Fiscal Capacity and the Provision of Public Goods in Brazil, 1891-1930

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Abstract

This paper examines the impact of agricultural booms on tax collection and public goods provision in Brazilian municipalities during the First Republic (1891-1930). We build a unique yearly panel dataset on public finance outcomes and employ a panel estimation approach that leverages exogenous variation in land suitability to estimate the impacts of coffee price fluctuations on the development of fiscal institutions in São Paulo. Our results reveal a strong positive relationship between coffee price booms and local tax collection between 1898 and 1928. Revenue increases primarily originated from indirect taxes on goods, services, and wealth transfers, imposing a disproportionate burden on the poorest individuals. We also document that exposure to coffee booms was associated with higher investments in public goods and services. These findings contribute to our understanding of how agricultural booms, coupled with the fiscal federalism structure of the 1891 constitution, influenced the capacity of Brazilian municipalities to establish tax systems that generate revenue from diverse sources.

JEL Classification: H71, H75, H76, O12
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1 Introduction

A growing body of research suggests that state and fiscal capacity play crucial roles in the economic development of a nation (Acemoglu, 2005; Besley and Persson, 2010; Dincecco and Katz, 2016). State capacity is the government's ability to implement different policies, including the provision of public goods and law enforcement. On the other hand, fiscal capacity is the government's ability to collect and manage revenue to fund its activities. Stronger states tend to have more efficient public services, better infrastructure, and higher levels of human development. They are also more capable of implementing policies to promote economic growth and reduce poverty (Acemoglu et al., 2015; Dell et al., 2018). In contrast, weak states may struggle to provide basic public goods and services, resulting in poor living conditions, low levels of human development, and weak economic growth (Besley and Persson, 2010; Michalopoulos and Papaioannou, 2013; Baland and Robinson, 2012; Fergusson et al., 2022).

Yet, there is still little consensus in the literature regarding the origins of state capacity, particularly within a country. Some studies emphasize the importance of foreign wars and external threats in state capacity development (Tilly et al., 1992; Gennaioli and Voth, 2015; Dincecco and Prado, 2012), while others highlight the role of economic performance (Karaman and Pamuk, 2013; Sánchez De La Sierra, 2020) and domestic conflicts between local elites (Besley and Persson, 2010; Garfias, 2018). Saylor (2014) explores elite dynamics and posits that state-building occurs during commodity booms in two scenarios: when export-oriented actors demand new public goods and when booms benefit rival factions of the ruling coalition, stimulating an expansion of the state capacity to preserve political advantage. In countries like Chile, Argentina, and Mauritius, export-oriented actors leading ruling coalitions stimulated substantial projects to provide public goods to support export production, which enhanced state capacity. In contrast, in governments where exporters were politically marginalized, such as Colombia, Ghana, and Nigeria, the state capacity stagnated (Saylor, 2014).

In this paper, we contribute to this debate by examining the origins of fiscal capacity in Brazilian municipalities. In particular, we focus on the role of coffee booms in the state of São Paulo in contributing to the development of relatively efficient fiscal institutions during the First Republic (1890-1930), a crucial period for state formation in Brazil. São Paulo's history offers a unique setting to study the origins of state capacity. First, Brazil underwent significant institutional changes when transitioning from a constitutional monarchy to the Republican era. During the monarchy, the fiscal system was highly centralized, but under the Republican government, states and municipalities

gained greater administrative autonomy to shape their economies.[1] Second, the redistribution of public revenue among national, state, and local governments was limited (Fritscher and Musacchio, 2010), leading municipalities to rely on their local economy to collect taxes (Hanley, 2018). Finally, at the turn of the twentieth century, São Paulo's economy was primarily agricultural and heavily dependent on coffee exports, which made municipalities exposed to international price fluctuations. Furthermore, in the First Republic, the political elite in São Paulo primarily aligned their actions with the interests of the coffee bourgeoisie, with many politicians themselves being members of that group (Fausto and Fausto, 2014, p. 156).

To examine the determinants influencing revenue collection and provision of local public goods and services, we digitize a novel yearly panel dataset on municipal public finances in São Paulo from 1898 to 1928. Drawing upon extensive literature, we measure fiscal capacity as tax revenues per capita. Effective tax collection requires the development of essential physical infrastructure and organizational capabilities to assess the tax base, calculate liabilities, record payments, conduct audits, and manage appeals (Pardelli, 2019). Nonetheless, our dataset includes comprehensive data on various revenue sources and public spending categories, providing a complete overview of local public finances during the First Republic. We estimate the differential effect of international coffee price fluctuations on local public finances using a panel estimation approach. To establish a causal relationship, we leverage data on land suitability for coffee plantations from the Food and Agricultural Organization's Global AgroEcological Zones (FAO-GAEZ) to construct our measure of local exposure to coffee booms.

One potential concern with our main results is the endogeneity of the coffee exposure measure. During the late nineteenth and early twentieth centuries, Brazil was the world's leading coffee producer and exporter, allowing the federal and state governments to coordinate actions to control international prices. In response to the oversupply of coffee and the subsequent decline in prices in the late nineteenth century, the leaders of the coffee states, whose political and financial power increased by Republican decentralization, mobilized to intervene in the coffee market. The impacts of the 1906 valorization program led by São Paulo took place between 1909 and 1912 when international prices increased thanks to the reduction in supply resulting from stockpiling and smaller coffee harvests (Fausto and Fausto, 2014, p. 157). While it is unlikely that local municipal governments influenced international prices, we conduct various robustness checks to evaluate the sensitivity of our findings.

[1]The 1891 constitution granted state legislatures the authority to determine the organization of municipalities, including their system of taxes and obligations.

We begin our analysis by studying the impact of coffee price fluctuations on local tax collection. First, we find that the ability of the municipalities to tax and collect revenue strongly correlates with coffee prices. Our point estimates suggest that a 1% increase in international coffee prices led to a 0.37% increase in tax revenue per capita. In our preferred specification, we control for municipality characteristics to ensure that our findings do not depend on differential trends across municipality characteristics. Next, we examine the distribution of the tax burden and find that coffee prices predominantly impact indirect taxes on goods, services, and wealth transfers, disproportionately burdening the poorest individuals.[2] Interestingly, we document a positive relationship between coffee prices and the local capacity to incur debt, primarily used to pay for significant projects like water and sewer systems or lighting networks (Hanley, 2018, p. 130). These findings align with previous studies indicating that the dynamism of the local economy plays a crucial role in the ability to secure loans and repay debts (Fritscher and Musacchio, 2010).

After documenting the positive effect of coffee prices on local tax collection capacity, we then explore the impact of coffee price fluctuations on local expenditure, particularly concerning public goods and services. Our findings indicate that a 1% increase in coffee prices is associated with a 0.73% expansion in total public spending and a 0.55% increase in spending on public goods and services during the First Republic. We observe that the exposure to coffee booms resulted in increased expenditure on public servant salaries and significant investments in public works projects such as water, sewer, and lighting networks. These findings are consistent with previous research investigating the influence of commodity booms on state governments in Brazil (Fritscher and Musacchio, 2010; Musacchio et al., 2014).

In sum, our findings highlight the importance of the federalism introduced by the 1891 constitution in shaping the municipalities' revenue generation, particularly their reliance on the local economy. As discussed by Hanley (2018), all municipalities in São Paulo were initially small but experienced growth and prosperity by the early twentieth century. They all produced goods and services for local consumption, relied on coffee production for export, transitioned from slave labor to immigrant-based wage labor around the 1880s, and operated within the same institutional and legal framework. Given the absence of major differences in economic, social, cultural, political, or institutional aspects among these municipalities, variations in tax collection and expenditure on public goods and services primarily reflect differences in the size and dynamism of their local economies, as well as their willingness to impose taxes (Hanley, 2018, p. 93).

[2]Domestic elites were not burdened by heavy tax collection as taxes primarily impacted consumers, and property tax was not introduced until the 1920s.

Lastly, and consistent with existing evidence, our study reveals that the impact of coffee booms on local fiscal capacity varies depending on the degree of political and economic inequality. We define political inequality as differences in opportunities to influence the political process and decision-making, which we measure using a Herfindahl index that captures the concentration of political power among local elites.[3] Economic inequality is measured by the land Gini coefficient, which reflects variations in land ownership distribution within municipalities. Our findings indicate that fluctuations in coffee prices have a stronger effect on the provision of public goods and services in municipalities with unequal land distribution. Conversely, estimates suggest that political inequality is associated with significantly smaller effects of coffee prices on spending. These preliminary findings provide valuable insights and pave the way for further research to explore the underlying mechanisms driving these results.

This paper is related to several strands of the economic literature. First, we connect to the literature on state capacity and development (Acemoglu, 2005; Besley and Persson, 2010; Michalopoulos and Papaioannou, 2013; Baland and Robinson, 2012). We contribute to this literature by examining how states develop and gain the ability to tax at the local level in the context of a developing country. There is still little evidence on within-country variation in state capacity. Despite improvements in recent decades, Brazil remains a highly unequal country, and our findings suggest that the fiscal structure of the First Republic may have contributed to the perpetuation of this inequality, as municipalities relied heavily on the local economy as their main source of revenue.

Previous literature on Brazil has primarily focused on the effects of changes in fiscal institutions at the state level. For instance, Fritscher and Musacchio (2010) provides evidence that the ability of states to collect export tax revenues was strongly associated with a lower cost of capital in international capital markets. Furthermore, Musacchio et al. (2014) find that states that exported commodities experiencing price booms collected higher export tax revenues per capita and allocated a higher proportion of their resources to investments in education during the First Republic. Menezes Filho et al. (2021) is an exception, as they examine the effects of commodity booms on human capital accumulation at the municipality level. We contribute to the existing literature by examining the emergence of fiscal states at subnational levels in a developing country. Instead of focusing on the impact of export tax collection capacity on other outcomes, we explore how local economies can build tax systems capable of generating revenue from

[3]We exploit the occupational structure of the voting elites in 1898 to construct our measure of political concentration using data from the São Paulo statistical yeabook. Specifically, we exploit the number of registered voters by occupation at the municipality level.

diverse sources when exposed to agricultural booms. In doing so, this paper sheds some light on the origins of state-building and the factors that account for variations in this process at the local level.

Although numerous studies have explored the relationship between inequality, development, and redistributive policies, the evidence remains inconclusive. While some works have found a positive association between economic inequality and the implementation of redistributive policies (Meltzer and Richard, 1981; Alesina and Rodrik, 1994; Boustan et al., 2013), others suggest that economic inequality harms the size of the government (Persson and Tabellini, 1994; Benabou, 2000; Galor et al., 2009; Cinnirella and Hornung, 2016). There are also studies examining the link between political inequality and development. For example, Acemoglu et al. (2008) demonstrates that land distribution is directly related to the concentration of political power, which may hinder growth through various mechanisms. Local elites who hold political power can create significant obstacles for new entrants (Acemoglu, 2008) and may have little interest in providing public goods (Bates, 1981).

