gubernatorial elections (Costa 1998). By not including any provision to limit the capacity of state debts, the Constitution also implicitly gave states the right to issue debt domestically and abroad (Martinez-Fritscher and Musacchio, 2009). Love (1993) and Martinez Fritscher (2009) point out that even some of the states that wanted more fiscal autonomy supported a relatively strong central government (with the right to collect all import duties) because they understood the benefits of having a national authority in charge of monetary policy, negotiating trade treaties with other countries, and backing states on certain programs with positive spillovers across states.

The rapid decentralization of fiscal resources is evident in Table 2. Before 1889 the federal government controlled 84% of total expenditures, while states controlled only 16% of the public moneys. By 1907 states and local governments were in charge of almost 24% of total expenditures (and municipalities also spending around 10%). By the end of the First Republic the pattern of decentralization was even starker, with the federal government spending less than 55% of the total. This is because by 1927 states controlled 34% of total expenditures.

The level of decentralization of public expenditures in Brazil is more impressive if we compare it with Mexico (a country in a similar stage of development) and the United States (a country with a federalist system). Table 3 displays figures of average state government expenditures per capita to make this comparison. Before 1913 Brazil and the United States spend around two dollars per capita (in dollars of 1890), on average. After 1913 states in the United States spent more per capita (between $3 and $8.5 per capita), which seems extremely high compared to the average for Brazil, which stayed around $2. Yet the richest states, such as Sao Paulo had state expenditure very similar to those of the United States. Obviously comparisons with the United States are unfair because according to most accounts the GDP per capita in the United States diverged significantly from that of Mexico and Brazil by the turn of the twentieth century (Haber, 1997) and during this time most of the expenditure on public goods per capita was done at the municipal level. When compared to the expenditure of Mexican states, however, Brazilian expenditures by states seem extremely high.

The fact that Brazilian states were relatively rich is related to the fact that almost half of their revenues came from taxes on exports. Most countries leave taxation of foreign trade on the

hands of the central government, yet the Brazilian Constitution of 1891 designed an extreme form of fiscal federalism that put state governments in a relatively favorable position to spend on public goods when they had valuable exports. Figure 2 shows that, on average, 47% of state revenues came from taxes on exports (this is across states for 1914-1916). The money that states collected from all forms of revenue, as Figure 3 shows, was spent on a variety of things, out of which public goods such as public safety (police), schooling, and public works represented about 35% of the total. At least 10% was spent on public administration and 20% on debt service (with other 34% assigned to a variety of things).

Once the state governments got the right to tax exports in 1891, they did not raise tax rates, they left the tax rates unchanged and instead focused on appropriating all of the revenues that formerly belonged to the central government. For instance, in Sao Paulo and Minas Gerais the state governments charged a tax rate for coffee exports of 11%. Before the Constitution of 1891 the central government collected 7% out of the 11% and left 4% for state governments. After the Constitution the entire 11% was kept at the state level (Love, 1980 and Topik, 1987).

In fact, states did not compete to attract exports using lower tax rates. States could not compete because it was hard to send the exports of a farmer in one state through the port of another state. Transportation across states was either too expensive or did not even exist. In the Amazon Basin, where it would have been easy to have rubber producers from Amazonas shipping their product to the port of Para we find that tax rates compensated for distance. Amazonas charged a 20% ad valorem tax on rubber, while Para charged 22% (see Table 4). Therefore the incentives to send rubber from Amazonas to Para were diminished due to the tax differences.

We argue that this fiscal federalism scheme created a problem because some of the possible mechanisms to equalize wages and living standards across states were absent in the case of Brazil. For instance, there are at least three reasons why incomes in the south and the northeast did not equalize. First, the federal government did not pursue policies of regional redistribution, therefore inequality in fiscal revenues per capita across states was translated into differences in expenditures on public goods (per capita) and, in the end, on regional inequality in living standards. Second, elites in the South did not facilitate or finance migration from the low-wage areas of the northeast, but they did organize a massive program of European immigration. Third, workers in the northeast did not finance their tickets to the south

themselves because of the high cost of transportation relative to the average wage. As a consequence, the lack of mobility of labor across states and regions contributed to the development of relatively isolated economies and labor markets in the northeast and the south and southeast (Leff, 1982).

The lack of redistribution within the federation can be partially blamed on the central government, which directed its expenditures in the capital of the country, Rio de Janeiro city. For instance, in 1914 the federal government spent 61% of its budget on the capital of the country, with some of the expenditures going to national public goods, such as the army and the navy, but with a large proportion going for public works in the city itself.

The Asymmetric Effects of the Commodity Boom

A key component in our argument is that the extreme fiscal federalism laid out in the 1891 Constitution accentuated inequality among states by amplifying the asymmetric effect of the commodity boom that began in the late nineteenth century. Farmers in Brazilian states could not just choose what commodity to export; they were constrained by natural endowments. Rubber tappers could only collect natural rubber in the Amazon River basin. Coffee growers could only set their plantations and farms in states with high altitudes, temperate weather, steep hills, and specific red soil types. Thus, we think there is a commodity lottery that determined which crops could be produced in each state and that then explained why the commodity boom had an asymmetric effect on the different provinces of the Brazilian federation.

The asymmetric effects of the commodity boom are clear when we look at the differences in exports and expenditures per capita across states. Table 5 shows that exports per capita by state were highly correlated with the kind of commodities states exported and with total expenditures per capita. In fact, this table summarizes our argument succinctly: states that exported more had higher revenues and ended up spending more on public goods such as education, public works, and police.

The asymmetric effect of the commodity boom was not a one-time event. There was significant variation over time in commodity prices that affected the relative prosperity of Brazilian states. Figure 4 demonstrates the variation over time in export tax revenue per capita in three states (Amazonas, Bahia, and Sao Paulo). We can see that in Amazonas there was a

sharp decline in export tax revenues per capita in the first decade of the twentieth century and a sharper decline after the international price of rubber fell dramatically in 1912.

We find similar results when we look at expenditures in schooling per capita over time. Figure 5 shows how Bahia had a very steady pattern of expenditures, because the prices of its main commodities (sugar, cotton, and cacao) did not go up as fast as the price of rubber and coffee. Sao Paulo increased its expenditures on education over time, especially after the stabilization of the coffee price in 1906 (when Brazilian producers designed a successful cartel to push coffee prices up). Amazonas also decreased its expenditures on education when its export tax revenues declined. Figure 6 shows a more drastic pattern of decline in state expenditures on public works as a consequence of the disruption of capital flows during the World War I and the 1920s.

One final sign of the asymmetric effect of the commodity boom is the variation over time in the percentage of revenues that came from export taxes. While state public revenues from export taxes represented on average around 60% of total revenue between 1914 and 1919, Table 6shows that the share of revenue that came from exports varied over time. São Paulo increased its collection capacity per capita three times after 1891. States like Amazonas and Para, rubber states, went from collecting around 80% of revenues from export taxes before 1907 to collecting 65% and 54%, respectively, after 1923 (once rubber prices had plummeted). Only a couple of states, such as landlocked Góias and the state of Rio Grande do Sul (focused on cattle ranching), collected less than 30% from export taxes.

Was it Colonial Institutions or the Commodity Boom?

Was the capacity to collect taxes from local elites determined as a consequence of institutions set during the colonization of the country? Or was the capacity to collect taxes a byproduct of the commodity boom that benefited some states? If colonial institutions determined how much state governments could tax the exporting elites we would expect to find two things. First, we would observe lower tax rates for the same commodities in states with institutions that protected elites. According to the literature on colonial institutions, upon their arrival to the Americas European settlers devised institutions that either gave privileges and disproportionate political power to elites or created somewhat democratic institutions (depending on weather conditions, the kind of crops that could be produced, the availability of

labor, and the disease environment). Thus, in places with adverse weather conditions or states which formerly had slaves and large-scale plantation agriculture we expect to find institutions protecting elites and making it harder for state governments to raise taxes to pay for public goods (Engerman and Sokoloff, 1997; Acemoglu, Johnson, and Robinson, 2001; Sokoloff and Mariscal, 2000). Second, we also would expect to find lower export tax revenues per capita in general (not only lower rates). Table 3 presents evidence that falsifies the first claim. For most commodities we do not find states with worst weather conditions (worse disease environments) having lower taxes on the exports of the elites. For instance, Amazonas (AM), Para (PA) or Mato Grosso (MT), had higher ad valorem taxes on rubber exports than any other state even though the three states had the worst weather conditions for human settlement (e.g., a terrible disease environment and extremely hot and humid weather). For sugar the evidence is more mixed, but still there is no uniformity in rates in the northeast (which is the former slave region and the sugar region).

