Smithian State Formation*

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Abstract

We examine the relationship between inequality and state capacity, measured with tax collection. Contrary to traditional models that emphasize the redistributive role of taxation, we focus on its role in providing public goods that help develop markets, increasing productivity (e.g. enforcement of property rights, coordination, roads, electricity). We build a simple model of public good provision where landowners decide whether or not to comply with property taxes taking into account: 1) that government expenditure increases property values, and 2) their expectation of the punishment when evading taxes. We validate the model empirically, using data from Colombian municipalities between 1923 and 1960, in two ways. First, we use detailed land values' data from cadastres available for a subsample of municipalities and the model's structure to predict tax revenues and compare them with actual revenues. Second, we show evidence in favor of the main model predictions: land concentration is positively correlated with tax revenues per capita, and negatively correlated with the average fiscal cost of collecting one peso. These correlations are robust to controlling for measures of potential sources of omitted variable bias. Moreover, they are stronger for places that stand more to gain from the development of markets.

JEL Classifications: H26, H41

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1 Introduction

Prominent explanations for why the elites pay taxes assume that they do so only under political pressure, as the state uses taxes for redistribution. For instance, Acemoglu and Robinson (2006) argue that landowning elites agree to redistribution as a strategic response to the threat of revolution, extending the franchise to commit credibly to future transfers. Their account builds on the logic of Meltzer and Richard (1981), who show that rising inequality increases support for redistribution, under the assumption that all individuals comply with the tax schedule, a logic was also alluded to by de Tocqueville (1835). These perspectives understand taxation as the outcome of redistributive conflict, where asset-owners comply only to avoid more costly outcomes. However, recent work by Besley (2020) emphasizes that state capacity depends not only on coercion, but also on reciprocity: when citizens believe they benefit from government action, they are more willing to comply.

This alternative perspective emphasizes coordination rather than redistribution. Historically, many states expanded by providing public goods that reduced uncertainty, and transaction and transportation costs, allowing easier exchange. Land and capital owners benefit from the state's provision of public goods (e.g. property rights protection, infrastructure construction, and contract enforcement) since asset values increase when markets work better. However, these public goods are not amenable to private provision, precisely because the state's role as coordinator is necessary.[1] Robert Bates (1987) referred to this idea as "Smithian state formation:" elites support taxation not because they are coerced, but because they reap the benefits from state action.[2] When public expenditure raises asset values, taxation can be seen as an investment rather than a burden.

In this paper, we formalize this idea in a simple model of public good provision with heterogeneous landowners that we test using historical data from Colombian municipalities. The model builds on the tax compliance framework of Allingham and Sandmo (1972), adapting it to capture how the distribution of land ownership shapes the willingness of elites to pay taxes. Landowners observe a fiscal policy composed of a tax rate, a penalty rate for non-compliance, and a fiscal multiplier that maps public expenditure

[1] Smith lays out this argument on Book V of The Wealth of Nations, referring specifically to "Public works and institutions for facilitating the commerce of society."

[2] "One of the basic arguments linking political centralization with economic reward rests upon the desire of people to benefit from the gains in welfare which can be reaped from markets.(...) The origins of the state, then, lie in the welfare gains that can be reaped through the promotion of markets." Essays on the Political Economy of Rural Africa.

into private land values. Each landowner chooses whether to comply, balancing the expected benefits of taxation with the expected cost of evasion. Simulations of the model under different land distributions show that when inequality is high, landowners have both more to gain from public goods and fewer peers to hide behind. As a result, a larger share of them comply, and tax revenues increase.

The model rests on two key assumptions. First, we assume that public expenditure increases land values proportionally. This link is indirect: property rights protection increases expected returns on investment, transportation infrastructure enhances access to markets, and public services such as electricity and sanitation improve amenities and productivity, all of which raise land values over time (Besley, 2002; Donaldson and Hornbeck, 2016; Coury et al., 2022). Second, we assume that enforcement is more effective when land is concentrated. Specifically, we model enforcement probability as a function of the number of landowners rather than the full land distribution, reflecting a situation in which the state does not observe the complete distribution of landholdings. This assumption simplifies the enforcement mechanism and reflects administrative capacity constraints.

These assumptions offer analytical leverage but also raise important questions. The model treats landowners as policy takers: they do not set tax rates, influence enforcement, or shape expenditure decisions. Their only choice is whether to comply. This abstraction rules out elite capture through lobbying, tax bargaining, or informal arrangements, which are common features in weakly institutionalized states. While this is a simplification, it isolates the logic of voluntary compliance and allows us to study coordination incentives under minimal political structure.

Moreover, the model adopts linear compliance costs, consistent with the deterrence literature, where paying taxes is modeled as a monetary transfer with no increasing marginal cost (Becker, 1968; Allingham and Sandmo, 1972). This distinguishes our approach from collective action models where contributions to public goods involve increasing participation or mobilization costs (Olson, 1965; Banerjee et al., 2007). Our focus is not on effort allocation or participation thresholds, but on how inequality shapes the incentives to comply with taxation when public goods increase private returns.