In the Brazilian context, Naritomi et al. (2012) find that the sugar and gold booms in the colonial period negatively affected land distribution and the quality of institutions across municipalities in the long term. Interestingly, they do not find similar effects for the coffee boom that occurred long after the colonial era in the First Republic. Américo and Ferraz (2021) show that the political power of the agrarian elite in the state of São Paulo restricted investments in public education to preserve their political status quo. Our study speaks to this literature by offering initial evidence on how political and economic inequality influenced the effects of coffee price fluctuations on investments in local fiscal capacity in São Paulo.

The remainder of the paper is organized as follows. Section 2 describes de historical background. Section 3 presents the data. Section 4 describes the empirical strategy. Section 5 contains the main results on local public finances. Section 6 summarizes the main robustness checks, and Section 7 presents some concluding remarks.

2 Historical Background

2.1 Fiscal Development in Brazil

From the founding of the new constitutional monarchy in 1822 to its overthrow in 1889, the structure of the fiscal system in Brazil was highly centralized. Public revenue relied extensively on taxes on international trade, which went directly to the imperial government and granted around 80 percent of all public revenue in the mid-nineteenth

century (Carreira, 1889). The provincial governments had minimal control over fiscal revenues and were responsible for taxes and fees not collected by the central government. Municipalities, in turn, had limited financial and legislative autonomy.[4] By 1856, municipal governments collected just 3.3% of the public revenue, and this allocation only experienced marginal growth by the end of the Empire (Sokoloff and Zolt, 2007).

In 1889, an economically ascendant group of coffee state producers supported a military coup that overthrew the Empire and established a decentralized federative Republic. The 1891 constitution brought significant changes to the country's political administration by granting provinces, now called states, autonomy over the central government and emancipating municipalities from the supervision of state legislatures.[5] During the Republic (1890-1930), municipalities were endowed with sources of revenue and legislative powers to plan and modify their economies. The principal sources of public revenue were the same as those in the Empire, but the new revenue distribution reduced the imbalance between the various levels of government. Notably, municipalities were responsible for 12 to 19 percent of all government income, a substantial improvement compared with the Empire (Brazil, 1912, 1940).

Despite significant administrative improvements, the fiscal structure continued to allocate the most profitable sources of public revenue to the national government, albeit the states also benefited from the new arrangement. One noteworthy addition to state revenue was the right to tax exports. The redistribution of trade taxes between the national and state governments proved particularly advantageous for states with export-oriented economies, resulting in a notable disparity in tax collection capabilities among different states (Fritscher and Musacchio, 2010). São Paulo emerged as the primary beneficiary of export taxes, with its per capita income tripling after 1891. During the Republican era, São Paulo alone accounted for one-third to one-half of all export taxes collected by the states (Love, 2013). Moreover, the Republican government granted the states the authority to issue debt and tax intra-state commerce by transferring taxes on industries and professions, property transfers, and rural and urban property (Varsano, 1996).

In contrast, municipalities primarily relied on local taxes, fees, and fines based on

[4]The 1834 Additional Act effectively deprived Brazilian municipalities of their authority over laws and finances by placing municipal governance under the close supervision of committees within the provincial legislative assemblies. This arrangement granted the provincial legislatures the authority to oversee the organization of municipalities, regulate municipal expenses, approve council loans, establish and abolish positions, determine employee salaries, manage public works, prisons, and public aid houses, and regulate political or religious associations (Brazil, 1834).

[5]According to Article 68 of the 1891 Constitution, "states will be organized to ensure the autonomy of municipalities in all that pertains to their particular interest". States were then responsible for structuring municipal codes within their own constitutions and organic laws.

the circulation of goods and services within their jurisdiction, thereby avoiding direct competition with state or national government revenues. Despite occasional variations, municipal revenues were divided into several broad categories: taxes on urban property, commercial activity taxes, professional license fees, market fees, slaughterhouse taxes, fees for regulating weights and measures, and miscellaneous fees. As noted by Hanley (2018), while the municipalities in the Republic shared a similar reliance on the local economy for municipal finance, the per capita values of their revenues varied significantly. The differences in revenue collection among municipalities were influenced by factors such as the size and dynamism of local economies, and the municipalities' ability and willingness to impose taxes.[6] Therefore, "what to tax and by how much were products of decisions made at the local level by municipal councils" (Hanley, 2018, p. 96).

In sum, the late nineteenth and early twentieth centuries represented an essential era for state-building in Brazil. "The dispersion of judicial, fiscal, and military power in early Republican Brazil provided a more effective state than had the centralized Empire, partly because of the greater extractive powers of the state at all levels" (Love, 2013, p. 2). However, despite the increased autonomy granted to state and municipal governments and the higher allocation of tax revenue to them during the First Republic, the main source of public revenue in Brazil relied heavily on indirect taxes on the circulation of goods and services, placing a disproportionate burden on the poorer segments of society.[7] Moreover, by the late nineteenth century, municipal governments in countries like the United States and Prussia absorbed substantial shares of the overall public revenue. Brazil's fiscal structure, in turn, deprived municipalities of the necessary resources to adequately finance local public services. It was common for municipalities to face resource constraints that restricted their capacity to provide essential public services to the community (Hanley, 2018).

[6]Through an instrument called ordinances - *posturas* - municipal councils deliberated on subjects concerning the administration of strictly local affairs, which included the collection of taxes and regulations to promote essential activities for the well-being and prosperity of the municipality, such as the maintenance of buildings and streets, bridges, water and sewer systems, lighting systems, hospitals and cemeteries, public health, and commerce. Hanley (2018) provides evidence demonstrating that municipal tax codes, often included as a section within the *posturas*, exhibited significant variations among municipalities. Therefore, variations in the taxable elements within each municipality's economy, and the varying tax rates imposed on similar goods and services, explain the revenue disparities observed among localities.

[7]Direct taxes on income and property were not considered until the 1920s.

2.2 Public Finance in São Paulo at the Beginning of the 20th Century

The state of São Paulo passed its constitution in 1891, granting municipalities significant governmental autonomy and economic independence. The new system of laws removed state supervision and delegated legislative responsibilities to the municipalities (Hanley, 2018, p. 56). Law No. 16 of 1891 reorganized municipal administration and specified the sources of municipal revenues, including taxes on industries and professions, and urban property.[8] Municipalities could also collect revenues from various activities and services, such as taxes on warehouses, stores, slaughterhouses, cemeteries, street markets, public entertainment, fines for municipal regulation violations, and taxes on non-exported products. Furthermore, municipal councils were authorized to introduce specific fees to finance essential services such as lighting, water supply, sewage, and the construction and maintenance of streets, squares, and roads, which provided municipalities with additional means to fund and maintain vital public services. A notable innovation was the possibility of establishing dedicated taxes to fund municipal public education. However, this opportunity did not materialize as planned in São Paulo (Colistete, 2019, p. 182).

Table 1 presents an overview of municipal revenues in São Paulo. Taxes on industries and professions, licenses, and fees on different commercial, retail, and professional activities were the most important source of municipal revenue during the Republic. While targeting the income of liberal professionals and producers, the ultimate burden of these taxes fell predominantly on the final consumers of their products and services (Colistete, 2019). From 1894 to 1928, industries and professions represented, on average, 31.2% of all municipal revenues. The second most relevant source of municipal income was the tax on urban property (*imposto predial*), which was a tax on the rental value of urban properties and was used to pay for urban lighting (Hanley, 2018). In 1895, the collection of taxes on urban property comprised 7.4% of total municipal revenues, while in 1925 the figure reached 14.3%.

The revenues from taxes on water and sewage gradually increased over the years as municipalities expanded their water and sewage services. In 1900, approximately 5% of total revenue came from this type of tax, a fraction that rose to 7.2% in 1915 and reached 8.2% in 1925. The growth in revenue from taxes on water and sewage services directly correlates with the increasing responsibilities assumed by municipalities in response to the rapid urbanization observed in São Paulo. Income from the market, cemetery, and

[8]The 1891 Federal constitution initially assigned these revenues to the states. However, São Paulo, Espírito Santo, and Rio Grande do Norte took a different approach by granting their municipalities the right to tax these sources. This decision enabled the municipalities to benefit directly from the revenue generated by these lucrative activities (Hanley, 2018).

slaughterhouse also played a substantial role in generating municipal revenue. However, their relative share in the overall revenue declined over time. In 1910, these sources accounted for 12.0% of municipal income, but by 1925, their contribution had decreased to 7.6%. Only states could tax exported products, but municipalities could charge a small fee on the coffee produced in the locality, whether destined for local consumption or export. Except for some coffee-producing municipalities, its impact on municipal revenue remained relatively small.

Other revenues, primarily collected from fines, assessments, licenses for street vendors, shows, transportation, and fees on services, commercial, and manufacturing activities not covered by the tax on industries and professions, remained significant in municipal budgets, accounting for 39.6% of total income in 1925. Another relevant contribution to municipal finances brought by the 1891 constitution was the allowance to incur debt. During the Republic, municipalities could make credit operations in domestic and international markets to invest in infrastructure and public services as long as the annual amortization and debt service payments did not consume more than a quarter of the municipal revenue (São Paulo, 1891). The new capacity to raise loans without the state legislature's approval became a significant source of income for most municipalities. From 1894 to 1928, loans averaged 20.2% of municipal finances in São Paulo.

As noted by Hanley (2018), municipalities relied on similar revenue sources in the Republic period. However, there was a significant disparity in the per capita values of these revenues among municipalities. These variations were primarily due to differences in the economic dynamism within each locality. In particular, the coffee economy improved commerce, diversified domestic manufacturing, promoted urbanization, and enlarged populations, indirectly benefitting some municipalities. Moreover, the capacity of these municipalities to collect income from the local economy shifted over time as coffee production moved through the state of São Paulo. Therefore, the enhanced revenues from industries and professions and the right to borrow money in the capital markets stimulated municipalities to invest in major public works projects that were not affordable during the Empire.

The investments in public markets and slaughterhouses, public lighting networks, and public water and sewer networks comprised the most important category of municipal expenditure. Besides public works, salaries and health spending absorbed a substantial fraction of the expenses. Although education remained a state responsibility during the Republic, municipalities started to invest in elementary education in 1892. Article 56 of Law 16 gave municipalities the right to "adopt resolutions on primary and professional instruction, creating schools, museums, and libraries." Municipalities could also "contract and pay teachers and provide assistance to private schools" (São Paulo, 1891). Further-

more, municipalities that chose to establish their primary education system could request the legislature the transfer of state schools. By doing so, they would receive a subsidy proportional to the state's expenditure on primary schools within the municipality. The absence of a specific tax to finance primary education did not prevent municipalities from creating and maintaining primary schools. However, this additional expenditure had to compete with the resources allocated to other municipal services.

2.3 The Agriculture in São Paulo in 1905

The advent of coffee as a significant export commodity profoundly influenced the Brazilian economy during the early decades of the nineteenth century (Fausto and Fausto, 2014, p. 101). The neighboring regions of Rio de Janeiro and São Paulo, particularly along the Paraiba Valley, were the primary coffee-producing areas during the Empire. Initially, coffee production relied on a combination of slave labor and rudimentary technology, with expansion occurring primarily at the extensive margin. Nevertheless, the end of the Atlantic slave trade in 1850 and the subsequent labor scarcity stimulated a shift towards a more concentrated production system with improved technology in the latter half of the nineteenth century.