Second, Tables 5 provides evidence that contradicts the second claim. State governments seem to have obtained higher export tax revenues per capita in states that had bad weather, high mortality, and labor systems that resembled indentured slavery. These are the rubber states on the Amazon Basin (AM, PA, and MT). Outside of the states specializing in rubber and coffee, the state governments that collected higher export tax revenues per capita where in sugar states like Bahia, Pernambuco, and Sergipe, which were also former slave states with sugar plantations.

Finally, and in contrast to what we would expect according to the literature on institutions, expenditures on public goods per capita such as education and infrastructure were also higher in states that did not necessarily had good conditions for human settlement. Table 6 shows that expenditures per capita were simply higher in states with higher exports.

Data and Methodology

The Data

Compiling fiscal and debt data for the different states of the Brazilian federation between 1890 and 1930 required us to compile statistics from a variety of archival sources and published materials. The Appendix describes in detail the source and methodology to estimate

the key variables used in the present analysis. Below is an explanation of how we construct our main dependent variables and of the empirical strategy we use to estimate the determinants of cost of capital for Brazilian states.

Table 7 shows the descriptive statistics of our data. In Panel A we shows the descriptive statistics for the whole sample and in Panel B we divide the sample among coffee exporters, we also present the averages of our variables for Sao Paulo, we show the averages for rubber exporters during the boom years (before 1915) and after the boom years (after 1915), and we include the averages for all the other states. This division makes sense because coffee and rubber exporters have the largest revenues and expenditures of all the states (Table 5). It is striking to note the differences in revenues and expenditures among states in Panel B of Table 7. For instance, total export tax revenues were almost three times larger for coffee exporters than for other nonrubber and noncoffee exporters (7.2 mil reis per capita vs. 2.6). Rubber exporters before 1915 had also almost nine times larger export tax revenues than the latter states and almost three times those of coffee exporting states. Yet after 1915 the coffers governments of states that exported rubber were comparable to those of coffee exporting states.

Empirical Strategy

We start by running a simple OLS regression using panel data. Our basic specification to examine the determinants of the expenditures per capita by state is of the following form:

$$pg_{it} = \beta\, s_{it-1} + \delta X_{it} + \zeta_i + \varphi_t + \varepsilon_{it},$$

where pg_{it} is the log of public good expenditures per capita, using either expenditures on education, public works, police, or the sum of public good expenditures in general (including the cost of public administration). s_{it-1} is the log of export tax revenue per capita for each state i. X is a vector of control variables that includes imports, population, and some commodity dummies. We also use fixed effects for states (ζ_i) to control for state unobservable characteristics and time dummy variables (φ_t), accounting for time varying trends common for all states. With these specifications we obtain something that could be interpreted as an (export) income elasticity for state governments, which tell us how much in percentage points would expenditures on public goods increase if there is a 1% increase in export tax revenue.

Findings

In Table 9 we can see that our basic story holds true: more export tax revenues per capita is correlated with higher expenditures on public goods across the board, even controlling for a variety of state characteristics (and state, regional, and time dummies). The effects are particularly strong for public works per capita. In order to understand the elasticities presented in this table it is perhaps better to look at concrete examples. For instance, if a state that did not export coffee could become a coffee exporter, then its export tax revenues per capita would increase 277% (they would go from a tax revenue per capita of 2.6—the average for a state that does not export coffee or rubber—to 7.2 mil reis, see Table 7 Panel B). An increase in export tax revenue of this magnitude would imply an increase in total state expenditures on public goods per capita of 121%, using the estimated elasticity of 0.438 in Specification 1. This is equivalent of having a state that was spending 6.1 mil reis per capita (approximately $2 dollars) increase its expenditures on public goods to 13.5 mil reis per capita (around $4).

In the case of expenditures of education per capita, using Specification 7, the elasticity is of similar size. The difference between a coffee exporter and a non coffee exporter (excluding rubber) implies an increase in expenditures in education per capita of almost 100%. That is, if a state that was on the average of the non coffee exporters could suddenly have coffee as its main commodity , we would observe an increase in tax revenues and, particularly, of expenditures on education from 0.8 mil reis per capita to 1.35 mil reis per capita.

Expenditures on public works have a higher elasticity in relation to export tax revenues per capita. This is because states tended to spend significantly more on public works during commodity booms and cut expenditures radically during periods of low commodity prices. That is, public goods are the equivalent of a luxury good in terms of public expenditure at the state level. Looking at Specification 11, we can see that the difference in export tax revenues between coffee exporters and non coffee exporters would imply an increase in expenditures on public goods per capita of 322% (this is because the increase in tax revenue used in the examples above is 277% and the income elasticity of state governments for expenditures on public works is 1.168). In simple terms this means that states that exported coffee, on average, could spend three times more on public goods on a per capita basis that the average state without coffee. Even if these counterfactuals do not make a lot of sense from a geographic point

of view, they provide interesting insights as to how pronounced the inequalities in the provision of public goods were during the First Republic (1889-1930) and show how during a period of extreme fiscal federalism differences in endowments heightened inequalities among states, at least in terms of the provision of public goods.

Instrumental Variables Approach

Alternatively, we also run a series of instrumental variables estimates to look at the determinants of state expenditures using the variation in commodity prices and the initial composition of state exports as an instrument. There are two reasons why we take this approach. First, we want to make sure that the variation in export tax revenues comes from conditions in the commodity market (and from the natural endowments of a state, limiting what kind of commodities each state could export). Second, we believe that there is potential serial correlation in our estimates because it is likely that export tax revenue at period *t-1* is correlated with the error term at period *t*. If, for instance, there is a permanent change in the conditions of the international market for the main commodity exported by state *i* (e.g. change in preferences or less competitiveness in the market), this could increase the export tax revenue and, furthermore, the expenditure in public goods in *t-1*. These could persist (through the error term in *t*) driving up expenditures on public goods in period *t*.

Because a lot of state revenues came from the taxes on commodity exports, we would want to find an exogenous factor that determined the export capacity of every state (without affecting expenditures on public goods directly). Ideally we would want to use geographical or climate-related variables to explain the variation in state revenues per capita across states (i.e., why some states specialized in some commodities and not in others) and the variation over time in revenues, since exports followed cycles determined either by international conditions or internal changes in the weather. Thus one option would have been to create a panel with climatic variables (such as rainfall, temperatures, and/or barometric pressure), with geographical variables (such as altitude and distance to the equator), and other geological variables such as soil types (which determine which crops can be produced in each state). Yet, this would have only allowed us to control for conditions that affected the supply of commodities and not the demand for it. Since the shock that we want to capture has an

important demand component and because most of the weather information is unavailable for the period 1891-1930 we devise an alternative approach.[4]

We create a series of price indices by state that use the variation in the prices of commodities exported in each state, weighted using the share of exports that each commodity represented (for each state). Table 8 shows the correlations between our geographical and climatic variables with the export share of each commodity (to total exports). We can see that there are some high correlations between some of these geographical variables and the kind of commodities states specialized in. Thus, we assume that the export shares at the beginning of our period reflect this heterogeneity across states. Then we use international prices to create a price index for commodity exports by state, using the export shares in the initial period as weights for the index.

We then combine the information on commodity exports at the state level in the initial year with the variation of prices using the following approach. Brazil has I commodities, i=1,…,8, there are J states, j=1,…., 18, and we have T periods t=0,…., 1; where t=0 represents 1901. SH_{ij0} is the export share of commodity i at the beginning of the period (t=0) for state i. We have the international prices for each commodity p_{it} at dollars. We transform it, using the exchange rate mil reis/dollar, into mil reis. Then we calculate the growth rate (g) of international prices for each commodity, which is defined as $g_{it}= [(p_{it} -p_{it-1})/ (p_{it-1})- 1]$, where i and t are defined as usual. Then we use g_{iNt} to predict prices at state level using SH_{ij0} as weights for a weighted price index per state, following the following formula

$$\hat{P}_{jt} = 100\left[\sum_{i=1}^{I} SH_{ijo} * g_{it} + 1\right],$$

where $\hat{P}_{jt}$ is the index price for state j at period t. For each of the indices, 1901 is the base year (1901= 100).[5] Once we have a price index $\hat{P}_{jt}$ for each state, we use it as a simulated

[4] We have only some of the geographical variables that do not change over time, such as altitude and distance to the equator. In fact, we found the average of weather variables for a later period and we have used them to see if the average explains a lot of the cross-sectional variation. It actually does explain cross-sectional variation, but for a panel estimation like ours, having these variables is equivalent to having fixed effects for the states.

instrument for state public revenue per capita in the first stage. The idea is that our price indices per state will reflect how much states can extract in ad valorem taxes on exports. In the second stage, we use our estimated state public revenues per capita as independent variable to estimate the cost of capital or spread of the states that traded bonds in international markets.