We test the model using newly digitized municipal-level fiscal data from Colombia between 1923 and 1960. During this period, tax rates were set at the national level, but municipalities had significant autonomy in collecting and spending revenues. We calibrate our simplest model for tax rates and penalty rates that are consistent with Colombia's property tax policy during the 20th century. For municipalities in the department

of Cundinamarca, we observe the full land distribution in 1890 from detailed cadastral records (Acemoglu et al., 2007). For each municipality we calculate tax revenues by predicting which landowners would choose to comply based on their land value share. The model predicts that Cundinamarca's municipalities with higher land inequality should pay higher taxes: municipal land Gini coefficients are positively correlated with predicted revenues. Moreover, predicted revenues are strongly correlated with observed tax revenues. This tight fit is notable given the minimal model structure and the potential measurement error inherent in this exercise.

To evaluate whether our results generalize beyond the Cundinamarca sample, we extend the analysis to a broader sample of 702 municipalities using occupation data. We use the number of landowners as a share of total agricultural workers from the 1938 Population Census as our main measure of land concentration. This variable is strongly correlated with land Gini coefficients from 1890 for the Cundinamarca sample, reflecting long-run persistence in land concentration. For the full sample high land concentration (low landowner share) is associated with high levels of tax revenues per capita. The correlation is robust to using taxes per hectare, and remains stable over our sample, despite institutional and economic changes that may have differentially affected municipalities according to their level of inequality.

While we are cautious about interpreting the correlations as causal, our model does argue for a direct role of inequality in facilitating higher tax revenues. The main empirical challenge is that land inequality may be correlated with other factors that also affect fiscal capacity or tax-payers willingness to pay. Therefore, we evaluate whether key sources of endogeneity could be biasing the results. We consider three potential threats.

First, municipalities with greater inequality may benefit from economies of scale, and their higher level of economic activity may lead to more revenues. To account for this, we include controls for the share of employment in manufacturing and services in 1912 and a dummy for departmental capitals. These variables proxy for persistent differences in economic development. The coefficient on landowner share remains negative and statistically significant, although smaller in magnitude.

To further understand whether the observed relationship between inequality and tax revenue reflects underlying economic activity or a more direct mechanism, we analyze the composition of municipal tax revenue. We distinguish between direct taxes (mainly property taxes) and indirect taxes (sales taxes). If the correlation were driven primarily by income or consumption levels in richer municipalities, one would expect a stronger

association between inequality and indirect taxes. Yet, we find the opposite. The negative correlation between landowner share and direct tax revenue is nearly twice as large as that for indirect tax revenue. This distinction is meaningful because direct taxes are more closely tied to property ownership and compliance, while indirect taxes are a function of broader economic activity. The stronger result for direct taxation supports the model's central mechanism: when public goods raise land values, landowners in more unequal municipalities have stronger incentives to comply with property taxes.

Second, differences in agrarian specialization may jointly influence land inequality and tax capacity. Certain crops or agricultural systems, like cattle ranching, are associated with large-scale landholdings and more unequal distributions. At the same time, these land-intensive systems might shape fiscal legibility, i.e. how property values are assessed or how easily revenue is collected (Garfias and Sellars, 2021). To address this possibility, we control for two relevant indicators: the number of coffee trees per capita and the number of cattle slaughtered per capita in 1948. These proxies capture the intensity and type of agricultural activity, particularly export orientation and land use scale. While cattle production is associated with higher tax revenues, adding these controls does not alter the core finding: municipalities with higher land inequality still tend to raise more tax revenue per capita.

Finally, historical legacies of state-building institutions may jointly shape land inequality and fiscal capacity. To address this concern, we include controls for the presence of *encomiendas* in 1550 and the presence of indigenous settlements in 1535. *Encomiendas*, early fiscal institutions used by the Spanish Crown to distribute the rents from Conquest, created concentrated claims on local resources that influenced both early inequality and state formation (Faguet et al., 2024). These institutions laid the groundwork for local fiscal capacity that persisted into the 20th century. Including these historical controls does not attenuate the negative association between landowner share and per capita tax revenue, suggesting that the relationship is not driven by persistent colonial differences in fiscal infrastructure.

We test whether the relationship between land inequality and tax revenues is stronger in places where public investment is more likely to enhance asset values. In our framework, tax compliance is more attractive when public goods raise the value of landholdings. This logic should be particularly relevant in municipalities that depend heavily on markets. In Colombia, coffee cultivation between 1920 and 1970 linked rural areas to national and international markets and accounted for roughly two-thirds of export

earnings. Coffee production required long-term investment, seasonal labor, and access to credit, all of which depended on functioning markets. We find that the negative association between landowner share and tax revenue is significantly stronger in coffee-growing municipalities. This result is consistent with our main hypothesis: the incentives to contribute to taxation increase where the fiscal return to public investment is higher.

To further assess whether inequality shapes compliance behavior, we analyze tax collection efficiency, defined as the ratio of expenditure in tax collection costs to total revenue. Municipalities with a higher landowner share, where land is more equally distributed, spend significantly more on average to collect each peso of tax revenue. This pattern suggests that, in more equal municipalities, tax compliance is lower and enforcement requires greater administrative effort. Conversely, in municipalities with high land concentration, the government deals with fewer actors, and large landowners face stronger incentives to comply when public expenditure raises land values. These patterns reinforce our argument: under certain conditions, inequality can reduce enforcement costs by aligning incentives for tax compliance.