The abolition of slavery in 1888 marked a crucial turning point in Brazil's coffee industry. With the decline of slave labor, European immigrant workers started to play a more prominent role in the coffee fields, driving the expansion of the production into new regions towards the West of São Paulo. Several factors contributed to the rising success of the "Oeste Paulista" region, including favorable physical conditions and technological developments. The expansion of railroads played a vital role by improving transportation infrastructure and facilitating access to markets. Additionally, the Western region of the state provided ideal soil and climate conditions, with the highly productive red soil known as "terra roxa" or "purple land" (Hall, 1969). While the Paraíba Valley economy experienced a decline, the economy in the "Oeste Paulista" expanded. Both regions engaged in large-scale agriculture, but the availability of vast tracts of land in the West allowed for continuous expansion. In contrast, the Paraíba Valley faced geographical limitations, resulting in diminished productivity and declining land prices as the available land was exhausted and eroded (Fausto and Fausto, 2014).

At the beginning of the twentieth century, São Paulo dominated the world's coffee market. Between 1901 and 1905, Brazilian coffee production represented almost 73% of the world's production supply, and the state of São Paulo was responsible for 63% of the national production (Luna et al., 2016). The expansion of coffee by the end of the nineteenth century is closely associated with the country's development, especially in

São Paulo, where the activity generated about one-third of the tax revenue of the state, estimulated the inflow of European immigrants, and the investments in the integration of markets by defining the extension of the railways. Consequently, São Paulo emerged as the richest and most industrialized state in Brazil (Dean, 1969; Cano, 1977; Saes, 1981).

Although coffee was the most important crop at the turn of the century, other forms of economic activity flourished from the coffee boom. By investigating the 1905 agriculture census, Luna et al. (2016) show that 80% of the farms in São Paulo harvested maize, meaning that it was the most produced crop in the state thanks to the ease of its cultivation and the growing internal demand. The cultivation of rice and beans was almost as important as maize. Beans attracted plenty of small producers, and the area harvested with the crop was only smaller than that used to produce coffee and maize. The production of rice and beans was roughly similar, but a smaller number of farms cultivated the former. A few large farmers highly concentrated sugar production, and both cotton and tobacco had little economic importance (Luna et al., 2016).

At the beginning of the century, São Paulo's agriculture was not entirely export-oriented. With the exception of coffee and tobacco, the domestic market absorbed the production of all other agricultural products. Large coffee farms dominated the state's agriculture employing thousands of workers focused on coffee production for the international market. Nevertheless, these farms were also large producers of cereals which were extremely important to the local economy. Despite the size and importance, large farmers coexisted with an extensive presence of small- and medium-scale farmers who also produced animal and food products for the internal market (Luna et al., 2016).

3 Data

Public Finance. We combine several historical records to construct a unique dataset on public finance outcomes for municipalities in the state of São Paulo in the early decades of the twentieth century. Specifically, we digitize a novel dataset on the municipal financial accounts from the annual São Paulo statistical yearbooks to gather information on the public finances of municipalities from 1898 to 1928.[9] This dataset includes detailed data on several revenue and expenditure categories, offering a complete overview of the

[9]The São Paulo Statistics and Archive Office published the statistical yearbooks between 1894 and 1928. However, not all municipalities reported their financial data consistently throughout this period. The omissions were more frequent when the state started collecting and publishing public statistics in the early 1890s. Nevertheless, occasional gaps in reporting data persisted throughout the Republic (Hanley, 2018). Furthermore, the yearbooks for 1897 and 1922-1925 do not include any public finance data for any municipality, and the 1899 yearbook is unavailable for reference.

municipalities' public finances during this period. The revenue categories cover taxes on industries and professions, urban property, taxes on coffee, water, and sewer, cemetery income, slaughterhouse income, income from the market, public lighting, recovery of active claims, deposits and cautions, state subsidies, loans, and extraordinary revenues. Additionally, the expenditure components include wages and subsidies for municipal workers, office and publication expenses, public works, public education, street cleaning, public health, public water, public sewers, market expenses, cemetery expenses, slaughterhouse expenses, judicial expenses, debt, and other extraordinary expenses.

Our main dependent variable is the capacity to collect taxes, which we define as local tax revenue per capita. In order to assess the municipalities' ability to provide public goods and services, we build an additional indicator that specifically focuses on public expenditures associated with the provision of key public services. This measure includes expenditures related to public works, street cleaning, public lighting, public health, market and slaughterhouse services, cemetery maintenance, sewage systems, water supply, and public education. By examining these specific expenditure categories, we gain insights into the municipalities' commitment to fulfilling their mandated responsibilities in providing essential public services to their communities.

Table 2 provides descriptive statistics for our main variables of interest. In Panel A, we observe substantial variation in fiscal capacity across municipalities. The mean tax revenue per capita between 1898 and 1928 is 3.44 milréis, with a standard deviation of 3.82 milréis. The data also reveals significant regional variations in tax collection, as shown in Figure 4. Notably, municipalities in the Western areas of the state, where coffee flourished, have the highest tax revenue per capita. A concern when building the dataset is ensuring consistency in municipality boundaries over time.[10] We then use the official information on the evolution of administrative divisions in Brazil to track municipalities' unions and partitions to adjust all data to conform to 1900 boundaries. Appendix B explains in detail the procedure.

Local Exposure to Coffee. We obtain annual data on coffee prices in the international market from Jacks (2019). The author provides a comprehensive dataset on real price indexes for 42 commodities over more than 170 years, from 1850 to 2022. We convert the coffee price index to U.S. dollars using the World Bank Commodities Price Data (The Pink Sheet). Figure 1 presents the international coffee prices during the First Republic (1891-1930). Coffee prices rose rapidly after 1885, remaining high until 1896.

[10]The administrative division in Brazil considerably changed over time. The state of São Paulo contained 88 municipalities in 1872 and 258 in 1933.

During the boom era, the significant increase in Brazilian production reduced prices to about one-third of the average of the early 1890s. A brief rise occurred between 1910 and 1912 as coffee speculators in Europe and North America manipulated the wholesale market, which was cut short by World War I (Holloway, 1980). After the war, high demand and a supply shortage due to a severe frost in 1918 caused prices to rise again. These prices remained erratic into the 1920s until the Great Depression, which caused a significant drop in prices. Throughout the first decades of the twentieth century, São Paulo's plan for coffee valorization also helped to support prices, which resulted in a crisis of overproduction by the late 1920s.

From the Global Agro-Ecological Zones database (FAO-GAEZ), we collect data on the potential yields for coffee. Based on an agronomic model and considering climatic conditions (temperature, rain, and humidity), these data report at the grid cell level of about 9.25 x 9.25 kilometers the potential output possible to harvest in a cell by assuming that farmers have used the better part of the suitability distribution in a grid cell. To construct a measure of the potential yield at the municipality level, we compute the mean value of each grid cell that falls within the border of each municipality by superimposing a map with the boundaries of São Paulo municipalities on the grid of soil suitability. FAO-GAEZ's version 4 calculates the potential yields under two assumptions about the input use, "low" and "high". We use data for rain-fed conditions under low input technology because this is the one that better characterizes Sao Paulo's agriculture over the period we analyze.[11] Figure A1 shows spatial distribution of the potential yield for coffee in São Paulo. Finally, we collect data on the number of coffee trees and the total harvested area at the municipality level from the 1905 São Paulo agricultural census. We use these data to construct alternative measures of local exposure to coffee price fluctuations.

Additional Data. To adjust nominal values for inflation, we use two price indices to deflate all public finance data to 1913 values. The annual price series for Brazilian inflation during the 1870-1913 period comes from Catão (1992), while Haddad (1974) provides the price index for 1914 onwards. Figure A2 presents price index evolution for the period of interest. Since the São Paulo statistical yearbooks do not report data on population for all years, we collect this information from different sources. Specifically, we use the Brazilian Demographic Census to obtain population statistics for 1900 and 1920, the Brazil statistical yearbook for 1910 (Brazil, 1912), and the São Paulo statistical

[11]The agricultural census data of 1905 reveals a lack of technology prevailing in São Paulo. Even the largest farms used few mechanical tools, plows, and fertilizers in agricultural production (Luna et al., 2016).

yearbook for 1929. We then use linear interpolation to fill in the gaps between data points to estimate the local population.

Since the coffee expansion at the turn of the century depended on appropriate geographical conditions, we also collect data on time-varying geo-climatic variables (temperature and rainfall) from Harris et al. (2020). The CRU TS climate database provides high-resolution data gridded to 0.5 × 0.5-degree resolution based on analysis of over 4,000 individual weather station records covering Earth's land areas from 1901 to 2022.[12] From the 1872 census, we construct the following municipality-level demographic variables: population density, the number of workers in public administration and legal professions over the total population, and the share of slaves. Differences in land concentration across municipalities may have generated more or less conducive policies to development (Engerman and Sokollof, 1997; Galor et al., 2009; Cinnirella and Hornung, 2016). Hence, we construct a measure of land concentration using data from the 1920 census.[13] There is also evidence that political inequality is negatively correlated to development (Acemoglu, 2008; Bates, 1981; Américo and Ferraz, 2021). To capture the influence of the elite's political power on public finances, we use the São Paulo statistical yearbook for 1898 to measure the number of registered voters by occupation at the municipality level.[14] Finally, we collect historical information regarding the dates of construction of the railroad system.[15]

4 Empirical Strategy

The main interest of this paper is to understand how coffee price fluctuations differentially affected the fiscal capacity at the local level in the early decades of the twentieth century. The institutional framework discussed in Section 2 suggests that local investments in public goods depended on local revenues, which, in turn, relied on local economic activity. In an agricultural economy, municipalities that could produce commodities with high demand had more dynamic and diversified local economies. This resulted in a relatively greater ability to generate revenue from local activities (Hanley, 2018). To em-

[12]We consider the historical average of precipitation and rainfall for the 1890s.

[13]We do not have data on farm distribution from the 1905 agricultural census, so we adapt the 1920 census data to the 1900 boundaries as a proxy for the agrarian structure of the municipalities, which is a reasonable assumption since the land inequality in the state remained roughly stable for over two centuries (Luna et al., 2016).

[14]The 1898 data is not available for some municipalities. In these cases, we use the 1900 data.

[15]Data available at www.estacoesferroviarias.com.br.

pirically test this hypothesis, we exploit cross-section variation in agricultural suitability and time-series variation in international coffee prices. Specifically, we estimate a model of the following form:

$$y_{mt} = \mu_m + \delta_t + \beta(Price_t \times Coffee_m) + \gamma W_{mt} + \eta_t X_m + \epsilon_{mt}, \quad (1)$$

where y_{mt} represents the outcome of interest for municipality m in year $t \in \{1898, ..., 1928\}$. The main outcome variables examined in our analysis include the logarithm (plus one) of revenue and expenditure, along with their respective categories normalized by population size. The variable $Price_t$ represents the logarithm (plus one) of the annual price of coffee in the international market, measured in US Dollars per metric ton.[16] $Coffee_m$ refers to an index of coffee suitability obtained from the FAO-GAEZ dataset. This index measures the suitability of a particular area for coffee cultivation. Using suitability data instead of actual production or harvest data helps us address potential endogeneity issues in the analysis. Our main variable of interest is the interaction between $Price_t$ and $Coffee_m$, denoted as $Price_t \times Coffee_m$, which measures the local exposure to coffee price fluctuations.