Using these price indices of commodity exports, however, we are assuming that states did not influence the growth rate of prices in international markets, which is not necessarily true. This is problematic because the state of São Paulo, Minas Gerais, and Rio de Janeiro were price setters in the international coffee market and thus the growth rate of national coffee exports was determined, to a large extent, by the actions of those states. As we mentioned in the introduction, Amazonas and Para were also the main suppliers in the international rubber market, but there was no coordination or any explicit effort to control prices. That is, rubber exporters were price takers. In order to deal with the potential endogeneity in the prices of coffee we construct alternative price indexes ignoring the price fluctuations for coffee (we also do it taking out rubber exports). Additionally, in some specifications we remove from our sample the data for Sao Paulo (state with the largest revenues coming from coffee exports) and Amazonas (the state with the largest revenues per capita coming from rubber). As we show in the next section, even with these changes our hypothesis holds.

Findings

Our IV estimates confirm the results of our OLS regressions. The results of our first stage regression using our commodity price indices at the state level, presented in Table 10, are very strong (with coefficients that indicate that an increase in commodity prices of 10% could raise export tax revenue per capita by 5%).

For instance, in Table 11 we find that the coefficients in the second stage are still positive and significant in most specifications, except for expenditures on police. The results using instrumental variables support our view that a good part of the expenditures on public goods per capita at the state level is determined exogenously by the type of commodities a state could export, which in turn was determined by the natural endowments of each of the provinces. The

[5] The first year with available data for commodity exports at state level is 1901. But there is no evidence of compositional changes in the state exports during the 1890s, so we believe that 1901 should be representative of the state of commodity exports in 1890.

coefficients in the IV regressions are larger, but they are still within two standard errors of distance of our coefficients from the OLS estimate.

Implications of our Findings

What is most important from our econometric results is to see the counterfactual scenarios that the coefficients of our regressions imply. As was mentioned before coffee exporting states spent three times more on education per capita than states exporting other commodities (except for rubber exporters). We believe the size of the effects have important economic implications. First and foremost, differences in the provision of crucial public goods like education can have long term effects on economic outcomes.

One way to examine whether the provision of public goods such as education had a long term impact on economic development is to look at the correlation between the average expenditures on, for example, education in the past and GDP per capita today. This is not to suggest strong causality, but to examine whether what happened during the period we study here may be correlated with future economic outcomes. We run simple OLS regressions with a constant to examine how large and significant were those correlations. In Panel A of Table 12 we show the results of a simple regression using the log of GDP per capita in 1920 as the dependent variable and we find strong correlations with expenditures on public goods between 1890 and 1930, but not with state expenditures per capita in the 1870s. Moreover, Panel B of Table 12 shows that the correlation of public good expenditures during our period and GDP per capita in 2006 are also significant and with similar coefficients to those found in Panel A.

In Table 13 we examine the correlation of expenditures on public goods per capita with the 1920 census estimates of value added per worker in agriculture and manufacturing. We find that expenditures on public good were highly correlated with value added per worker in agriculture, but more importantly we also find that education and infrastructure expenditures are highly correlated with value added per worker in manufacturing. All of this evidence suggests that perhaps expenditures on public goods may have had a real and long-lasting effect on living standards and productivity in Brazilian states.

Why did elites allowed governments to tax them in order to pay for education?

The reasons why elites would actually allow themselves to be taxed to pay for public goods such as education are puzzling when we take into account the views of the recent literature on education expenditures in Latin America, which predicts that in countries with literacy requirements to vote we should find low expenditures on education and low literacy and enrollment rates (Sokoloff and Mariscal, 2000). Yet, that very same paper presents data that uncovers a somewhat contradictory story. Brazil had the most rapid increase in literacy rates in the Americas from 1900 to 1940, exactly the period when there was a literacy requirement to vote (i.e., 1890 to 1932). What, then, explains the pattern we find in terms of expenditures on education and the increases in literacy rates during the First Republic?

Our explanation is very simple. The Constitution of 1891 restricted the vote to adult males who could read a section of the constitution (a literacy requirement), but it also made the electoral system more competitive (not clean or fair, but more competitive). For instance, the system of electoral colleges that prevailed during the empire and that limited who could become a federal senator or deputy was eliminated. Elections at the local and state level also became more important as fiscal decentralization progressed. All of these changes created competition among local bosses, *coroneis*, to get male voters to become part of their constituencies or *clientelas*. Some of these coroneis used coercion to obtain votes, but electoral competition made votes more valuable and, academics argue, the exchange of votes for public services or favors prevailed over pure coercive mechanisms to mobilize voters. Queiroz (1977) argues that "the history of the First Republic was more often made by these kinds of fights [among coroneis] than by coroneis oppressing their constituencies" (p. 162). She explains that during the First Republic the "political power [of the coroneis] was measured by how many votes a local boss could count on" (p. 157). Coroneis who could mobilize a larger mass of voters guaranteed support for their candidates or for their own candidacies to local, state, or national posts.

Electoral competition among local bosses generated at least two clear incentives to increase expenditures on education at the state and local levels. First, since many of the relations between the coroneis and their *clientelas* depended on the provision of goods, favors, and capital in exchange for political support. "Politicians depended on their voters. They had to serve them; trying to satisfy their needs in exchange for their votes" (Queiroz, 1977: p. 160). That is why,

we believe, the local provision of public goods by local governments helped them to increase their political support directly. Second, since political support counted only if the clienteles could vote, local bosses had to make sure that their male constituencies could read.

There are, of course, alternative hypothesis to explain why the First Republic was a period in which literacy increased rather rapidly. The most obvious one is that the republican elites brought with them the ideology of positivism and its emphasis on education. This may explain why literacy rates in Brazil go up so much during the First Republic and may explain why it was not only in males that we see such improvements in education levels (the increase in female literacy is very similar, see Table 14). Yet one piece of evidence makes us think our hypothesis is plausible as well. If there was a national change in attitudes and education policies we would not observe too much variation in literacy rates or in the growth rates of literacy rates across states.

Our evidence points, we believe, in favor of our hypothesis, even if it does not fully discard the hypothesis of "change in ideology." We find significant variation in both literacy rates and growth rates in literacy across states. TABLE 14 shows the increase in literacy rates by state and it shows significant variation in the improvement of literacy rates across states. There seems to be relatively strong correlation between expenditures on education per capita and increases in literacy rates (of around 0.68), which further proves our point. Yet the increases in literacy among men and women are so overwhelming that we cannot comfortably say that increases in education expenditures were designed to increase the number of voters (who had to be male adults). Now, what is clear during the First Republic is that the rates of electoral participation increased rapidly. During the empire participation was restricted to about 5 to 10% of the potential adult population, while during the Republic we find participation rates in presidential elections fluctuating from 9% to 20% (between 1890 and 1920), and reaching around 30% for the 1930 election.[6]

[6] These rates of electoral participation were calculated using the number of voters in presidential elections divided by the potential number of voters (using the census data on the number of males over 14 years of age). These figures are relatively large compared to previous estimates by Love (1970), who used the total male population of the country as the denominator and, thus, got estimates of around 4%.

Conclusion

We argue that the relation among the world prices for commodities and the level of export tax revenues per capita at the state level led to marked differences in the capacity that states had to spend on public goods between 1890 and 1930. Since differences in expenditures on public goods can lead to market differences in economic development among states we sustain that the set up of the 1891 Constitution may have promoted some of the regional inequality that we still observe today in Brazil. We do not argue that a federalist system with broad taxation powers for states should inexorably lead to inequality among states. If there is mobility of labor and capital, competition among states should lead to the equalization of living standards just like Weingast (1995), Weingast and Qian (1997) or McKinnon (1997) predict. Yet when there are frictions complicating the mobility of labor and capital across states, as was the case in Brazil, fiscal federalism can lead to markedly different development paths among states, thus accentuating regional inequalities.

Using qualitative as well as econometric analysis we show that in Brazil some states were able to export commodities that had higher demand in international markets, and the governments of these states collected relatively more in export tax revenues per capita. Because a large part of those revenues was used to pay for public goods, these states ended up having better infrastructure, more schools, and richer populations (on average). This perhaps extends the argument of Cano (1987) to all states. He explained that because the system that prevailed between 1890 and 1930 benefited São Paulo more than any other state, there was a higher industrialization in that state, while other states did not have enough time to catch up with São Paulo during the republican period (1889-1930). Yet our story is not that states with valuable commodities inevitably developed more than others, the duration of the commodity boom was important in determining who the winners and losers were. States along the Amazon Basin had larger expenditures on public goods per capita before 1910 than any other state in the country, but their revenues declined rapidly after that day as the prices of rubber plummeted. Those states went from being the richest (in fiscal terms) to being average states. After these changes we find that the order of states according to revenues per capita and GDP per capita in 1930 is almost exactly the same ranking we find today among Brazilian states.