Our findings offer a reinterpretation of the relationship between inequality and state capacity. Rather than obstructing taxation, land concentration may facilitate it when tax revenues are used for promoting markets. Our argument complements work emphasizing the importance of elite-state bargains in historical fiscal development (e.g., Hoffman and Norberg (2002); North and Weingast (1989); Besley and Persson (2009)), and stands in contrast to findings in more modern settings where the redistribution framework may be more relevant. For instance, Hollenbach and Silva (2019) argue that inequality reduces tax compliance in modern-day Brazil.

In highlighting the role of inequality in enabling elite coordination around market-supporting public goods, we aim to recover a political logic of state formation that is distinct from both redistribution and repression. In Colombia, during a time of limited democracy but expanding fiscal capacity, taxation was not always a threat to elites. Sometimes, it was a bargain, as was in the African countries where Robert Bates developed this insight.

Related Literature

This paper contributes to a literature on the political economy of public goods by exploring how elite coordination facilitates state investment. Wallis (2003) shows that in mid 19th-century Indiana, property taxation aligned the interests of landowners with in-

frastructure provision by directly tying public investment to asset appreciation. Property taxes acted as a coordinating device, enabling investments in roads and canals that would have been difficult to achieve through voluntary contributions alone. Dell (2010) makes a complementary argument in the Peruvian context: she finds that the absence of large landowners in regions historically subject to the mita system is related to lower public investment and access to markets. However, Dell does not develop the precise mechanism linking inequality to public good provision. The argument in this paper provides a clear story linking both via tax compliance. Together, these studies highlight how land concentration can shape state formation, not only through its distributive consequences but also by determining whether the incentives of elites align with public investment.

Second, we contribute to the literature on redistribution and political conflict. Classic models (Meltzer and Richard, 1981; Acemoglu and Robinson, 2006) emphasize elite resistance to taxation in unequal societies. While our argument produces similar empirical predictions, it relies on a different logic: elites pay taxes not to avoid redistribution, but because public expenditure increases the value of their assets.

Third, this work contributes to the literature on state capacity by highlighting the conditions under which economic elites choose to support taxation voluntarily. Earlier work emphasized supply-side investments, such as building bureaucratic or legal capacity (Besley and Persson, 2013; Dincecco and Katz, 2016). More recent accounts, including Besley (2020), recognize the importance of reciprocity: state capacity is more likely to emerge when taxpayers see direct benefits from public investment. Our contribution lies in formalizing a demand-side mechanism: when taxation improves the value of elite-owned assets, fiscal capacity can arise even in settings with limited enforcement. By demonstrating how land inequality can facilitate this process, we provide a complementary perspective to traditional accounts that focus primarily on state strength and coercion.

Fourth, in public economics, we emphasize how the concentration of assets influences the decision to comply with taxation. Unlike standard models of tax compliance that highlight the role of audit probabilities and penalties for evasion (Allingham and Sandmo, 1972; Kleven et al., 2011), we show how land concentration can shape compliance incentives. When public goods increase land values, large landowners have more to gain from taxation and may choose to comply even under weak enforcement. This framework complements existing models of tax evasion and contributes to the literature on the redistributive role of taxes (Slemrod, 1992; Diamond and Saez, 2011) by showing

that not only can taxes affect wealth distribution, but the reverse can also hold: wealth distribution can influence taxation.

Finally, we contribute to Latin American economic history by examining the role of land inequality in shaping fiscal institutions. Engerman and Sokoloff (2002) argue that factor endowments in the Americas shaped differences in inequality, which led to the formation of institutions that privileged elites and limited broad-based investment in public goods. Building on this, Sokoloff and Zolt (2007) show that countries with these colonial legacies often relied on indirect taxes rather than direct taxation of income or property, reflecting elite resistance to fiscal burdens. In contrast, we study landowners decisions for a given tax system and show that municipalities in Colombia with more concentrated land ownership collected more property taxes per capita. This result departs from the cross-country pattern documented by Sokoloff and Zolt and suggests that inequality can, under specific conditions, facilitate local state capacity. When public spending raises land values, as in our framework, fiscal contributions become aligned with landowners' interests. Our findings offer a new perspective on how inequality shaped the incentives for public good provision at the subnational level in Latin America.

2 Theoretical Framework

We build a simple theoretical model of public goods provision and tax compliance to explore the relationship between inequality and taxation. In particular, we adapt the Allingham and Sandmo (1972) framework to show how taxes can serve as a coordination device between landowners and the state to provide public goods. Landowners weigh the benefits of paying taxes vs. free-riding, against the expected cost of being found evading and charged a penalty rate. Our model is built around two main assumptions: (i) with tax revenues, the state funds public goods that increase land values proportionally, and (ii) the probability of the state discovering a landowner evading taxes is inversely proportional to the number of landowners in the municipality.

Assumption 1 A central assumption of the model is that local public spending increases land values proportionally. While stylized, this assumption reflects a well-documented empirical relationship between market-enabling public goods and asset values. These goods—such as property rights protection, transportation infrastructure, and legal enforcement—facilitate participation in markets by reducing uncertainty and transaction

costs. Because they cannot be privately provided at scale, landowners have an incentive to support their provision.