The variables μ_m and δ_t stand for municipality and year fixed effects, respectively. The former controls for unobserved fixed characteristics of each municipality potentially correlated with the ability to collect taxes and invest in public services. The time fixed effects control for aggregate shocks common to all the municipalities in a specific year. The vector W_{mt} contains time-varying climatic controls (temperature and precipitation) at the municipality level, and X_m is a set of initial conditions obtained from the 1872 census that includes the population density, number of workers in public administration and legal professions over the total population, and the share of slaves in total population, all interacted with year-fixed effects to allow for differential trends across municipalities. We also include a control for the initial presence of a railway station in the municipality in 1872. For parsimony and transparency, we present the effects with and without the control variables and show similar results.

We are interested in the parameter β, which is interpreted as the average response of the outcome to changes in the exposure to coffee price fluctuations. The identifying assumption of the empirical design is that $(Price_t \times Coffee_m)$ is uncorrelated with the error term after controlling for the municipality fixed effects and other covariates. One potential source of endogeneity in our analysis is the possibility that municipalities could affect

[16] Our results are roughly the same when using the inverse hyperbolic sine transformation (*asinh*) on these variables.

the coffee prices in the international market. Indeed, São Paulo implemented various plans for governmental intervention in the coffee market to safeguard the coffee interests in the early twentieth century.[17] However, sustaining such efforts without substantial and long-term support of the federal government proved challenging (Fausto and Fausto, 2014, p. 157). In addition, it is worth noting that while the state's intervention policies were relatively successful in reducing the coffee supply and maintaining high prices until 1912, it is unlikely that individual municipalities had significant influence over the coffee market, which helps alleviate concerns about endogeneity in our empirical analysis.

5 Main Results

Fiscal Capacity. We begin our analysis by assessing the impact of coffee price fluctuations on the capacity to collect tax. To measure local fiscal capacity, we consider tax revenues per capita as our main dependent variable. Before presenting the results, we analyze the relationship between coffee tree density, measured as the ratio of harvested coffee trees to total area in 1905, and the logarithm of tax revenue per capita. Figure 2 visually demonstrates a clear positive association between coffee municipalities and tax collection in 1905. As we will show in the regression analysis, the observed positive relationship between the variables is also statistically significant. Table 3 presents the OLS estimates for Equation (1). Column 1 reports the results for the specification with municipality and year fixed effects but without any control. The positive and statistically significant point estimate indicates that the international coffee price had a positive effect on tax revenue collection in coffee municipalities compared to non-coffee municipalities. Specifically, the results suggest that a 1% increase in the international price of coffee led to an increase in tax revenue per capita by 0.25%.

To ensure the robustness of our results, we introduce additional control variables in various specifications. In particular, we control for: (i) time-varying geo-climatic variables (column 2), (ii) population density in 1872 to account for its positive association with subsequent municipality growth, which may be related to higher tax revenues (Michaels et al., 2012) (column 3), (iii) the size of the state bureaucracy at the local level (i.e., the

[17] After a long period of expansion of coffee production, international prices significantly dropped at the beginning of the twentieth century. The overproduction crisis led the governors of the states of São Paulo, Minas Gerais, and Rio de Janeiro, the major Brazilian producers, to sign the Taubaté Agreement in 1906, which determined the federal intervention in the market to support the coffee planters. The agreement consisted of two key components: negotiating a loan of 15,000,000 pounds sterling to assist the state in purchasing coffee surpluses from coffee growers, thereby maintaining coffee prices artificially high, and implementing measures to fix the exchange rate and prevent its increase (Fausto and Fausto, 2014, p. 157).

number of workers in public administration relative to the total population) (column 4), (iv) historical reliance on slave labor (column 5), (v) the number of legal professionals relative to the total population (column 6), and finally (vi) the presence of a railway station to account for prior investments in transportation infrastructure (column 7). The point estimates reported in Table 3 show that our findings are very robust to the inclusion of these potential confounders, with the estimated coefficients remaining stable in magnitude (ranging from 0.25 to 0.37) and statistically significant at conventional levels. In our most complete specification, column (7), a 1% increase in international coffee prices is associated with a 0.37% increase in tax revenue per capita, indicating a positive impact of coffee prices on fiscal capacity during the First Republic.

Distribution of the Tax Burden. Next, we investigate the allocation of the tax burden in the First Republic by analyzing the breakdown of revenue sources into seven distinct categories. This strategy enables us to evaluate how taxes were distributed across various economic activities. Table 4 presents coefficients obtained from estimating separate regressions based on Equation (1) along with a comprehensive set of controls for the major categories of public revenues during the early decades of the twentieth century.

Our findings reveal several interesting patterns. First, we document that fluctuations in coffee prices were associated with increased tax collection from urban activities and professions (column 1). Specifically, a 1% increase in coffee price led to a 0.21% rise in per capita revenue from taxes on industry and professions. Furthermore, column 2 of Table 4 documents an increase in taxes on urban property, suggesting an increase in the rental value of urban properties in municipalities affected by coffee price fluctuations. A 1% rise in coffee prices resulted in approximately 0.08% more revenue from taxes on urban property. Additionally, we document an increase in taxes from market, cemetery, and slaughterhouse activities in column 5. A 1% increase in coffee prices led to a 0.1% rise in income generated from the circulation of these goods and services. Since these activities are closely linked to local commerce, these findings imply that municipalities relied on indirect taxes and the vibrancy of the local economy to generate the necessary income for investing in public goods (Hanley, 2018; Colistete, 2019).

Consistent with these findings, scholars have argued that indirect taxes played a central role in Brazil's public revenue during the First Republic. "It is at the municipal level that we find the strongest evidence that reliance on indirect taxation for public revenue was regressive, with negative effects on income and standards of living. The municipal fiscal menu was weighted toward taxes and fees on commerce. From weights and measures to business licenses to fees and taxes levied specifically on food and beverages, municipal taxes raised the price of goods and services to all who transacted in the formal economy."

(Hanley, 2018, p. 91). With the rapid growth of the coffee industry, urbanization experienced an acceleration, attracting a larger share of the population to urban spaces and the formal economy. As a result, municipal taxes, licenses, and fees affected nearly everyone except for the poorest rural population, who were predominantly engaged in subsistence living (Hanley, 2018).

However, it is worth noting that taxes on urban activities alone were insufficient to cover the necessary public services and investments mandated by law. Interestingly, our findings reveal that São Paulo's municipalities accumulated debts to address this shortfall. Column 7 of Table 4 provides compelling evidence that borrowing was a common strategy employed by these municipalities, even in highly diversified and dynamic economies. The estimates reveal that a 1% increase in coffee prices led to a significant 1.2% increase in per capita revenue from loans. This result indicates that municipalities heavily relied on borrowing as an additional means of generating income to meet their financial obligations, particularly in response to fluctuations in coffee prices. "For most of the municipalities, loans in the borrowing boom years were worth almost as much as ordinary revenue." (Hanley, 2018, p. 128). Our findings are consistent with those of Fritscher and Musacchio (2010). The authors demonstrate that states with higher per capita exports were more successful in issuing debt in international markets and securing loans at lower interest rates during the First Republic. While we do not have specific data on the interest rates for the municipalities' loans, the procyclical nature of the debt allocation suggests that the local economy largely influenced the ability of municipalities to contract loans and repay their debts.

Allocation of Spending. Having established the positive impact of coffee price fluctuations on local tax collection capacity, particularly from urban activities, we now investigate the relationship between coffee price shocks and public spending. We begin our discussion by reporting in Table 5 the effects of coffee price changes on spending per capita (columns 1, 2, and 3) and expenses related to the provision of basic public goods and services (columns 4, 5, and 6). In the interest of full disclosure, we present the specification with fixed effects but no controls (columns 1 and 4), the specification that includes climatic time-varying controls (columns 2 and 5), and our preferred specification, which contains municipality and year-fixed effects and a comprehensive set of controls (columns 3 and 6). Our results show that coffee price flucuations led to an expansion of total public expenses. The estimated coefficient in column 3 indicates that a 1% increase in coffee prices is associated with a 0.73% increase in total public spending. Moreover, our findings suggest that public goods and services expenses also increased in response to coffee price fluctuations. As seen in column 6, there is an increase of 0.56% in investments

in spending on public goods and services following a 1% increase in coffee prices during the First Republic.

Next, we investigate the relationship between coffee prices and specific categories of public spending. To do so, we estimate separate regressions using Equation (1) with our preferred specification across eight distinct categories of public expenditure. Table 6 presents the estimated coefficients. Column 1 reports the point estimate for the effects on public servants' salaries. Our findings suggest a significant and positive effect of coffee price fluctuations on the remuneration of local state representatives. A 1% increase in coffee price led to a 0.15% rise in salaries. The interpretation of this result should consider the significant influence of large landowners on political and economic matters during the Republican period (Love, 1970). For instance, Pardelli (2019) documents a negative relationship between spending on public employee wages and the political competitiveness in Brazil during the First Republic. The author argues that this finding is consistent with a scenario where landowning elites strategically expand the public sector, utilizing patronage appointments to co-opt rivals and undermining effective political competition to maintain dominance.

Furthermore, our findings indicate a positive impact of coffee price fluctuations on expenses related to public works projects, which includes activities such as road construction and repair, bridge maintenance, excavation and filling operations, as well as building expenses, maintenance, and repair (Hanley and Lopes, 2017, p. 373). The point estimate in column 2 of Table 6 suggests that a 1% increase in coffee prices resulted in a 0.26% increase in spending on public works. Our analysis also reveals significant positive effects of coffee prices on expenses on lighting networks (column 3) and water and sewer systems (column 5). These findings are consistent with the increasing urbanization observed in São Paulo during the period under study. Although the point estimates indicate a positive relationship, we do not find statistically significant effects of coffee price fluctuations on expenses related to market, cemetery, and slaughterhouse (column 4), public health (column 6), and public education (colum 7).

As we mentioned earlier, borrowing was a common practice for most municipalities to address budget deficits or finance significant capital projects such as water and sewer systems or lighting networks. Consistent with this observation, Table 6 demonstrates a positive association between coffee booms and debt service, which includes interest payments and principal amortization. The point estimate in column 7 indicates that a 1% increase in coffee prices resulted in a 0.39% increase in spending on debt services. Hanley (2018) argues that the period between 1910 and 1912 was notable for most municipalities as they experienced a surge in borrowing and subsequent debt service. It coincided with the economic expansion brought about by the coffee 1906 valorization program, in which

the state of São Paulo financed the purchase of excess coffee to stabilize prices. This policy protected the incomes of the coffee sector and mitigated the negative effects of overplanting on coffee prices. It also led to increased liquidity in the credit markets, facilitating borrowing for municipalities (Hanley, 2018, p. 130).