After 1930 the government of Getulio Vargas changed the federalist pact, imposed some of his associates as federal supervisors of the actions of state governments and centralized the collection of tax revenues. This may have altered some of the inequalities among states we document for the period 1890 to 1930. Moreover, interregional migration in Brazil accelerated in the twentieth century as transportation by road became cheaper and this probably also attenuated some of the regional inequalities we found before 1930. Still it is surprising to find high correlation of living standards in 1930 and today. That is, perhaps natural endowments do explain some of the regional inequalities in countries like Brazil in the long run. But further research needs to be done to show there is a causal relation between expenditures in public goods before 1930 and current levels of economic development at the state level.

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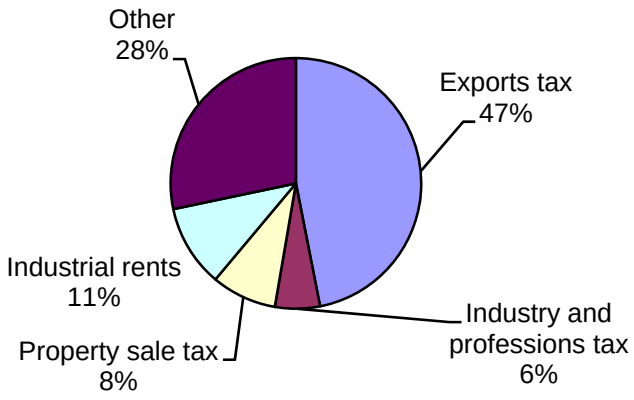
Methodological Appendix Sources and Methodology to Construct the Dataset

Variable	Source	Comments
State Public Finances	For data before 1897, we use Brazil (1914). For data from 1897 to 1939, see AEB V (1939/40).	Few data for some years and some states, the data is the budgeted and not the "actual". Some data reported was not for 1 year (either 6 or 18 months) and it was adjusted to be of 12 months (multiplying by 2 or 2/3 respectively). Finally, missing data for some years was filled out with linear interpolation between the closest data points available.
International Trade Data	Data from 1888, Ministerio da Fazenda (1888) Data from 1887, 1892 to 1897 and 1903-1907 is from Directoria Geral de Estatistica (1908). Data from 1902 (imports) and 1901 and 1902 (exports) from Servico de Estatistica Commericial ,(1904) 1908-1912 comes from AEB I Data from 1913-1927 and 1935-40 comes from Commerico Exterior do Brasil, several years. Information from 1928-1934 is from Serviço de Estatística Econômica e Financeira (1938). Overall data of exports and imports for the whole country from 1889-92 and 1898-1901 was taken from AEB V. Data from Minas Gerais is Servico de Estatistica Geral (1929). Yearly information since 1839-1840 until 1927.	1.. To fill out data gaps from 1889 to 1892 and 1898 to 1900 for exports and 1898 to 1901 for imports we followed the following strategy: We have data for total exports and imports of Brazil for these years, so we calculated the values for each state making a linear interpolation of the shares between the two known points of time and multiplying this share by the total imports and exports respectively. 3. Information includes only 18 states, the ones which have customs offices (usually the states with river or sea ports). For this reason, no data available data for Goias and Minas Gerais (MG). The later one, however, has reported exports but not from which ports they were shipped from. However, we know that most of the exports were shipped from Santos (in São Paulo, SP) and Rio de Janeiro (RJ). So, in order to include this important state in the sample, we assume that the same share in the total exports for RJ and SP corresponds to the exports from MG in each port. So in this case, we subtract from the SP and RJ exports, the MG's share and recalculate the export values for these 3 states. For the MG export data for 1927-1931, we assume that the MG average export share between 1923 and 1927 will prevail for the rest of the studied period and we proceed with the same methodology as explained above. In order to show that results of the estimations do not change, we also use the exports as reported by the federal publications (excluding MG). Unfortunately, data for imports for MG is not available. So, all the estimations including imports exclude MG. 4. Rio de Janeiro/DF. Federal District is located in Rio de Janeiro city, which is in Rio de Janeiro state. Both the city and the states collected their own public revenue, but the federal revenue public revenue is consolidated. Moreover, the port of the state is in Federal District and it is not until the twenties when other ports were open in the state (eg. Angra dos Reis). So we cannot distinguish the exports made by the city in itself or the state. However, we are confident that most of the state exports were shipped from the RJ port and most of the RJ port's exports come from the commodities produced in the state. Furthermore, we consider that the state was benefited from the exports and economic activity made in the port of Rio de Janeiro and vice versa and for this reason we use the same level of international trade activity for both state and city.
Commodities prices	Global Financial Data	
Population	The sources for the population are from the Population Census 1890 and 1900; and AEB V which contains data from 1900 to 1939.	Data from 1873 to 1899 was estimated through interpolation: We assumed a linear trend between censuses points for each state. Used to calculate the variables at per capita terms.
Prices	Index prices before 1913 were taken from Catao (1992) and from then on, see Contador and Haddad (1975).	Used to deflate the variables at 1913 prices.
Public goods expenditure data	Wileman (1909) and Brazil (1926)	

Figure 1. Map of Brazil with the Legal State Borders from 1890 to 1930

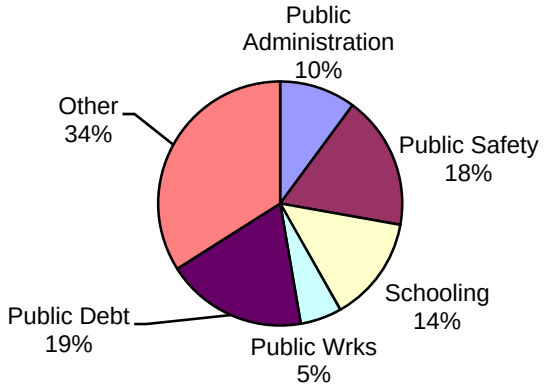
Figure 2. Distribution of State Revenue by source (average 1914-1916)



Source:Directoria Geral de Estatistica (1926)

Other represents Property tax (1.9%), Timber tax(2.2), territorial tax (2.2) and Others not specified (22)

Figure 3. Distribution of State Public Expenditure (Average 1914-1916)



Source:Directoria Geral de Estatistica (1926)

Other represents Inactive classes (2.6%), Collection (5.8%) and others not specified (25.6%)

Public Administration includes Executive, Legislative and Judicial Powers

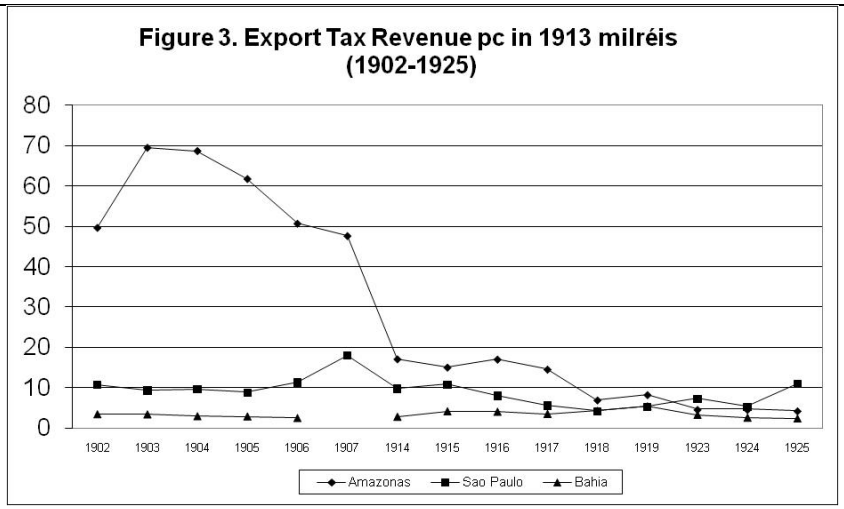


Figure 3. Export Tax Revenue pc in 1913 milréis (1902-1925)
80
70
60
50
40
30
20
10
0
1902 1903 1904 1905 1906 1907 1914 1915 1916 1917 1918 1919 1923 1924 1925
Amazonas
Sao Paulo
Bahia