There is substantial evidence that such public goods raise land values by increasing the returns to economic activity. Property rights enforcement, for instance, has been shown to increase investment and agricultural productivity (Besley, 2002; Hornbeck, 2010). Land titling boosts investment and housing improvements in urban settings (Galiani and Schargrodsky, 2010). Infrastructure investment raises rural land values by expanding access to markets (Donaldson and Hornbeck, 2016; Wallis, 2003). Similarly, access to utilities such as electricity and piped water raises urban and rural land values (Lewis and Severnini, 2020; Kitchens and Fishback, 2013; Coury et al., 2022). Complementing this, Boehm (2022) finds that weak legal enforcement distorts input use across sectors, reducing aggregate productivity—underscoring the broader gains from contract enforcement institutions. Taken together, these findings support the view that when the state provides public goods that facilitate exchange, the value of land increases. This underpins our modeling choice: taxation can be viewed not as redistribution but as a means to fund investments that benefit landowners directly through higher asset values.

Assumption 2 We assume that the probability of detecting tax evasion is inversely related to the number of landowners in a municipality. This reflects a setting in which the state has limited administrative capacity and imperfect information about the full land distribution—particularly when cadastral records are outdated or incomplete. Under such conditions, it is more plausible that authorities can identify landowners when they are few in number. This assumption is consistent with the idea that property taxes are easier to enforce when land is concentrated: land is immobile and visible, and large landowners tend to be politically and economically prominent, making them easier to monitor. Empirically, Klepper and Nagin (1989) find that perceptions of audit probability increase with the amount of tax at stake, and that tax authorities tend to focus enforcement efforts on large taxpayers. In our context, this suggests that enforcement is more credible when a small number of actors own a large share of taxable land.

2.1 Model Setup

Landowners and Land Holdings Consider a municipality m with L_m landowners. Each landowner i holds a plot of size l_i, such that:

$$\sum_{i=1}^{L_m} l_i = 1.$$

A vector $(l_1, \ldots, l_{L_m})$ fully describes the land distribution.

Fiscal Policy Each landowner faces a property tax at rate τ on their land value l_i. If a landowner complies, they pay τl_i. If they evade, they pay nothing up front but risk detection with probability $\pi(L_m)$, in which case they must pay $(\tau + p)l_i$. An evader still benefits from the public good provided by others' tax payments, though they do not contribute themselves.

We assume the probability that evasion is detected, $\pi(L_m)$, is higher when L_m is small (fewer landowners). For simplicity, we specify a linear function:

$$\pi(L_m) = 1 - L_m$$

The model could be extended to allow for a function with increasing enforcement costs, like $(1 - L_m)^\beta$.

Public Goods Given a set of compliers C, tax revenues are given by:

$$T_m = \sum_{i \in \mathrm{C}} \tau l_i$$

They finance a public good that raises each landowners' land value to $s(T_m)l_i$. The function $s(\cdot)$ is increasing in total tax revenue T_m, capturing the idea that public goods and services (roads, security of property rights, market infrastructure) increase land productivity. Examples of $s(\cdot)$ include:

$$s(T) = \theta T \quad \text{or} \quad s(T) = \theta T^\gamma$$

In this formulation, θ represents a fiscal multiplier that summarizes the ability of government expenditure to increase land values.

2.2 Threshold Rule and Solution

Payoff Comparison Let C be the set of compliers. If landowner i complies, they pay τl_i and enjoy:

$$U_i(\text{comply}) = s(T_m^+)l_i - \tau l_i,$$

where $T_m^+ = \sum_{j \in C \cup \{i\}} \tau l_j$. If they evade, they pay nothing immediately but risk penalty with probability $\pi(L_m)$. Their expected payoff is:

$$U_i(\text{evade}) = s(T_m^-)l_i - \pi(L_m)(\tau + p)l_i,$$

where $T_m^- = \sum_{j \in C \setminus \{i\}} \tau l_j$.

Indifference Condition and Threshold A threshold strategy emerges: there exists some α such that all landowners with $l_i \geq \alpha$ comply, while those with $l_i < \alpha$ evade. For the marginal landowner at $l_i = \alpha$:

$$(T_m^- + \tau\, l_i)l_i - \tau l_i = s(T_m^-)l_i - \pi(L_m)(\tau + p)l_i.$$

Canceling l_i and rearranging gives

$$s\big(T_m^- + \tau\,\alpha\big) - s\big(T_m^-\big) = \tau - \pi(L_m)\,(\tau + p) \tag{1}$$

This equation implicitly defines the cutoff α. When $s(\cdot)$ is linear, $s(T) = \theta\, T$, one can solve for α in closed form. Otherwise, a numerical approach may be required.

2.3 Comparative Statics

We now examine how tax revenues are affected by changes in land concentration L_m and the distribution of l_i. We use the simplest version of our model, where $s(T_m) = T_m$, $\pi(L_m) = 1 - L_m$, and $l_i \sim U(0,1)$. In this particular case, all the differences in land inequality come from the extensive margin (the number of landowners or L_m) as within owners land is distributed uniformly. For this case, we have a closed form solution for α and total revenue per capita:

$$\alpha = 1 - (1 - L_m)\left(1 + \frac{p}{\tau}\right)$$

$$T_m = \tau N_C \left[(1 - L_m)\left(1 + \frac{p}{\tau}\right)\right]$$

Where N_C defines the number of compliers C. Using this simplified version, we first evaluate the effect of changes in L_m on T_m, keeping the rest of the parameters constant.