Heterogeneous Effects. We complement our analysis by investigating how inequality influences our estimated effects. Specifically, we examine the role of political and economic inequality in shaping the impacts of coffee price fluctuations on investments in local fiscal capacity. In our context, political inequality refers to the variations in power, influence, and opportunities to participate in political processes and decision-making across different groups. To capture the concentration of political power among the elites, we construct the Herfindahl index based on the share of voters by occupation at the municipality level. Specifically, the index is calculated as $PolIneq_m = \sum_{i=1}^{n} v_i^2$, where v_i is the share of voters in each occupation group i relative to the total number of voters in 1898. Higher values of the Herfindahl index indicate a greater concentration of political power in a municipality.[18] Furthermore, we construct the land Gini coefficient to capture variations in the distribution of land ownership and provide a measure of economic inequality within municipalities.[19]

To assess the impact of inequality on tax collection and provision of public goods, we include the terms $Price_t \times Coffee_m \times PolIneq_m$, and $Price_t \times Coffee_m \times LandIneq_m$ in Equation (1) using the public finances outcomes as dependent variables.[20] $PolIneq_m$ and $LandIneq_m$ are continuous variables indicating political and economic inequality, respectively. As before, the coefficient on $Price_t \times Coffee_m$ estimates the overall effect of the coffee price on public finances. The coefficients $Price_t \times Coffee_m \times PolIneq_m$ and $Price_t \times Coffee_m \times LandIneq_m$ respectively estimate how and whether political power concentration and land inequality among landowners have a differential effect on the capacity to collect tax and invest in public goods.

Before presenting the results, we examine the relationship between political and economic inequality and the logarithm of tax revenue per capita. Figure 3a illustrates a

[18] The statistical yearbook of the state of São Paulo contains data on registered voters categorized by occupation at the municipality level. The list of occupations includes farmers, artists, clergy, traders, civil servants, industrialists, short-term contract workers, military personnel, and factory workers.

[19] We construct the land Gini coefficient for each municipality using the same formula as Nunn (2008). See Appendix B for details.

[20] Sánchez De La Sierra (2020) adopts a similar strategy to investigate heterogeneous effects of mineral price shocks on essential functions of the state in the context of armed actors in the eastern Democratic Republic of the Congo.

positive association between land inequality and tax collection in 1898, while Figure 3b visually reports a negative association between tax revenues and political inequality. We show in the regression analysis that these patterns are statistically significant. Table 7 presents the results for the collection of revenues per capita (columns 1, 2, and 3) and the spending on public goods and services. These results are obtained using our preferred specification. Our findings indicate that coffee price fluctuations have a higher impact on public goods and services expenses in municipalities where land distribution is unequal (columns 4 and 6). Conversely, point estimates suggest that political inequality is associated with significantly lower effects of coffee prices on the provision of public goods (columns 5 and 6). We observe a similar pattern when examining the impacts on the tax revenues, but the point estimates are not statistically significant (columns 4 to 6).

In summary, our findings suggest that coffee booms had varying impacts on local fiscal capacity, depending on the political and economic inequality. These results, while preliminary, provide valuable insights and open up new avenues for further research to delve deeper into the mechanisms that drive these results. Understanding the underlying elements contributing to these differential effects can shed light on the complex dynamics between economic growth, inequality, and fiscal capacity in the context of coffee-dependent regions.

6 Robustness Checks

In this section, we present the robustness checks of our main findings. In particular, we show that our results for the capacity to collect taxes remain unchanged when we remove the top coffee producers from the sample. Furthermore, the results are robust to alternative measures of exposure to coffee price fluctuations. We present the Tables of the robustness exercises in Appendix A.

Removing Top Coffee Producers. One potential concern with our baseline findings is whether the local exposure to coffee prices is exogenous. Since Brazil was the world's leading coffee producer and exporter during the late nineteenth and early twentieth centuries, the federal and state governments could coordinate actions to control international prices. Although local governments are less likely to influence international prices, we address this issue by excluding the top 5% largest coffee-producing municipalities in São Paulo from our sample. We present the results in Panel A of Table A1. The findings suggest that our main results remain robust even after removing these municipalities from the analysis, providing further support for the validity and stability of our estimates.

Alternative Measures of Exposure to Coffee Prices. Another concern is that using the natural logarithm transformation in Equation (1) for the dependent and coffee price variables may not accurately capture the effects on local public finances. To address this concern, we present alternative specifications in Table A1 to examine the robustness of our results. In Panel B of Table A1, we utilize the hyperbolic sine transformation (*asinh*) for these variables instead of the natural logarithm transformation. In Panel C, we use the coffee tree density, measured as the ratio of harvested coffee trees to the total area, as an alternative measure rather than the suitability index from FAO-GAEZ. In Panel D, we introduce a dummy variable that takes the value of one if the coffee tree density is above the sample median (40.38 trees/ha). In all three cases, the results demonstrate consistent qualitative patterns compared to the baseline estimates.

7 Conclusion

The Brazilian 1891 constitution marked a crucial moment in the country's political and economic history. In the new federal system of government, state and municipal governments received increased autonomy to regulate their internal affairs. In particular, the recent federalism empowered municipalities to raise their revenues and make independent decisions regarding the allocation of public resources. In this paper, we exploit a unique dataset on municipal public finances between 1898 and 1928 to shed light on the impact of exposure to the international market, specifically the coffee price fluctuations, on the public finances of municipalities in the state of São Paulo during this period of profound political and economic transformation.

Our findings reveal that increases in international coffee prices were associated with higher tax capacity at the municipal level. These effects were primarily driven by indirect taxes linked to the dynamism of the local economy, such as taxes on industries, professions, commerce, and urban activities, which disproportionately affected poorer individuals. Additionally, we find evidence that municipalities allocated these revenues towards higher salaries for state representatives and the provision of essential public services, including public works, lighting, and water and sewer infrastructure. Furthermore, our analysis shows that the impact of coffee price fluctuations on tax collection and public spending varied depending on the distribution of political power and land ownership within municipalities.

The coffee boom during the First Republic had a notable effect on fiscal institutions in São Paulo. Municipalities with a prosperous economy could generate higher tax revenues and invest in public goods. However, the long-term persistence of these fiscal institutions remains uncertain. This paper offers preliminary results that open up a new agenda

for future research. Examining the long-term persistence of these fiscal institutions will enhance our understanding of state capacity formation in Brazilian local governments.

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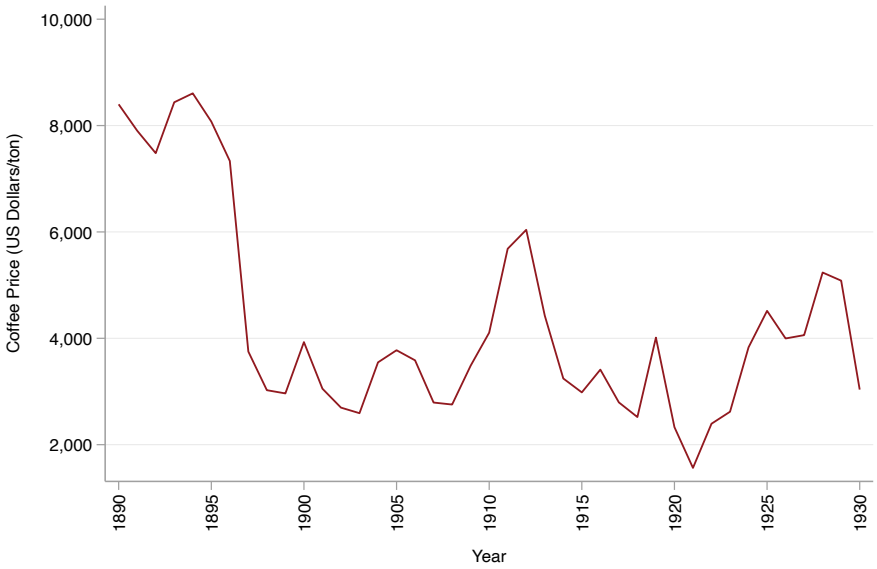
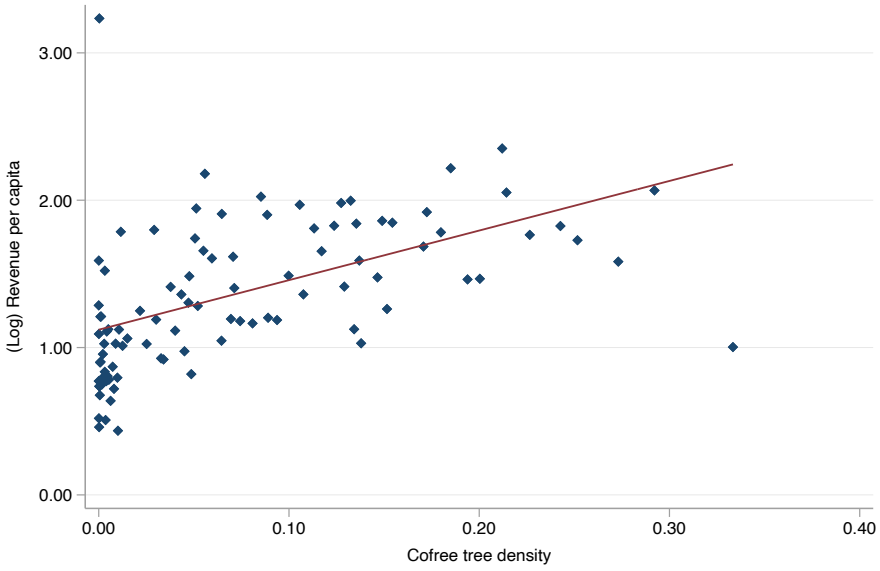
Figures

Figure 1: International Coffee Prices, 1890-1930



Notes: This figure presents the annual international prices of coffee between 1890 and 1930 in US Dollars per metric ton. Source: Jacks (2019) and World Bank Commodities Price Data (The Pink Sheet).