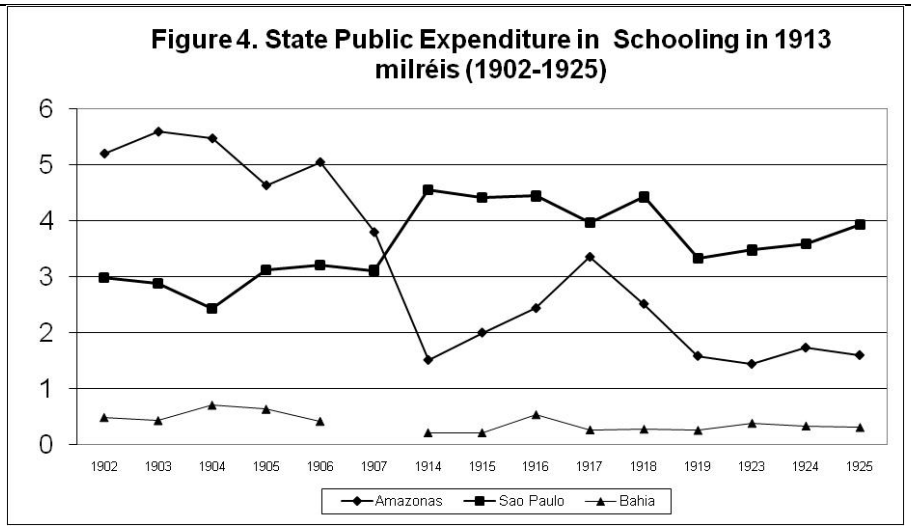


Figure 4. State Public Expenditure in Schooling in 1913 milréis (1902-1925)
6
5
4
3
2
1
0
1902 1903 1904 1905 1906 1907 1914 1915 1916 1917 1918 1919 1923 1924 1925
Amazonas
Sao Paulo
Bahia

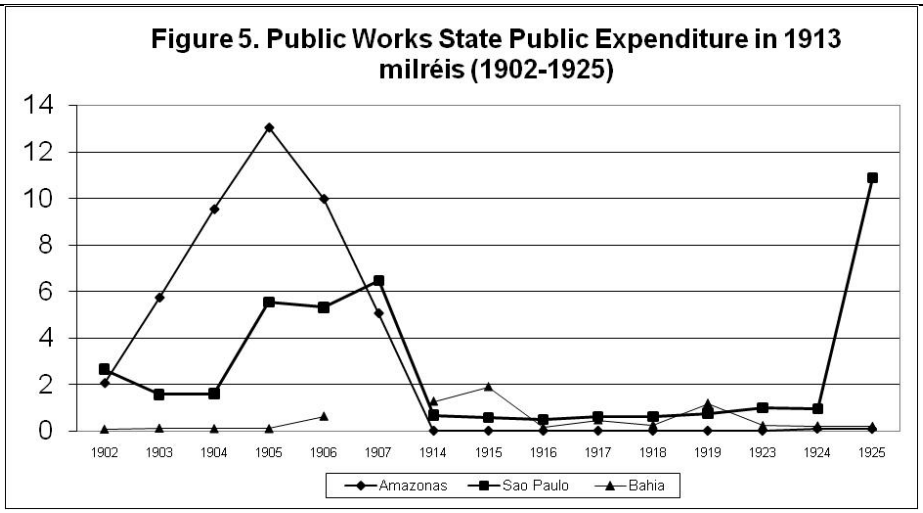


Figure 5. Public Works State Public Expenditure in 1913 milréis (1902-1925)
14
12
10
8
6
4
2
0
1902 1903 1904 1905 1906 1907 1914 1915 1916 1917 1918 1919 1923 1924 1925
Amazonas
Sao Paulo
Bahia

Table 1 Correlation of Economic Indicators of State Prosperity in the Past and Today (1872-2007)

Panel A Correlation of GDP and Exports per capita at the State Level

	GDP 2006	GDP 1980	GDP 1939	GDP 1920	Exports p.c. 1920	Exports p.c. 1910	Exports p.c. 1900
GDP p.c. 1980	0.95*						
GDP p.c. 1939	0.73*	0.75*					
GDP p.c. 1920	0.88*	.91*	0.75*				
Exports p.c. 1920	0.75*	0.81*	0.59*	0.78*			
Exports p.c. 1910	0.11	0.16	0.18	0.15	0.51		
Exports p.c. 1900	0.30	0.37	0.37	0.39	0.69*	0.68*	
Exports p.c. 1890	0.50	0.55	0.49	0.66*	0.79*	0.79*	0.87*
Exports p.c. 1872	0.30	0.43	0.50	0.64*	0.42	0.42	0.31
Correlations with exports per capita (without rubber-exporting states) [b]							
Exports p.c. 1920	0.82*	0.85*	0.62*	0.83*			
Exports p.c. 1910	0.66*	0.62*	0.83*	0.62*	0.72*		
Exports p.c. 1900	0.75*	0.75*	0.78*	0.79*	0.86*	0.81*	
Exports p.c. 1890	0.67*	0.66*	0.59	0.79*	0.78*	0.55	0.91*
Exports p.c. 1872	0.45	0.56	0.61*	0.75*	0.61*	0.43	0.71*

Panel B Correlation of Literacy Rates by State[c]

	2007	1991	1980	1950	1920	1900	1890
1991	0.98*	1					
1980	0.97*	0.99*	1				
1950	0.9*	0.92*	0.93*	1			
1920	0.81*	0.81*	0.83*	0.91*	1		
1900	0.69*	0.64*	0.66*	0.7*	0.87*	1	
1890	0.54	0.57*	0.61*	0.62*	0.62*	0.46	1
1872	0.36	0.37	0.38	0.42	0.47	0.34	0.6515*

Notes: a) The sample includes 18 states because it excludes the Federal District and Goias which did not on exports for some years; b) For these correlations we exclude the states of Amazonas and Pará; c) these correlations include all states except the Federal District. Stars (*) denote 1% significance.

Exports p.c. 1890
0.59*
0.80*

have data
e

Table 2. Expenditure by level of government										
	1913 Contos de reis					%				
	Federation	States	Local	RJ city	Total	Federation	States	Local	RJ city	Total
1883-1887	287,637	54,909	n.a.	2,443	344,988	83.4%	15.9%	n.a	0.7%	100%
1907	555,544	205,162	78,236	34,509	873,450	63.6%	23.5%	9.0%	4.0%	100%
1912	756,848	249,033	103,212	45,820	1,154,913	65.5%	21.6%	8.9%	4.0%	100%
1917	698,509	246,460	93,300	40,011	1,078,279	64.8%	22.9%	8.7%	3.7%	100%
1922	864,565	310,172	106,570	61,204	1,342,511	64.4%	23.1%	7.9%	4.6%	100%
1927	844,150	543,170	148,910	65,396	1,601,625	52.7%	33.9%	9.3%	4.1%	100%

Source: Separata do Anuario Estatistico do Brasil-- 1939/1940, IBGE

Table 3. State Public Revenue per capita in US, Mexico, Brazil and Sao Paulo (1890 Dollars) (1890-1927)

	US	Mexico	Brazil	Sao Paulo
1890	1.84		2.29	6.31
1900	2.63	0.80	1.95	3.32
1902	2.30	0.67	1.87	4.26
1913	3.35	0.83	1.62	8.87
1922	6.00	0.84	1.23	2.59
1927	8.47	0.87	2.04	6.53

Source: For population and state public revenue in Brazil, see methodological appendix. Exchange rate (reis/dollars), see Musacchio (2008).

For US, see Series F1-5, Y652-670, Y567-589, Y505-521. Historical Statistics of The United States: Colonial Times to 1970, Government Share and value per capita for 1890 and 1900, see Wallis(2000).

For US population, see Maddison (2003).

For Mexico, State public revenue for 1900 Penafiel (1901) and from 1902 on see Servin (1956) , Population and exchange rate (Oxford Latin America Economy History Database)

Inflation data to deflate data is from Lawrence H. Officer and Samuel H. Williamson "Annual Inflation Rates in the United States, 1775 - 2008, and United Kingdom, 1265 - 2008," MeasuringWorth, 2009. URL http://www.measuringworth.com/inflation/

Table 4. Ad Valorem Tax Rates on the Main Commodities Exported in Brazil (percentage points), circa 1912

	BA	SE	AL	PE	PB	RN	CE	PI	MA	PA	AM	RJ	SP	MG	PR[c]	SC	RS[e]	MG	MT	GO
Cocoa (Cacao)	**12**									6	5									
Coffee	7	8			8							**8.5**	**9[b]**	**8**	4	8		**8**		6
Cotton		8	9	**10**	**8**	8	**6**	12	**8**							0				6
Hides	14	**12**	**15**	15				12		17						10			12	
Mate															**0**	**0**				
Meat																6				
Rubber	9	10			6	**8**		**12**	3	**22**	**20[a]**								**20[a]**	
Skins	14	**12**	**10**		10	8	**7**			10					10				12	
Sugar	1	7	6	2	5	8	4	12				2.5				5				6
Tobacco	**8**				8		6									8				
Wax				6		8		**12**												
Wood	20		25				10			3					4	10				

Soruce: Lyra (1914).

Note: This table shows only ad valorem taxes and not lump some taxes that were charged on some products.