Proposition 1 *Assuming $l_i \sim U(0,1)$, higher land concentration or a lower L_m increases tax revenues in municipality m. In particular, the marginal change in T_m is given by:*

$$\frac{\partial T_m}{\partial L_m} = -N_C(\tau + p)$$

Furthermore, to study how tax revenues are affected by changes in the distribution of l_i, we rely on simulations. We fix model parameters to Colombian tax policy during the second half of the 20th century ($\tau = 0.4\%$, $p = 0.2\%$)[3] and simulate land distributions with varying degrees of inequality (e.g., from equal shares to highly skewed). Specifically, we use chi-squared distributions with different degrees of freedom k to simulate more equal or more concentrated land ownership patterns. For these simulations we leave L_m fixed and only vary land distribution within landowners. This exercise is equivalent to "turning-off" the compliance mechanism, since all municipalities with the same number of landowners face identical probabilities of tax code enforcement. For each case, we numerically solve for the threshold α and compute total tax revenue T_m. Figure 1 presents the results of these simulations and summarizes the main prediction of our model.

Proposition 2 *More unequal land distributions, represented by chi-squared distributions with lower degrees of freedom, lead to higher tax revenues. Intuitively, when land is more concentrated, large owners have more incentive to comply because they benefit more from the public good (their absolute gains from improved infrastructure or security are larger).*

3 Testing the model with municipality-level data from Colombia (1923-1960)

We use our model to analyze empirically how differences in land inequality are related to differences in tax revenues. We use data from Colombian municipalities during the mid 20th century. This context has several features that fit our model well.

First, property tax rates and penalties were set at the national level and applied uniformly across municipalities. Law 20 of 1908 established a tax rate of two per thou-

[3] See Section 3.

sand pesos of assessed value (0.2%), which was raised to four pesos per thousand (0.4%) through subsequent reforms, and stayed at that level for most of the century. Law 73 of 1935 introduced additional penalty of 50% for non-compliance, effectively setting the penalty rate at 0.2%. These fixed parameters meant that municipal authorities and local landowners had no formal role in setting tax rates, making it reasonable to assume landowners were tax policy takers.

Still, elites may have influenced implementation through informal bargaining. Even if they could not change nominal rates, landowners could delay cadastral updates, lobby for under-assessment, or pressure tax authorities to weaken enforcement (Sánchez-Talanquer, 2020). Such practices were more feasible in areas where political power was concentrated. Acemoglu et al. (2007) show that in 19th-century Colombia, political offices were held by a narrow subset of the wealthy. This suggests that while some powerful landowners may have influenced implementation, most were effectively subject to the tax policy as set. Our model's assumption of exogenous policy fits this majority's experience.

Second, throughout the 20th century, Colombian municipalities were in charge of collecting local taxes and funding basic public services. The property tax, established by Law 20 of 1908, and the industry and commerce tax (main sales tax), created by Law 97 of 1913, became the primary sources of municipal revenue. Municipal governments used these funds to build and maintain infrastructure such as roads, aqueducts, and sanitation systems, as well as to finance local health, education, and justice services. In 1948, Decree 2473 mandated that one-quarter of all property tax revenue be transferred to the Institute of Municipal Development (Instituto de Fomento Municipal), a national entity responsible for executing large-scale public infrastructure projects (Ricciulli-Marín et al., 2024). These institutional arrangements tied municipal revenue to the provision of public goods likely to increase land values rather than redistribute income.

Third, while we have limited cadastral data across time, our analysis focuses on cross-municipality variation in land inequality, which is highly persistent in Colombia. The colonial origins of large haciendas and weak redistributive land policy throughout the 19th and 20th centuries contributed to a remarkably stable landholding structure (Bértola and Ocampo, 2021; Safford and Palacios, 2002; LeGrand, 1986). Most land redistribution came from distributing public lands rather than dividing large estates, leaving the top of the land distribution largely intact. Thus, even with incomplete data, measuring land inequality at a given point in time is informative about long-run variation across municipalities.

These institutional features make Colombia in the early to mid-20th century a compelling setting to apply our model. Tax parameters were fixed nationally, limiting local discretion; municipal governments used revenues primarily to provide public goods; and the distribution of land ownership remained persistently unequal across municipalities. This combination enables us to bring the model to the data and test its predictions using historically grounded cross-sectional variation in inequality and fiscal outcomes.

3.1 Data

We build a panel of fiscal statistics for 702 municipalities from 1923 to 1960. As the set of municipalities changes over time, we create a fixed set by connecting units across four Population Censuses (1938, 1951, 1964, 1973) to the 1912 Census units. Fiscal statistics include municipal government revenues and expenditures. For the later years in our sample, income and expenditure sources, as well as the total cadastral value of land and the number of registered real estate properties, are available. More detailed cadastral data is scarce in Colombia, making it difficult to estimate land inequality. Therefore, we measure land inequality using occupation data from the 1938 Population Census. For each municipality, we define inequality as the number of landowners as a share of agricultural workers. Inequality rises as this measure decreases. We are interested in the relationship between the level of taxation (taxes per capita) and land concentration.