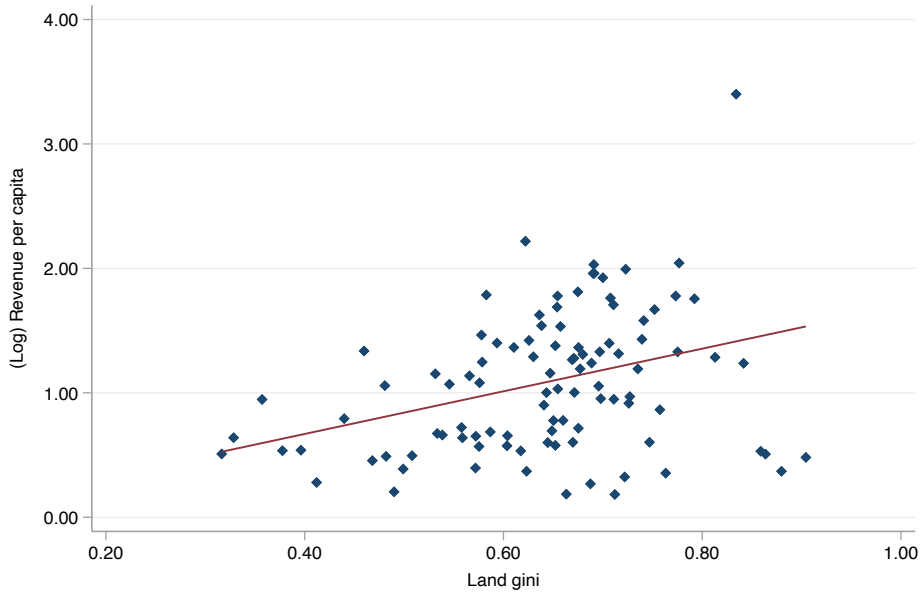
Figure 2: Coffee Tree Density and Tax Revenue Per Capita, 1905



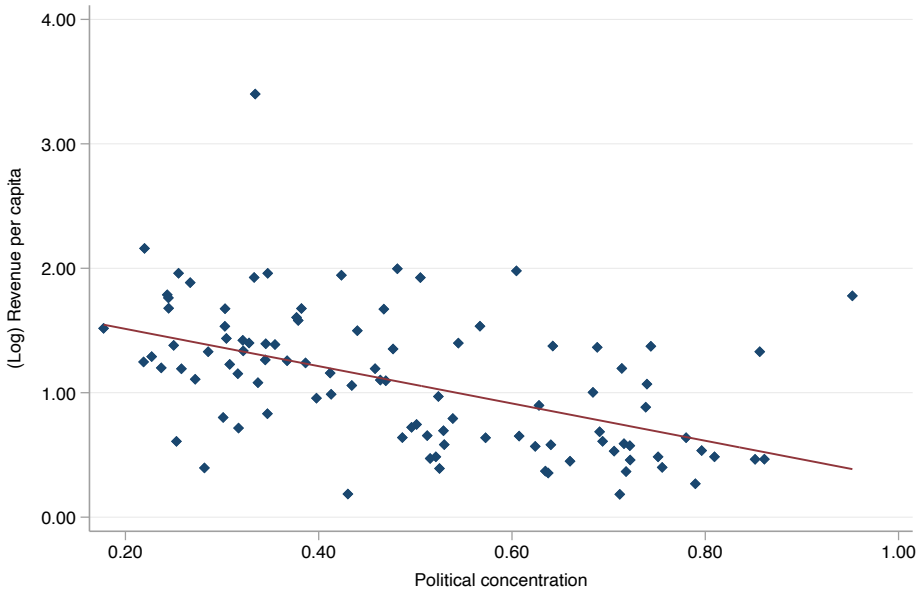
Notes: This figure presents the non-parametric relationship between coffee tree density, represented by the ratio of harvested coffee trees to total area, and the logarithm of tax revenue per capita in 1905. Observations are sorted into 100 bins of equal size, and the dots represent the mean value of each group. The red line indicates the linear fit line. Source: 1905 São Paulo statistical yearbook.

Figure 3: Fiscal Capacity and Inequality, 1898

(a) Land Inequality and Tax Revenue Per Capita

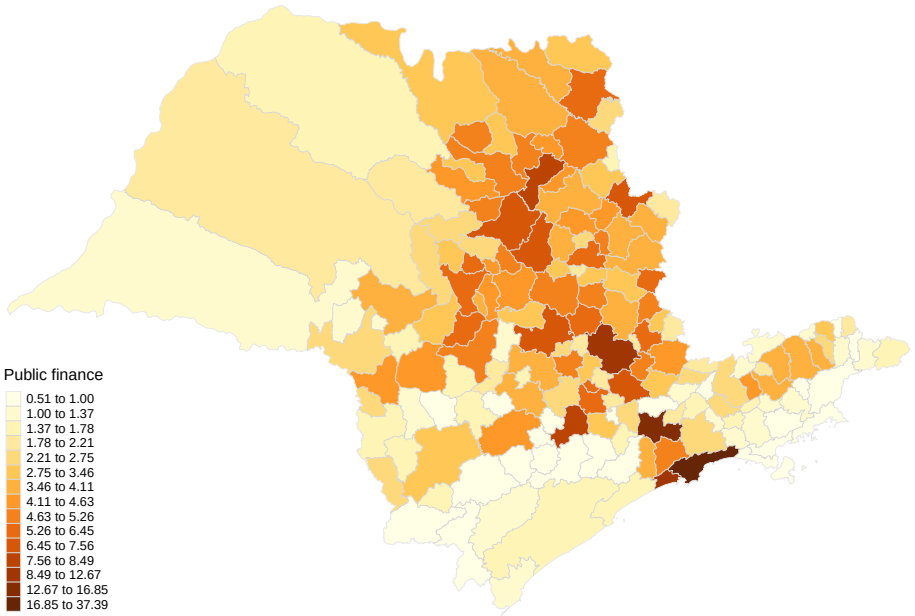


(b) Political Inequality and Tax Revenue Per Capita



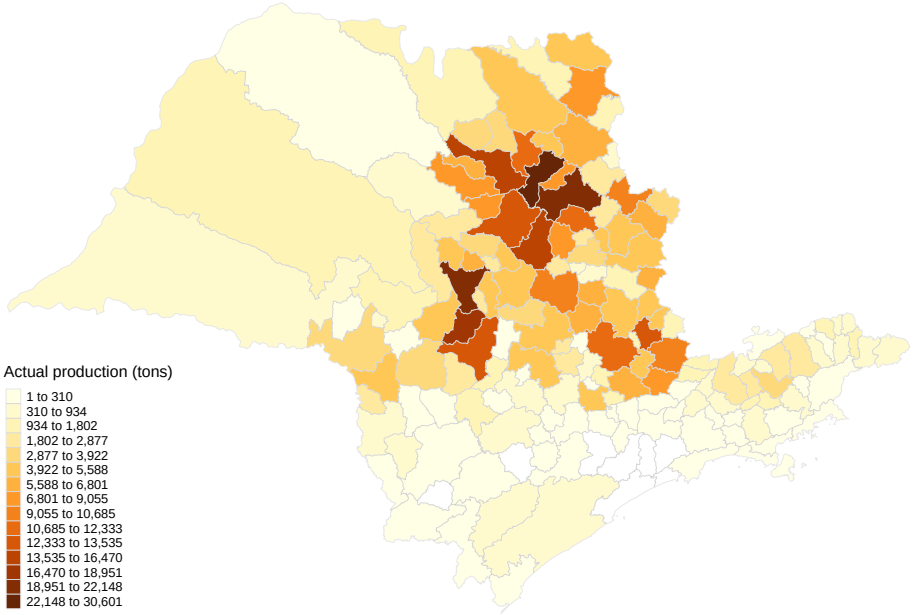
Notes: These figures present the non-parametric relationship between fiscal capacity and inequality. Figure 3a exhibits the relationship between land inequality, measure by the land Gini coefficient, and the logarithm of tax revenue per capita in 1898. Figure 3b exhibits the relationship between political inequality, measure by the Herfindahl index based on the share of voters by occupation, and the logarithm of tax revenue per capita in 1898. Observations are sorted into 100 bins of equal size, and the dots represent the mean value of each group. The red line indicates the linear fit line. Source: São Paulo statistical yearbooks.

Figure 4: Revenue per capita, 1898-1928



Notes: This figure presents the spatial distribution of tax revenue per capita averaged from 1898 to 1928 in São Paulo. Values in real milreis. Source: São Paulo statistical yearbooks.

Figure 5: Coffee Production, 1905



Notes: This figure presents the spatial distribution of coffee production in metric tons in São Paulo in 1905. Source: 1905 São Paulo statistical yearbook.

Tables

Table 1: Revenues from Taxes and Fees, 1895-1925

	Industry and Professions	Urban property	Taxes on coffee	Water and sewer	Market, cemetery, and slaughterhouse	Other revenues
1895	0.233	0.074	0.025	0.004	0.086	0.578
1900	0.358	0.088	0.041	0.048	0.122	0.344
1905	0.361	0.090	0.045	0.059	0.114	0.330
1910	0.334	0.077	0.017	0.058	0.120	0.394
1915	0.289	0.076	0.026	0.072	0.092	0.445
1920	0.329	0.069	0.000	0.059	0.059	0.483
1925	0.277	0.143	0.025	0.082	0.077	0.396

Notes: This table presents the revenues from municipal taxes and fees as a percentage of total revenue in São Paulo (for all municipalities that submitted data to the statistical office) for selected years. For 1920, market and slaughterhouse data only. Source: São Paulo statistical yearbooks.

Table 2: Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
Panel A. Public Revenues					
- Tax revenue per capita	3,836	3.443	3.820	0.030	58.873
- Industry and professions	3,814	1.349	1.135	0.010	12.645
- Uban property	3,722	0.395	0.709	0.001	9.813
- Taxes on coffee	2,421	0.326	0.353	0.000	8.141
- Water and sewers	1,853	0.609	0.732	0.000	5.390
- Market, cemetery, and slaughterhouse	3,575	0.397	0.425	0.001	4.009
- Other revenues	3,799	1.287	2.216	0.001	37.441
- Municipal loans	1,368	3.309	12.323	0.002	232.953
Panel B. Public Expenditure					
- Expenditure per capita	3,837	4.995	9.646	0.127	251.712
- Public service spending	3,827	1.802	2.353	0.020	32.581
- Salaries	3,784	0.670	0.514	0.014	8.996
- Public works	3,697	0.883	1.300	0.003	16.264
- Lighting	3,483	0.330	0.406	0.000	5.114
- Market, cemetery, and slaughterhouse	2,480	0.155	0.214	0.000	2.145
- Water and sewer	1,324	0.420	1.298	0.000	16.718
- Public health	3,226	0.301	0.629	0.000	12.676
- Public education	2,518	0.226	0.274	0.000	3.307
- Debt service	2,683	1.987	7.979	0.000	204.705
Panel C. Controls					
- Temperature	4,419	19.372	1.562	14.417	24.092
- Rainfall	4,419	111.176	24.359	64.033	259.631
- Population density in 1872	4,419	0.129	0.155	0.001	1.076
- Public administration in 1872	4,419	0.944	1.354	0.000	11.221
- Share of slaves in 1872	4,419	0.160	0.088	0.014	0.531
- Legal professionals in 1872	4,419	0.816	0.866	0.000	5.244
- Railway in 1872	4,419	0.035	0.185	0.000	1.000
- Land gini in 1920	4,419	0.649	0.111	0.306	0.904
- Political concentration index	4,419	0.483	0.180	0.165	0.952

Notes: This table presents descriptive statistics for the main variables considered in our analysis. Panel A reports summary statistics for the municipalities' revenue sources from 1898 to 1928. Panel B reports summary statistics for the municipalities' expenditure categories from 1898 to 1928. All figures in Panels A and B are in real milréis. Panel C reports summary statistics for the historical and geographical characteristics of the municipalities. The sample in all panels is based on the 1920 administrative division. Appendix B provides detailed descriptions and sources of the data.