The main commodities exported by each state appear in bold.

a. Rubber from the remote Javary River basin paid only 10%

b. Love (1980)

c. There is also an additional tax of 10% on all products except mate.

d. Rubber from Mato Grosso (MT) exported through Pará and Amazonas paid only 12%.

e. Tax rates not reported. Meat and hides were the main exports of Rio Grande do Sul (RS).

Table 5. State Exports, Expenditures, and Export Tax Revenue per capita (average for 1901-1926 in 1913 milreis)

		Main Commodity	Exports	Total Expenditure	Export Tax Revenue	Expenditure in schooling	Expenditure in Public Works	Expenditure in Police	Collection Costs	State Share of Total State Expenditure
Alagoas	AL	Sugar	7.8	3.8	1.7	0.5	0.1	0.7	0.4	1.1%
Amazonas	AM	Rubber	237.5	41.0	29.3	3.2	3.0	4.8	2.5	5.2%
Bahia	BA	Tobacco	26.6	6.8	3.4	0.4	0.5	1.0	0.2	6.6%
Ceará	CE	Cattle	11.0	4.1	1.6	0.7	0.0	0.8	0.3	1.5%
Espirito Santo	ES	Coffee	85.1	13.0	8.6	1.0	0.7	1.4	0.7	2.2%
Goiás	GO		n.a.	3.1	1.4	0.2	0.1	0.9	0.5	0.5%
Maranhao	MA	Cotton	14.1	4.6	0.8	0.5	0.2	0.7	0.4	1.1%
Minas Gerais	MG	Coffee	47.3	15.7	3.0	0.8	0.3	0.8	0.5	12.8%
Mato Grosso	MT	Rubber	29.6	5.6	8.4	1.8	1.1	4.0	1.8	1.0%
Para	PA	Rubber	109.8	17.0	11.6	2.0	0.3	3.3	0.3	4.9%
Paraiba	PB	Cotton	7.1	4.3	2.0	0.5	0.4	0.9	0.6	1.1%
Pernambuco	PE	Sugar	18.1	7.3	2.4	0.5	0.6	1.3	0.4	4.9%
Piaui	PI	Cotton	3.7	2.7	1.1	0.2	0.2	0.6	0.3	0.5%
Paraná	PR	Mate	43.7	11.3	4.2	1.4	1.2	2.5	0.9	2.7%
Rio de Janeiro	RJ	Coffee	89.4	9.4	4.7	1.0	0.5	1.0	0.6	5.3%
Rio Grande do Norte	RN	Cotton	5.7	5.9	2.5	0.5	0.4	1.0	0.4	0.9%
Rio Grande do Sul	RS	Cattle	24.9	12.1	2.2	1.5	1.2	2.1	0.5	8.8%
Santa Catarina	SC	Mate	11.9	6.4	1.9	0.8	0.7	0.8	0.5	1.3%
Sergipe	SE	Sugar	4.0	7.1	2.5	0.9	0.3	1.0	0.7	1.0%
Sao Paulo	SP	Coffee	80.9	24.6	9.0	3.6	2.6	4.0	0.7	36.6%

Table 6. Importance of Export Taxes in State Public Finance 1901-1925			
	Export Taxes/Total Revenue		
	Average 1901-1907	Average 1914-1916	Average 1923-1925*
AL	43.30%	54.9%	56.9%
AM	88.91%	82.1%	65.3%
BA	65.90%	63.3%	66.2%
CE	39.84%	68.5%	59.3%
ES	77.59%	89.0%	85.8%
GO	44.45%	62.7%	59.2%
MA	20.37%	17.9%	42.1%
Mato Grosso	30.11%	73.0%	59.9%
MG	57.07%	66.5%	55.7%
PARA	78.37%	62.2%	53.6%
PARAIBA	42.36%	70.6%	73.0%
PR	27.95%	54.0%	65.2%
PE	31.10%	57.7%	59.5%
PI	41.69%	67.3%	59.1%
RJ	52.44%	60.3%	70.2%
RN	62.81%	84.5%	86.6%
RS	28.09%	31.2%	15.7%
SC	40.59%	38.5%	38.0%
SP	58.71%	66.5%	45.7%
SE	48.10%	44.3%	43.6%
Average	48.99%	60.75%	58.03%

Source:Directoria Geral de Estatistica (1926) and Willeman (1909)

* Data is from the approved budget

Table 7. Descriptive Statistics (At least otherwise indicated, all variables in milréis)

Panel A. All Observations

	Observations	Mean	Std. Dev.	Min	Max
Population (millions)	787	1.2	1.3	0.1	7.1
Simulated Prices (Index, 1901=100)	748	154.8	109.6	21.6	961.2
Exports pc	787	45.0	76.0	0.0	711.0
Imports pc	743	33.5	60.2	0.8	418.2
State Expenditure pc	787	11.0	13.0	1.2	124.7
Export tax revenues pc	251	5.6	9.4	0.1	69.3
Schooling pc	250	1.2	1.1	0.2	5.6
Public Works pc	242	0.8	1.6	0.0	13.0
Health per capita	93	0.4	1.0	0.0	8.6
Police pc	250	1.8	1.7	0.0	10.9
Public Administration pc	249	1.2	1.0	0.3	6.5
Collection costs pc	236	0.7	0.7	0.1	4.1
Collection share (% of Expenditure	236	7.7%	4.4%	0.9%	22.7%

Panel B. Average for Coffee, Rubber and Other States*

	Coffee	S. Paulo	Rubber	Rubber (> 1915)	Other States
Population (millions)	1.9	3.4	0.4	0.6	1.1
Simulated Prices (Index, 1901=100)	187.6	197.5	95.5	81.6	155.8
Exports pc	114.7	123.0	173.9	87.7	18.4
Imports pc	96.8	55.1	48.0	23.0	13.9
State Expenditure pc	16.1	25.8	30.5	13.0	6.1
Export tax revenues pc	7.2	9.0	20.7	6.8	2.6
Schooling pc	1.8	3.6	2.6	1.7	0.8
Public Works pc	1.2	2.6	1.8	0.0	0.5
Health per capita	0.3	0.9	0.8	na	0.3
Police pc	2.1	4.0	4.1	2.5	1.2
Public Administration pc	1.0	1.4	3.1	2.2	0.9
Collection costs pc	0.6	0.7	1.5	1.1	0.6
Collection share (% of Expenditure	4.8%	3.0%	5.7%	6.8%	9.7%

Note: Coffee (SP, RJ and ES) and rubber (AM and PA) states are those observations that have 50% or more of their exports composed by coffee and rubber respectively.

Brazilian States (averages 1890--1930)

Panel A: Correlations Between Geographical and Weather Variables and the Share of Exports of Each

	Mate	Tobacco	Cacao	Rubber	Cotton	Sugar	Coffee	Mineral	Cattle
Altitude	**0.65***	0.22*	0.16*	-0.43*	-0.13*	-0.16*	**0.21***	-0.07	-0.13*
Rain	**0.26***	-0.15*	-0.12*	**0.68***	-0.50*	-0.29*	-0.02	-0.07	-0.21*
Sun	-0.43*	**0.21***	**0.20***	-0.35*	**0.43***	**0.50***	-0.24*	-0.10*	**0.30***
Temperature	-0.53*	0.08	**0.18***	**0.43***	**0.18***	**0.31***	-0.22*	-0.12*	-0.07*
Distance to equator	**0.52***	0.06	-0.04	-0.44*	-0.42*	-0.20*	**0.47***	**0.22***	0.06

Panel B: Correlations Between Soil Types and Crop Specialization (i.e., Export Shares) by State

	Mate	Tobacco	Cacao	Rubber	Cotton	Sugar	Coffee	Mineral	Cattle
Argissolos	-0.10*	-0.03	0.06	**0.89***	-0.28*	-0.22*	-0.16*	-0.12*	-0.20*
Cambissolos	**0.70***	0.48*	0.43*	-0.27*	-0.37*	-0.27*	**0.17***	-0.01	-0.12*
Chernossolos	-0.12*	**0.79***	**0.75***	-0.13*	-0.20*	-0.14*	-0.14*	0.10*	0.31*
Latossolos	-0.01	0.16*	0.22*	**0.68***	-0.33*	-0.27*	-0.12*	-0.10*	-0.12*
Luvissolos	-0.23*	-0.03	-0.02	-0.10*	**0.51***	0.07	-0.27*	-0.13*	0.16*
Neossolos	0.09*	0.22*	0.24*	0.20*	-0.17*	-0.23*	-0.34*	-0.13*	0.30*
Nitossolos	**0.74***	-0.08	-0.09	0.02	-0.26*	-0.20*	-0.21*	-0.13*	-0.11*
Vertissolos	-0.06	0.04	-0.07	-0.12*	-0.15*	-0.10*	-0.13*	-0.04	**0.60***
Plintossolos	-0.02	-0.14*	-0.11*	**0.52***	-0.19*	-0.21*	-0.24*	-0.11*	-0.06
Planossolos	-0.11*	0.78*	0.75*	-0.15*	-0.16*	-0.07	-0.19*	0.07	0.29*