Municipal Fiscal Statistics We digitized local public finance data throughout the 20th century from three main primary sources. The National Statistics Office (DANE) published fiscal statistics in the Yearly Statistical Reports (*Anuarios de Estadística*) from 1923 to 1936 and in the Fiscal Statistics Report (*Estadísticas Fiscales*) between 1957 and 1967. In between, the Office of the Comptroller General produced the Financial Reports of the Comptroller (*Informes Financieros del Contralor*) between 1940 and 1956.

We collected information on total revenue and expenditure for all years. When available, we also digitized the main sources of revenue (direct and indirect taxes, intergovernmental transfers, and non-tax income) and the main categories of local expenditure (governance, justice, health, education, public services, public investment, tax collection). For selected years (1923, 1928, 1932, 1935, and 1960), the reports include cadastral data: total value of land, and number of real estate properties registered in the cadastre.

Throughout the paper, we focus on three measures. First, tax revenue per capita. We also use tax revenue per hectare in robustness exercises. These revenues may come from

direct or indirect taxes. Second, the total expenditure on tax collection as a proportion of total revenue. The average cost of raising one peso serves as a measure of tax collection efficiency. Third, the long-term growth in the share of revenues devoted to infrastructure expenditures. Specifically, expenditures under the public services and public investment categories as a share of total expenditure.

Land Values For our simulations, we calibrate total land values for Colombian municipalities in 1960. We use the summary data from the fiscal statistics to obtain land value per hectare. However, this figure applies only to properties registered in the cadastre. We scale up the number of hectares in the cadastre by dividing by the share of agricultural land with formal title in the 1960 Census of Agriculture.

Land Distribution Beyond summary statistics from the fiscal reports, detailed cadastral data for Colombia is scarce. Detailed cadastral data would allow us to measure inequality using the Gini coefficient within landowners for each municipality. We need to measure inequality for two purposes: first, to simulate landowners' decisions based on their land values and aggregate those decisions at the municipality level. Second, to measure land inequality for use in cross-municipality exercises.

For municipalities in the department of Cundinamarca, we document the detailed land distribution in 1890. Specifically, we build individual landowner shares of total land value, a vector of $l_i = [1, \ldots, L_m]$ for each m. We do this using detailed cadastral data from Acemoglu et al. (2007). For our cross-sectional results, we also calculate the 1890 land Gini coefficient based on land values for each of the 94 municipalities.

We leverage detailed occupation data in the 1938 Census of Population to proxy for land inequality. For each municipality, we calculate the number of landowners as a share of agricultural workers. A high landowner share implies lower land concentration. For municipalities in Cundinamarca, the 1938 landowner share is negatively related to the 1890 land Gini coefficients (Figure A.1). Even though it is a coarse measure, the 1938 landowner share captures some of the cross-municipality variation in persistent inequality. While we aim to be precise when needed, we sometimes refer to "land inequality" to mean either the 1890 land Gini or the 1938 landowner share.

Benefits from Markets An important part of our argument relates to landowners' ability to benefit from markets. To explore this mechanism, we collect indirect information

on market participation from the first coffee farm census (*Colombia Cafetera*, 1928). Counties engaged in coffee cultivation relied heavily on several markets. They exported most of their output, hired seasonal labor, relied on credit due to a five-year lag before production, and imported some machinery. We explore how inequality relates to taxation in places that stood to benefit more from markets, defined as those above the 10th percentile of coffee trees per capita in the 1920s. These are the early adopters of this crop.

Population, Economic Activity, Historical Fiscal Capacity We interpolate total population figures from five Population Censuses (1912, 1928, 1938, 1951, and 1973) to measure tax revenues per capita more precisely each year. To measure differences in economic activity, we use the manufacturing and services share of total employment in 1912. From the 1948 Yearly Statistical Reports, we collect information on meat production, measured in number of cows per capita per year. We use this, together with our measure of coffee cultivation, to control for the agrarian economic structure. Finally, from the Panel CEDE (Acevedo and Bornacelly Olivella, 2014), we obtain identifiers for municipalities with high density of indigenous groups around 1550 and for the presence of *encomiendas* established by the Spanish Crown after 1530.

4 Empirical Results

We use data from Colombian municipalities to test our simple model of public goods using two approaches. First, we calibrate the model using Colombia's tax policy parameters and simulate tax revenues based on our derived compliance rule and landowner-level data from counties in Cundinamarca with cadastral records from 1890. The correlation between simulated and observed tax revenues at the municipality level is 0.94. Moreover, the observed correlation between land Gini coefficients and tax revenues per capita is positive: municipalities with higher land inequality collect more taxes. When using the 1938 landowner share instead of the Gini coefficient, the correlation is negative, but the interpretation remains the same: municipalities with higher land concentration (lower landowner share) tend to raise more tax revenue. These last two results are directly consistent with the two propositions derived from our theoretical framework in Section 2.3.

Second, we extend the analysis to the full sample to test the model's main implication: inequality has a direct positive effect on tax revenues when revenues are used to fund public goods that promote markets. Land concentration and tax revenues are positively

correlated across our full sample of Colombian municipalities. This relationship remains stable over time and holds when using revenue per hectare instead of revenue per capita.

There may be other explanations for this correlation. Since our model suggests a causal role for inequality in determining equilibrium tax levels, we aim to go beyond OLS results consistent with the model's predictions. Ideally, we would exploit variation in land inequality that does not affect tax revenue through other channels. In the absence of such exogenous variation, we directly investigate three potential sources of omitted variable bias: economic activity, agrarian structure, and historical fiscal capacity. We argue that none of these alternatives is sufficient to explain away the direct role of inequality in shaping tax outcomes.