Table 3: Effects of Coffee Booms on Fiscal Capacity, 1898-1928

	Dep. variable: Log revenue per capita						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Price_t \times Coffee_m$	0.254**	0.269**	0.267**	0.302**	0.306***	0.334***	0.371***
	(0.112)	(0.117)	(0.115)	(0.117)	(0.113)	(0.115)	(0.118)
R-squared	0.868	0.868	0.869	0.871	0.874	0.875	0.878
Observations	3,836	3,836	3,836	3,836	3,836	3,836	3,836
Mean dep. var.	1.306	1.306	1.306	1.306	1.306	1.306	1.306
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weather Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Pop. Density 1872	No	No	Yes	Yes	Yes	Yes	Yes
Public Admin. 1872	No	No	No	Yes	Yes	Yes	Yes
Share of Slaves 1872	No	No	No	No	Yes	Yes	Yes
Legal Professions 1872	No	No	No	No	No	Yes	Yes
Railway 1872	No	No	No	No	No	No	Yes

Notes: This table presents the estimated effects of coffee price fluctuations on municipalities' capacity to collect tax from 1898 to 1928. The dependent variable is the logarithm of the tax revenue per capita. The variable of interest is the interaction between $Price_t$ and $Coffee_m$, denoted as $Price_t \times Coffee_m$, which measures the local exposure to coffee price fluctuations. $Price_t$ represents the logarithm (plus one) of the annual price of coffee in the international market, measured in US Dollars per metric ton, and $Coffee_m$ refers to an index of coffee suitability obtained from the FAO-GAEZ. All regressions include municipality and year fixed effects. Time-varying weather controls include temperature and rainfall. Socioeconomic characteristics are obtained from the 1872 census and include the population density, number of workers in public administration and legal professions over the total population, the share of slaves in total population, and the initial presence of a railway station in the municipality in 1872, all interacted with year-fixed effects to allow for differential trends across municipalities. The unit of observation is municipality-year. Standard errors are clustered at the municipality level in 1872 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Public Revenue by Category, 1898-1928

	Public revenue by category						
	Industry and professions	Urban property	Tax on coffee	Water and sewer	Market, cemetery, and slaughterhouse	Other revenues	Municipal loans
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Price_t \times Coffee_m$	0.211**	0.081*	0.062	0.026	0.101*	−0.001	1.196**
	(0.090)	(0.048)	(0.077)	(0.050)	(0.059)	(0.124)	(0.511)
R-squared	0.750	0.882	0.728	0.858	0.841	0.633	0.572
Observations	3,814	3,722	2,411	1,839	3,574	3,799	1,356
Mean dep. var.	0.773	0.280	0.257	0.403	0.302	0.652	0.845
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weather Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pop. Density 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Public Admin. 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Share of Slaves 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Legal Professions 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Railway 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents the estimated effects of coffee price fluctuations on municipalities' capacity to collect tax from different sources between 1898 and 1928. The dependent variables are the logarithm of the tax revenue per capita from seven categories. The variable of interest is the interaction between $Price_t$ and $Coffee_m$, denoted as $Price_t \times Coffee_m$, which measures the local exposure to coffee price fluctuations. $Price_t$ represents the logarithm (plus one) of the annual price of coffee in the international market, measured in US Dollars per metric ton, and $Coffee_m$ refers to an index of coffee suitability obtained from the FAO-GAEZ. All regressions include municipality and year fixed effects. Time-varying weather controls include temperature and rainfall. Socioeconomic characteristics are obtained from the 1872 census and include the population density, number of workers in public administration and legal professions over the total population, the share of slaves in total population, and the initial presence of a railway station in the municipality in 1872, all interacted with year-fixed effects to allow for differential trends across municipalities. The unit of observation is municipality-year. Standard errors are clustered at the municipality level in 1872 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Public Expenditure, 1898-1928

	Expenditure per capita			Public goods and services		
	(1)	(2)	(3)	(4)	(5)	(6)
$Price_t \times Coffee_m$	0.537***	0.641***	0.728***	0.389***	0.466***	0.559***
	(0.134)	(0.151)	(0.163)	(0.126)	(0.131)	(0.131)
R-squared	0.791	0.791	0.804	0.696	0.696	0.719
Observations	3,837	3,837	3,837	3,827	3,827	3,827
Mean dep. var.	1.488	1.488	1.488	0.859	0.859	0.859
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Weather Controls	No	Yes	Yes	No	Yes	Yes
Pop. Density 1872	No	No	Yes	No	No	Yes
Public Admin. 1872	No	No	Yes	No	No	Yes
Share of Slaves 1872	No	No	Yes	No	No	Yes
Legal Professions 1872	No	No	Yes	No	No	Yes
Railway 1872	No	No	Yes	No	No	Yes

Notes: This table presents the estimated effects of coffee price fluctuations on municipalities' expenditures per capita from 1898 to 1928. The dependent variables are the logarithm of the spending per capita (columns 1, 2, and 3) and expenses related to public goods and services provision (columns 4, 5, and 6). The variable of interest is the interaction between $Price_t$ and $Coffee_m$, denoted as $Price_t \times Coffee_m$, which measures the local exposure to coffee price fluctuations. $Price_t$ represents the logarithm (plus one) of the annual price of coffee in the international market, measured in US Dollars per metric ton, and $Coffee_m$ refers to an index of coffee suitability obtained from the FAO-GAEZ. All regressions include municipality and year fixed effects. Time-varying weather controls include temperature and rainfall. Socioeconomic characteristics are obtained from the 1872 census and include the population density, number of workers in public administration and legal professions over the total population, the share of slaves in total population, and the initial presence of a railway station in the municipality in 1872, all interacted with year-fixed effects to allow for differential trends across municipalities. The unit of observation is municipality-year. Standard errors are clustered at the municipality level in 1872 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Public Expenditure by Category, 1898-1928

	Public expenditure by category							
	Salaries	Public works	Lighting	Market, cemetery, and slaughterhouse	Water and sewer	Public health	Public education	Debt service
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Price_t \times Coffee_m$	0.146**	0.260**	0.171**	0.009	0.486*	0.078	0.057	0.386**
	(0.065)	(0.129)	(0.069)	(0.057)	(0.275)	(0.059)	(0.060)	(0.181)
R-squared	0.673	0.564	0.704	0.656	0.477	0.787	0.629	0.615
Observations	3,784	3,697	3,483	2,479	1,310	3,226	2,518	2,681
Mean dep. var.	0.478	0.518	0.255	0.132	0.228	0.219	0.185	0.735
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weather Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pop. Density 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Public Admin. 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Share of Slaves 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Legal Professions 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Railway 1872	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents the estimated effects of coffee price fluctuations on municipalities' expenditure per capita by category from 1898 to 1928. The dependent variables are the logarithm of the specific categories of public spending. The variable of interest is the interaction between $Price_t$ and $Coffee_m$, denoted as $Price_t \times Coffee_m$, which measures the local exposure to coffee price fluctuations. $Price_t$ represents the logarithm (plus one) of the annual price of coffee in the international market, measured in US Dollars per metric ton, and $Coffee_m$ refers to an index of coffee suitability obtained from the FAO-GAEZ. All regressions include municipality and year fixed effects. Time-varying weather controls include temperature and rainfall. Socioeconomic characteristics are obtained from the 1872 census and include the population density, number of workers in public administration and legal professions over the total population, the share of slaves in total population, and the initial presence of a railway station in the municipality in 1872, all interacted with year-fixed effects to allow for differential trends across municipalities. The unit of observation is municipality-year. Standard errors are clustered at the municipality level in 1872 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

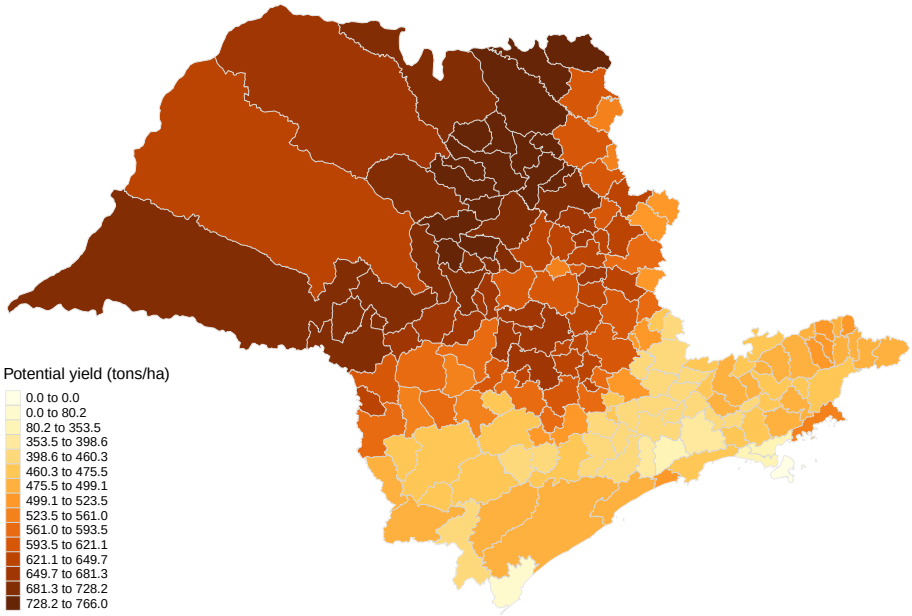
Table 7: Political and Economic Inequality, 1898-1928

	Revenue per capita			Public goods and services		
	(1)	(2)	(3)	(4)	(5)	(6)
$Price_t \times Coffee_m$	0.207	0.405***	0.243	0.086	0.817***	0.366
	(0.223)	(0.137)	(0.238)	(0.253)	(0.182)	(0.283)
$Price_t \times Coffee_m \times LandIneq_m$	0.205		0.201	0.593**		0.561*
	(0.215)		(0.211)	(0.295)		(0.283)
$Price_t \times Coffee_m \times PolIneq_m$		−0.079	−0.076		−0.597**	−0.587**
		(0.111)	(0.114)		(0.254)	(0.253)
R-squared	0.878	0.878	0.878	0.719	0.720	0.720
Observations	3,836	3,836	3,836	3,827	3,827	3,827
Mean dep. var.	1.306	1.306	1.306	0.859	0.859	0.859
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Weather Controls	Yes	Yes	Yes	Yes	Yes	Yes
Pop. Density 1872	Yes	Yes	Yes	Yes	Yes	Yes
Public Admin. 1872	Yes	Yes	Yes	Yes	Yes	Yes
Share of Slaves 1872	Yes	Yes	Yes	Yes	Yes	Yes
Legal Professions 1872	Yes	Yes	Yes	Yes	Yes	Yes
Railway 1872	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents the heterogeneous effects of coffee price fluctuations on municipalities' capacity to collect tax and provide public goods and services from 1898 to 1928 according to the political and inequality level. The dependent variables are the logarithm of the tax revenue per capita (columns 1, 2, and 3) and expenses on public goods and services (columns 4, 5, and 6). The variable of interest is the interaction between $Price_t$ and $Coffee_m$, denoted as $Price_t \times Coffee_m$, which measures the local exposure to coffee price fluctuations. $Price_t$ represents the logarithm (plus one) of the annual price of coffee in the international market, measured in US Dollars per metric ton, and $Coffee_m$ refers to an index of coffee suitability obtained from the FAO-GAEZ. All regressions include municipality and year fixed effects. Time-varying weather controls include temperature and rainfall. Socioeconomic characteristics are obtained from the 1872 census and include the population density, number of workers in public administration and legal professions over the total population, the share of slaves in total population, and the initial presence of a railway station in the municipality in 1872, all interacted with year-fixed effects to allow for differential trends across municipalities. The unit of observation is municipality-year. Standard errors are clustered at the municipality level in 1872 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