Panel C: Correlations Between Geography, Weather, and State Public Revenue Per Capita

	Altitude	Rain	Sun	Temperature	Distance to Equator
Public rev. pc	-0.18*	0.60*	-0.40*	0.14*	0.03
Public rev. pc (w/o rubber states)	0.28*	0.42*	-0.31*	-0.22*	0.54*

Note: Soil type represent the percentage of the state area that corresponds to each type of soil. Correlations
Source: Most variables kindly shared by Rodrigo Soares. See Naritomi, Soares, and Assunção (2007)

Table 9. Public Goods Expenditures per capita at State Level. 1901-1926. The dependent variable is the logarithm of the expenditure per capita in different functions: Total state public expenditure. Schooling, public works, police, public administration (includes executive, legislative and judicial powers) and collection costs. Regressions test the hypothesis that revenues per capita derived by exports and the state risk premium explain the capacity of the states to provide different public goods. A positive coefficient on export tax revenue per capita and a negative one in the coupon spread support our hypothesis that better endowed states were able to provide more public goods. Variables are in logarithms, so the coefficient is an elasticity. Robust cluster standard errors shown in parenthesis.Coefficients marked with: *** indicates significant at 1%, ** at 5% and * at 10%

	(1) Log (Total Expenditure pc)	(2) Log (Total Expenditure pc)	(3) Log (Total Expenditure pc)	(4) Log (Schooling pc)	(5) Log (Schooling pc)	(6) Log (Schooling pc)	(7) Log (Schooling pc) No coffee	(8) Log (Schooling pc) No rubber	(9) Log (Public Works pc)	(10) Log (Public Works pc)	(11) Log (Public Works pc)	(12) Log (Public Works pc) No coffee	(13) Log (Public Works pc) No rubber
Log (Exports Revenue pc)	0.438***	0.342***	0.289***	0.324***	0.256***	0.251***	0.235***	0.153**	1.265***	1.284***	1.168***	1.153***	0.787**
	(0.13)	(0.11)	(0.09)	(0.10)	(0.08)	(0.07)	(0.07)	(0.06)	(0.28)	(0.24)	(0.29)	(0.26)	(0.30)
Log (Import pc)		0.307***	0.193**		0.278***	0.161*	0.177	0.091		0.158	0.179	0.032	-0.038
		(0.08)	(0.08)		(0.10)	(0.09)	(0.11)	(0.07)		(0.25)	(0.25)	(0.36)	(0.29)
Log (Population)		-0.003	0.196		1.117	0.935	0.818	1.358**		-0.42	0.268	0.8	0.125
		(0.73)	(0.55)		(0.86)	(0.65)	(0.77)	(0.59)		(1.97)	(2.35)	(1.54)	(2.72)
Log (Exports pc)		0.037	0.082		-0.036	0	0.032	-0.037		0.103	-0.004	0.024	0.167
		(0.09)	(0.07)		(0.04)	(0.04)	(0.07)	(0.05)		(0.15)	(0.17)	(0.19)	(0.23)
Log (Debt pc)		0.096	0.113*		-0.018	-0.034	-0.035	-0.033		-0.337*	-0.288	-0.086	-0.338*
		(0.06)	(0.06)		(0.07)	(0.06)	(0.06)	(0.07)		(0.17)	(0.18)	(0.11)	(0.19)
Sugar share			-0.448**			-0.439**	-0.474***	-0.393**			0.913*	0.673	0.623
			(0.17)			(0.17)	(0.16)	(0.18)			(0.50)	(0.40)	(0.48)
Coffee share			-0.111			-0.398	-1.041	-0.407			0.658	2.857	0.811
			(0.18)			(0.30)	(1.07)	(0.31)			(1.18)	(2.06)	(1.16)
Cotton share			-0.482***			-0.005	-0.12	0.056			-0.189	-0.41	-0.312
			(0.17)			(0.15)	(0.19)	(0.10)			(0.75)	(0.63)	(0.66)
Rubber share			1.311***			0.837**	0.831	0.444			2.072	1.097	2.975
			(0.42)			(0.37)	(0.53)	(0.48)			(1.99)	(1.95)	(2.43)
Cacao share			1.617*			-3.397***	-3.279***	-4.128***			8.528	8.68	13.452***
			(0.92)			(0.85)	(0.79)	(0.94)			(7.21)	(7.98)	(3.96)
Tobacco share			-0.494			-0.314	-0.35	-0.637			-1.054	-2.115	1.277
			(0.45)			(0.81)	(0.91)	(0.66)			(2.93)	(3.22)	(2.97)
Mate share			-0.189			-0.12	-0.378	0.011			0.637	0.938	1.610*
			(0.35)			(0.42)	(0.35)	(0.27)			(0.77)	(0.67)	(0.82)
Constant	-8.220***	-10.023***	-9.707***	-4.657***	-4.822***	-4.617***	-4.726***	-4.595***	0.592	0.568	0.048	-0.331	-2.918
	(0.75)	(1.15)	(0.93)	(0.61)	(0.79)	(0.72)	(0.87)	(0.78)	(1.63)	(2.14)	(1.85)	(1.57)	(2.44)
Observations	294	234	234	292	232	232	191	207	265	206	206	165	188
R-squared	0.948	0.954	0.963	0.889	0.878	0.89	0.88	0.895	0.714	0.732	0.752	0.789	0.718

Table 10. First Stage. Export Tax Revenue per capita. The instrument is the simulated prices to explain t
the states. We expect that favorable commodity prices in international markets affected positively the exp
export tax revenue collected by state governments. The hypothesis is that the coeffcient is positive. Varia
they should be interpreted as elasticities. Specifications include state and year fixed effects. Robust cluste
in parenthesis. Coefficients marked with: *** indicates significant at 1%, ** at 5% and * at 10%

	(1)	(2)	(3)
COEFFICIENT	Log (Exports Revenue pc)	Log (Exports Revenue pc)	Log (Exports Revenue pc) NO SP
Log (Simulated Prices)	0.565***	0.469*	0.515*
	(0.12)	(0.25)	(0.26)
Log (Import pc)		0.179	0.241
		(0.15)	(0.15)
Log (Population)		-0.683	-0.451
		(1.45)	(1.44)
Log (Exports pc)		0.193*	0.139
		(0.10)	(0.09)
Log (Debt pc)		-0.012	0.006
		(0.12)	(0.12)
Constant	-8.518***	-9.381***	-9.220***
	(0.56)	(1.81)	(1.79)
Observations	274	234	219
R-squared	0.784	0.808	0.807

the export tax receipts of
orts and furthermore the
ables are at logarithms and
ered standard errors shown

(4)
Log (Exports Revenue pc)
NO COFFEE
0.597**
(0.25)
0.265
(0.18)
-0.499
(1.50)
0.141
(0.09)
-0.001
(0.13)
-9.770***
(1.90)
193
0.802

TAble 11. IV. Second Stage. Instrument: Simulated Prices, Endogenous Variable: Exports Tax Revenue pc. The dependent variable is the logarithm of the expenditure per capita in different functions. Regressions test the hypothesis that revenues per capita derived by exports (instrumented by the simulated export tax revenue) and the state risk premium explain the capacity of the states to provide different public goods A positive coefficient on export tax revenue per capita and a negative one in the coupon spread support our hypothesis that better endowed states were able to provide more public goods. Cluster robust standard errors shown in parenthesis. Coefficients marked with: *** indicates significant at 1%, ** at 5% and * at 10%

VARIABLES	(1) Log (Total Expenditure pc)	(2) Log (Total Expenditure pc)	(3) Log (Schooling pc)	(4) Log (Schooling pc)	(5) Log (Schooling pc) No coffee	(6) Log (Public Works pc)	(7) Log (Public Works pc)	(8) Log (Public Works pc) No coffee
Log (Exports Revenue pc)	0.881***	0.707***	0.632***	0.528**	0.526***	2.460***	2.932*	1.935**
	(0.15)	(0.27)	(0.15)	(0.21)	(0.19)	(0.79)	(1.73)	(0.93)
Log (Import pc)		0.09		0.204**	0.201*		-0.459	-0.357
		(0.08)		(0.08)	(0.11)		(0.62)	(0.58)
Log (Population)		0.026		1.127	0.939		0.073	-0.015
		(0.45)		(0.77)	(0.86)		(2.15)	(0.98)
Log (Exports pc)		-0.133		-0.116	-0.096		0.093	0.16
		(0.09)		(0.08)	(0.07)		(0.27)	(0.17)
Log (Debt pc)		0.116**		-0.004	0		-0.032	-0.013
		(0.05)		(0.06)	(0.06)		(0.40)	(0.25)
Constant	-5.102***	-6.408***	-3.042***	-2.3	-3.085*	6.354	10.027	4.541
	(0.85)	(1.68)	(0.84)	(1.83)	(1.77)	(4.61)	(10.84)	(6.19)
Observations	274	234	272	232	191	245	206	165
R-squared	0.917	0.936	0.839	0.853	0.832	0.596	0.584	0.735

Table 12. Correlations of Expenditures on Public Goods and GDP per capita over time. Data in logarithms.
Coefficients marked with: *** indicates significant at 1%, ** at 5% and * at 10%

Panel A OLS State Expenditures on Public Goods and GDP per capita in 1920.