4.1 Simulations

We calibrate the model to predict levels of taxation for municipalities m with different land distributions. We assume tax policy is constant across municipalities and follows the structure described in Section 2.3, with $\tau = 0.4\%$ and $p = 0.2\%$. Cadastral data from 1890 provides a sample of 94 municipalities, each with a vector of land distribution (l_i) and a count of landowners (L_m). We focus on the simplest version of the model, with the probability of enforcement linearly related to land concentration, linear costs of compliance, and a unitary fiscal multiplier.

For each municipality, we calculate α_m, the threshold of land value share above which landowners choose to pay taxes, using Equation 1. Given each landowner's land value and the threshold rule, we predict individual compliance decisions. We then aggregate compliant landowners' value shares and multiply them by the corrected 1960 land values (accounting for underreporting in the cadastre) and the property tax rate to generate a prediction for per capita tax revenue. The correlation between predicted and observed tax revenue is 0.94.

Figure 2 illustrates two results aligned with the model's key implication. Panel 2a shows that predicted tax revenues in 1960, based on 1890 land distributions, rise with inequality. This aligns closely with the observed data in Panel 2b. We replicate the calibration and simulation using 1923 tax policy and land values. Figure A.3 presents the model fit in this case, providing further validation to our model.

4.2 Cross-municipality evidence

Results from the full sample, using the 1938 landowner share as a measure of inequality, tell a similar story to the Cundinamarca sample. Places where land is distributed among more owners tend to collect lower revenues. Our (inverse) measure of land concentration, landowner share, is negatively correlated with tax revenues. Table 1, Columns (1) and (2) show the raw correlation and the within-department correlation between landowner share and (log) tax revenues per capita in 1960, respectively. The landowner share is standardized, so coefficients reflect the change in per capita taxes associated with a one standard deviation increase in landowner share. The raw correlation indicates a decline of 24% relative to the mean, while the within-department correlation indicates a decline of about 14%.

The negative correlation is relatively stable over time, despite major changes in tax policy, external shocks, political violence, and economic development between 1923 and 1960 that may have had differential effects for different levels of inequality (Figure A.4). For instance, Colombia implemented the first land reform, established universal male suffrage, and reformed the tax code between 1935 and 1936. However, the correlation between landowner share and tax revenues is not statistically different before 1935 than after. We do not see a difference in the correlation coefficients for years before the start of civil war (1943), in the middle of the war (1953), or 5 years after the National Front accord ended partisan warfare (1962).

While we are testing a causal claim that comes out of our model, the correlations in Figures 2b and Table 1 cannot be interpreted causally. There might be countless factors that are correlated with both land inequality and the local government's fiscal capacity, which would invalidate the causal interpretation of the correlations. Ideally, we would identify variation in inequality that affects tax revenue only through the distribution of land. However, this is challenging for two reasons.

First, tax revenues come out of equilibrium decisions by taxpayers and governments. Any factor correlated with the willingness to pay or the ability to raise taxes, would not be a valid instrument. Second, inequality in the distribution of land has been extremely persistent in Colombia. The correlation between our two measures of inequality, spaced out by 50 years, is around 0.6. Potential sources of variation could be either shocks and policies that change the distribution of land or deep-rooted factors that explain variation in persistent inequality. However, in the first case, we would also require two equivalent measures of inequality over time (at least). But even with a good measure of changes in

land inequality over time, most shocks (e.g., trade or natural disasters) and most policies that deal with land distribution will also affect landowners willingness to pay taxes directly. For instance, land reforms may generate quasi-exogenous variation in inequality but by reconsidering property rights they may also affect landowners' willingness to pay taxes.

Although we cannot fully resolve endogeneity, we assess whether three potential sources of omitted variable bias drive our results: economic activity, agrarian structure, and historical fiscal capacity. While this may not be a comprehensive analysis, we cover the main potential issues that could explain away our results. We think the data is consistent with a direct positive relationship between land inequality and the government's ability to raise taxes.

Addressing Potential Sources of Omitted Variable Bias

While it may be impossible to find the true causal estimate of land inequality on tax revenues, we do argue that inequality has a direct effect on tax collection. In our model the mechanism is the higher willingness to pay taxes of landowners in unequal municipalities when they stand to gain from government revenues via increases in land value. In this section, we examine alternative explanations for our findings.

Economic Activity, Economies of Scale Places with high land inequality may also be richer and more productive. Differences in the level of economic activity or the output per hectare may be driving the correlation between land inequality and tax revenues. For instance, if there are economies of scale in agriculture, the average land value of large farms may be higher in more unequal municipalities, leading to higher tax revenues.

We explore whether these explanations are consistent with the data in two ways. First, the correlation between inequality and tax revenue is robust to controlling for the 1912 manufacturing and services employment share and an indicator variable for department capitals (Column (3), Table 1), which are a direct measure of cross-sectional differences in economic development. We include these controls in all other specifications. The coefficient drops in magnitude, to about -11% of the average revenue per capita. Second, we divide tax revenues by source. Indirect taxes (mostly sales taxes) might respond more to differences in economic activity across municipalities. Columns (4) and (5) show that the correlation between direct tax revenue and inequality is roughly twice as large than the correlation between indirect taxes and land inequality (13.2% and 6.4% relative to the

average, respectively). The overall correlation between land inequality and tax revenues is mostly driven by direct and not indirect taxes.