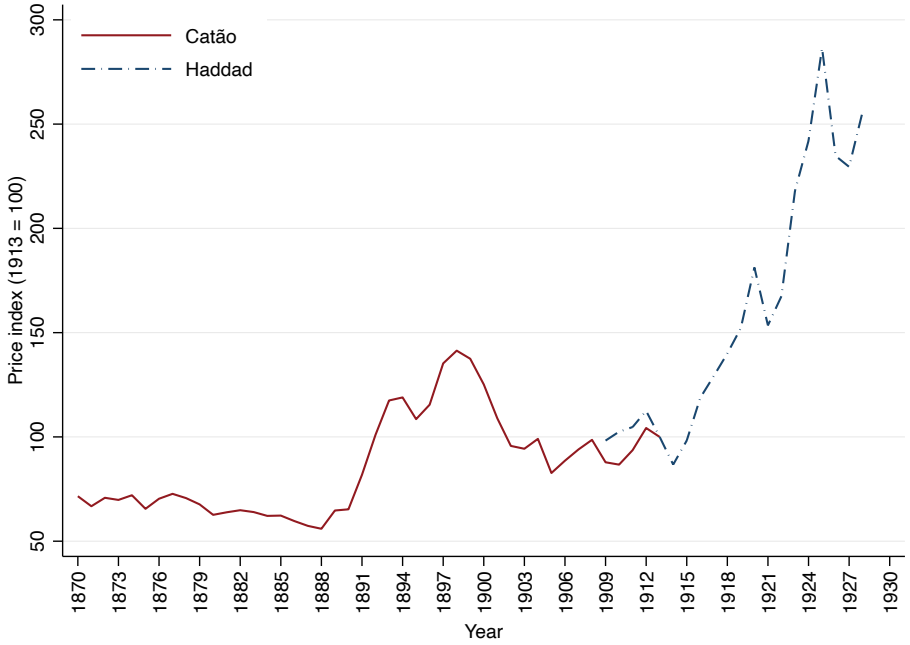
Appendix A Figures and Tables

Figure A1: Potential coffee yields (in metric tons per hectare)



Notes: This figure presents the agroclimatic attainable yields averaged at the municipality level for coffee in metric tons per hectare for rain-fed and low levels of inputs.

Figure A2: Inflation rates, 1870-1930



Notes: This figure presents the price indices used to deflate all public finance data. The annual price series for 1870-1913 period comes from Catão (1992), while Haddad (1974) provides the price index for 1914 onwards. 1913 = 100

Table A1: Robustness Checks

	Dep. variable: Log revenue per capita						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Droping top 5% coffee producers							
$Price_t \times Coffee_m$	0.206*	0.206*	0.211*	0.254**	0.259**	0.291**	0.305***
	(0.114)	(0.115)	(0.114)	(0.115)	(0.111)	(0.112)	(0.113)
R-squared	0.869	0.869	0.870	0.873	0.876	0.876	0.879
Observations	3,449	3,449	3,449	3,449	3,449	3,449	3,449
Panel B. Inverse hyperbolic sine (asinh)							
$Price_t \times Coffee_m$	0.254**	0.269**	0.267**	0.302**	0.306***	0.334***	0.371***
	(0.112)	(0.117)	(0.115)	(0.117)	(0.113)	(0.115)	(0.118)
R-squared	0.868	0.868	0.869	0.871	0.874	0.875	0.878
Observations	3,836	3,836	3,836	3,836	3,836	3,836	3,836
Panel C. Coffee tree density							
$Price_t \times CoffeeTree_m$	0.300**	0.300**	0.441***	0.461***	0.537***	0.539***	0.558***
	(0.139)	(0.143)	(0.137)	(0.139)	(0.129)	(0.134)	(0.136)
R-squared	0.868	0.868	0.869	0.871	0.875	0.875	0.878
Observations	3,836	3,836	3,836	3,836	3,836	3,836	3,836
Panel D. Coffee tree density (above median)							
$Price_t \times \mathbb{1}\{CoffeeTree_m\}$	0.016	0.016	0.030	0.037	0.056**	0.054**	0.059**
	(0.025)	(0.026)	(0.026)	(0.025)	(0.026)	(0.026)	(0.027)
R-squared	0.868	0.868	0.869	0.871	0.874	0.875	0.878
Observations	3,836	3,836	3,836	3,836	3,836	3,836	3,836
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Weather Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Pop. Density 1872	No	No	Yes	Yes	Yes	Yes	Yes
Public Admin. 1872	No	No	No	Yes	Yes	Yes	Yes
Share of Slaves 1872	No	No	No	No	Yes	Yes	Yes
Legal Professions 1872	No	No	No	No	No	Yes	Yes
Railway 1872	No	No	No	No	No	No	Yes

Notes: This table presents the robustness checks of the main results for the estimated effects of coffee price fluctuations on municipalities' capacity to collect tax from 1898 to 1928 according to the political and inequality level. Panel A excludes the top 5% largest coffee-producing municipalities in São Paulo from the sample. Panel B uses the hyperbolic sine transformation (*asinh*) instead of the natural logarithm transformation. Panel C, uses the coffee tree density, measured as the ratio of harvested coffee trees to the total area, as an alternative measure rather than the suitability index from FAO-GAEZ. Panel D uses a dummy variable that takes the value of one if the coffee tree density is above the sample median (40.38 trees/ha) as a measure for local exposure to coffee booms. All regressions include municipality and year fixed effects. Time-varying weather controls include temperature and rainfall. Socioeconomic characteristics are obtained from the 1872 census and include the population density, number of workers in public administration and legal professions over the total population, the share of slaves in total population, and the initial presence of a railway station in the municipality in 1872, all interacted with year-fixed effects to allow for differential trends across municipalities. The unit of observation is municipality-year. Standard errors are clustered at the municipality level in 1872 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix B Data

B.1 Adjustment for Changes in Municipality Boundaries

The administrative division in São Paulo significantly changed at the beginning of the twentieth century. The number of municipalities increased from 88 in 1872 to 258 in 1933. To maintain municipal boundaries constant at the 1900 level, we use official information on historical changes in administrative division (IBGE, 2011). Specifically, we locate the urban center of each municipality between 1900 and 1928 and then determine its corresponding origin in 1900 to aggregate the data on public finances. The underlying assumption is that the population concentrates primarily on the urban centers.

To match municipalities from 1900 to their original localities in 1872, we identify parishes present in the 1872 census that later became municipalities by 1900. We then use their data instead of aggregated municipal measures, allowing for greater variation in sociodemographic characteristics. However, it is worth noting that not all municipalities in 1900 existed as parishes in 1872. In such cases, we assign values from their municipality of origin, excluding parishes that eventually became separate municipalities.

B.2 Variable Definitions and Sources

Public finances. The annual São Paulo statistical yearbooks provide data on the municipal public finances from 1898 to 1928. The revenue categories cover taxes on industries and professions, urban property, taxes on coffee, water, and sewer, cemetery income, slaughterhouse income, income from the market, public lighting, recovery of active claims, deposits and cautions, state subsidies, loans, and extraordinary revenues. Additionally, the expenditure components include wages and subsidies for municipal workers, office and publication expenses, public works, public education, street cleaning, public health, public water, public sewers, market expenses, cemetery expenses, slaughterhouse expenses, judicial expenses, debt, and other extraordinary expenses. It is worth noting that not all municipalities reported their financial data consistently throughout this period. Furthermore, the yearbooks for 1897 and 1922-1925 do not include any public finance data for any municipality, and the 1899 yearbook is unavailable. All figures are measured in the Brazilian currency of the period, which was the milréis, or one thousand réis.

Deflators. We deflate all figures to 1913 values The annual price index for Brazilian inflation during the 1870-1913 period comes from Catão (1992). We use the GDP deflator from Haddad (1974) for 1914 onwards.

Population. Population data come from different sources. The Brazilian Demographic Census provides population data for 1872, 1900 and 1920, the Brazil statistical yearbook for 1910 (Brazil, 1912), and the São Paulo statistical yearbook for 1929. We use linear interpolation to fill in the gaps between data points to estimate the local population.

International coffee prices. Data on international coffee prices come from Jacks (2019), who provides a comprehensive dataset on real price indexes for 42 commodities over more

than 170 years, from 1850 to 2022. We convert the coffee price index to U.S. dollars using the World Bank Commodities Price Data (The Pink Sheet).

Coffee suitability. Based on an agronomic model and considering climatic conditions (temperature, rain, and humidity), these data report at the grid cell level of about 9.25 x 9.25 kilometers the potential output possible to harvest in a cell by assuming the use of the best suitable land. To construct a measure of the suitability at the municipality level for coffee, we compute the mean value of each grid cell that falls within the border of each municipality by superimposing a map with the boundaries of Brazilian municipalities on the grid of soil suitability for coffee. FAO-GAEZ's version 4 calculates the potential yields under two assumptions about the input use, "low" and "high". We use data for rain-fed conditions under low input technology because this is the one that better characterizes Brazil's agriculture over the period we analyze. Source: FAO-GAEZ.

Population density. Number of individuals by municipality area. Source: 1872 Census.

Legal professionals. Number of workers in legal professions over the total population *1000. Source: 1872 Census.

Public administration. Number of workers in public administration over the total population *1000. Source: 1872 Census.

Share of slaves. Number of slaves over the total population. Source: 1872 Census.

Railway. Dummy variable indicating the presence of a railway station in the municipality in 1872. Source: www.estacoesferroviarias.com.br.

Land Gini. Land Gini coefficient is calculated using the same formula as Nunn (2008): $LandGini_m = 1 + \left(\frac{1}{n}\right) - \frac{2\sum_1^n (n-i+1)a_i}{n\sum_i^n a_i}$, where n is the number of farms, a_i is farm size in hectares, and i denotes the rank in ascending order of a_i. Data on the number of farms and their average size within each municipality come from the 1920 Census.

Political concentration. The Herfindahl index of the share of the voters by occupation in 1898. Specifically, the index is calculated as $PolIneq_m = \sum_{i=1}^n v_i^2$, where v_i is the share of voters in each occupation group i relative to the total number of voters in 1898. Higher values of the Herfindahl index indicate a greater concentration of political power in a municipality. Source: 1898 São Paulo statistical yearbook.

Climatic variables. Annual data on temperature and rainfall come from the Climate Research Unit of the University of East Anglia (Harris et al., 2020). The CRU TS climate database provides high-resolution data gridded to 0.5 × 0.5-degree resolution based on analysis of over 4,000 individual weather station records covering Earth's land areas from 1901 to 2022. We consider the historical average of precipitation and rainfall for 1898 and 1900. To construct temperature and rainfall indices at the municipality level, we compute the mean value of each grid cell that falls within the border of each

municipality by superimposing a map with the boundaries of Brazilian municipalities on the grid of CRU TS climate database.