	(1) Log (GDP pc in 1920)	(2) Log (GDP pc in 1920)	(3) Log (GDP pc in 1920)	(4) Log (GDP pc in 1920)	(5) Log (GDP pc in 1920)	(6) Log (GDP pc in 1920)
Log Total State Expenditure pc	0.488***					
	(0.13)					
Log Schooling Expenditure pc		0.425***				
		(0.11)				
Log Public Works Expenditure pc			0.308***			
			(0.06)			
Log Police Expenditure pc				0.421***		
				(0.14)		
Log Public Administration Expend pc					0.413**	
					(0.16)	
Log State Public Expenditure (1870's)						0.261
						(0.16)
Constant	-2.298***	-1.215***	-1.033***	-1.410***	-1.272***	-1.620***
	-0.261	-0.093	-0.109	-0.105	-0.107	-0.212
Observations	20	20	20	20	20	20
R-squared	0.461	0.402	0.422	0.299	0.191	0.097

Panel B OLS of State Expenditures on Public Goods and GDP per capita in 2006.

	(1) Log (GDP pc in 2006)	(2) Log (GDP pc in 2006)	(3) Log (GDP pc in 2006)	(4) Log (GDP pc in 2006)	(5) Log (GDP pc in 2006)
Log Total State Expenditure pc	0.423***				
	-0.131				
Log Schooling Expenditure pc		0.392***			
		-0.117			
Log Public Works Expenditure pc			0.296***		
			-0.064		
Log Police Expenditure pc				0.357**	
				-0.14	
Log Public Administration Expend pc					0.314**
					-0.149
Constant	0.802***	1.744***	1.922***	1.572***	1.688***
	-0.273	-0.089	-0.091	-0.11	-0.104
Observations	20	20	20	20	20
R-squared	0.386	0.382	0.437	0.241	0.123

Table 13. Exports in 1870s, Expenditure per capita and Added Value in Agriculture and Industry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(exports pc 1870)	Log Total State Expenditure pc	Added Value in Agriculture 1920	Added Value in Agriculture 1920	Added Value in Agriculture 1920	Added Value in Industry 1920	Added Value in Industry1920	Added Value in Industry1920
Log Total State Expenditure pc			0.495***					0.595
			(0.17)					(0.39)
Log Schooling Expenditure pc				0.371**			0.658**	
				(0.16)			(0.29)	
Log Public Works Expenditure pc					0.323***	0.459**		
					(0.09)	(0.21)		
Log State Public Expenditure in the	0.417	-0.44						
	(0.41)	(4.99)						
Constant	1.609**	10.839	-3.098***	-2.012***	-1.807***	-3.147***	-3.414***	-4.758***
	-0.569	-7.51	-0.382	-0.116	-0.127	-0.311	-0.222	-0.729
Observations	19	20	20	20	20	20	20	20
R-squared	0.05	0.001	0.354	0.229	0.347	0.264	0.271	0.192

Table 14. Expenditures in Schooling, Literacy Rate , Enrollment and Schools

		Main Commodity	Expenditure in schooling (average 1901-1926)	Female Literacy Rate 1890	Male Literacy Rate 1890	Literacy Rate 1890	Female Literacy Rate 1940	Male Literacy Rate 1940	Literacy Rate 1940	Change Female Literacy	Change Male Literacy	Change Literacy	Primary schools in 1889	Primary schools in 1933	% Change in Primary Schools	Students in 1889	Students in 1933	% Change in Students
Alagoas	AL	Sugar	0.5	10.6%	17.0%	13.7%	19.0%	20.4%	19.6%	8.4%	3.4%	5.9%	209	560	168%	6,928	32,913	375%
Amazonas	AM	Rubber	3.2	8.5%	22.5%	16.2%	33.0%	40.5%	36.9%	24.5%	18.0%	20.7%	122	926	659%	3,546	24,100	580%
Bahia	BA	Tobacco	0.4	6.2%	11.1%	8.7%	20.2%	27.7%	23.8%	13.9%	16.5%	15.1%	671	1,624	142%	22,131	86,876	293%
Ceará	CE	Cattle	0.7	8.8%	18.2%	13.4%	24.7%	27.8%	26.2%	15.9%	9.7%	12.8%	237	861	263%	9,497	62,035	553%
Espirito Sa	ES	Coffee	1.0	8.2%	18.4%	13.4%	34.0%	45.5%	39.8%	25.8%	27.1%	26.4%	280	801	186%	18,698	166,644	791%
Federal Dis	FD			43.8%	57.9%	51.7%	74.2%	82.7%	78.5%	30.4%	24.9%	26.7%	105	784	647%	2,582	44,783	1634%
Goiás	GO		0.2	5.4%	16.6%	10.9%	17.9%	27.5%	22.8%	12.5%	10.9%	11.8%	95	391	312%	2,708	22,956	748%
Maranhao	MA	Cotton	0.5	9.0%	17.4%	13.2%	19.2%	23.3%	21.3%	10.2%	5.9%	8.1%	170	636	274%	6,545	34,117	421%
Minas Ger	MG	Coffee	0.8	6.5%	14.1%	10.4%	29.0%	37.5%	33.2%	22.4%	23.4%	22.8%	1,757	3,628	106%	46,997	396,769	744%
Mato Gros	MT	Rubber	1.8	10.6%	22.9%	16.9%	35.7%	44.9%	40.6%	25.1%	22.0%	23.8%	51	302	492%	1,830	20,888	1041%
Para	PA	Rubber	2.0	12.3%	31.8%	22.2%	36.0%	46.7%	41.3%	23.7%	14.9%	19.2%	336	999	197%	11,904	65,745	452%
Paraiba	PB	Cotton	0.5	8.4%	16.9%	12.5%	19.3%	22.4%	20.8%	10.9%	5.6%	8.4%	92	710	672%	2,531	51,317	1928%
Pernambuc	PE	Sugar	0.5	10.9%	17.6%	14.2%	23.6%	27.0%	25.2%	12.7%	9.3%	11.0%	747	1,902	155%	19,742	98,204	397%
Piaui	PI	Cotton	0.2	5.1%	14.8%	9.9%	15.5%	22.8%	19.1%	10.4%	8.0%	9.2%	84	181	115%	2,129	15,999	651%
Paraná	PR	Mate	1.4	11.4%	25.7%	18.8%	36.6%	49.1%	43.0%	25.2%	23.3%	24.2%	213	1,037	387%	6,968	69,140	892%
Rio de Jane	RJ	Coffee	1.0	10.6%	19.7%	15.2%	38.1%	47.4%	42.8%	27.5%	27.7%	27.6%	852	1,531	80%	31,091	129,543	317%
Rio Grande	RN	Cotton	0.5	10.8%	20.1%	15.4%	26.6%	27.7%	27.1%	15.8%	7.5%	11.8%	159	430	170%	5,443	34,847	540%
Rio Grande	RS	Cattle	1.5	20.7%	29.7%	25.3%	51.7%	57.4%	54.5%	31.0%	27.7%	29.3%	499	4,313	764%	24,287	249,895	929%
Santa Cata	SC	Mate	0.8	15.8%	23.5%	19.6%	45.1%	53.2%	49.2%	29.3%	29.8%	29.6%	174	1,733	896%	7,508	100,861	1243%
Sergipe	SE	Sugar	0.9	7.9%	12.6%	10.2%	25.8%	28.8%	27.2%	17.9%	16.2%	17.0%	206	448	117%	3,750	22,291	494%
Sao Paulo	SP	Coffee	3.6	9.2%	18.8%	14.1%	46.2%	59.0%	52.8%	37.0%	40.2%	38.7%	1,098	4,910	347%	21,989	488,646	2122%
Brazil				**10.4%**	**19.1%**	**14.8%**	**34.4%**	**42.6%**	**38.5%**	**24.0%**	**23.5%**	**23.7%**	**8,157**	**28,707**	**252%**	**258,804**	**2,218,569**	**757%**