Agrarian Structure The structure of the agricultural sector in each municipality may be an important omitted factor. If the "basket" of products a place produces is correlated with both the land distribution and the ability to raise taxes, there would be identification concerns. For instance, cattle ranching in Colombia is a land-intensive activity with economies of scale (Meisel, 2023), which leads to municipalities specializing in cattle to have very unequal land distributions. If producing cattle made it easier for the government to assess land values, for instance, there would be an omitted variable bias concern.

Results in Column (6) show that the correlation between inequality and tax revenues is robust to controlling for two relevant dimensions of the agrarian structure: coffee cultivation (measured as coffee trees per capita) and cattle ranching (measured as the number of heads of cattle slaughtered per person in 1948). Cattle production is in fact positively correlated with tax revenues. Controlling for these two measures of the agrarian structure does lead to a reduction in the correlation coefficient's magnitude to about 9% of the average revenue per capita for a change of one standard deviation in a municipality's landowner share.

Historical Fiscal Capacity It might be the case that historical fiscal capacity is driving the results. The Spanish Crown distributed rents from Conquest in the form of fiscal institutions, called *encomiendas*. Encomiendas, beyond distributing indigenous labor and tribute, laid the foundation for the Colonial and modern state. Faguet et al. (2024) document that places with encomiendas in 1550 are places with higher state capacity throughout time, with higher ability to raise taxes and provide public goods. As encomiendas were grants that depended on a relationship with the Crown, places with high prevalence of encomienda are also unequal places, where the initial distribution of resources to a limited number of conquistadores persisted over time.

The coefficient for landowner share is robust to controlling for the presence of indigenous groups in 1535 and the presence of encomiendas in 1550 (Column (7)). As emphasized by Faguet et al. (2024), places where the Spanish Crown established encomiendas raise more tax revenues per capita in 1960. The presence of indigenous groups, a coarse measure of population density around 1500, is not correlated with taxes per capita. Only the historical presence of fiscal institution is correlated with tax collection in the mid 20th

century, not the initial population density. But controlling for these differences does not lead to a change in the coefficient of interest.

Land extension Finally, it could be that places with high land concentration have also more extensive plots of land and more hectares of land in the aggregate, resulting in higher property tax revenues. To rule out this explanation, we reproduce Table 1 using taxes per hectare of land as main dependent variable. Table A.1 shows that our main results remain unchanged using this alternative definition of tax collection.

Coordination and Markets

So far, we have presented evidence that aligns with the model's main prediction. Land inequality is positively associated with tax revenues, even after accounting for potential sources of omitted variable bias. This section discusses empirical evidence that we interpret as validation for our argument. The model argues that land inequality facilitates coordination among landowners to pay taxes when the government uses revenue to finance public goods that increase land values. In the model, the threshold land value share over which landowners comply is lower for places with higher land inequality. Empirically, we discuss two results.

Gains from Markets We compare the correlation between land inequality and tax revenues for places specializing in coffee cultivation against other municipalities. The first part of the model's argument relies on the idea that public goods may enhance markets, increasing land values. Those gains will be concentrated in places that stand to gain a lot from the development of markets. In the Colombian setting, those are distinctively the places engaged in coffee cultivation. Between 1920 and 1970, coffee was the country's most important economic activity. Coffee exports were 2/3 of total exports and the main source of foreign exchange. The bulk of these exports was produced by small to medium farms in the Andean region, and most of the production was exported (Palacios, 2002).

Landowners in places specializing in coffee cultivation frequently interacted in several markets. Starting a coffee farm required considerable capital, since trees start producing coffee cherries after 5 years of being planted. A single, labor-intensive harvest season generated labor shortages where labor markets did not function properly. Most importantly, long distance trade was built around financial contracts for the exchange of goods, letters of exchange, and foreign currency. In the Colombian context, coffee growers stand

to gain a lot from public goods that enhance how markets operate (Deas, 1976).

Figure 3 compares the relationship between land inequality and tax revenues for two groups of municipalities. Diamonds represent municipalities beyond the 10th percentile in the 1925 coffee trees per capita distribution. Circles represent municipalities not engaged in coffee cultivation. The relationship is steeper for the first group, coffee growing municipalities. Figure 4 further shows that in municipalities with higher land concentration, public spending is disproportionately directed toward investments that raise land values, such as infrastructure and basic public services (e.g., water and sanitation). Taken together, these findings support our proposed mechanism: when public revenues increase land values, particularly in places that stand more to gain from markets, large landowners have stronger incentives to comply with taxation. While there may be other explanations for this result, we think it provides compelling evidence about the role of markets to understand when landowners can coordinate into paying taxes.

Tax collection efficiency Our model argues that the relationship between inequality and taxation comes from the higher willingness to pay of large landowners when public expenditure reverts back in higher land values. To explore this idea, Figure 5 presents the correlation between land inequality and tax collection efficiency, measured as the total expenditure in tax collection over the total revenue. On average, places with higher inequality (to the left on the x-axis) spend considerably less for each peso of revenue.

While not conclusive because we do not have a direct measure of landowner's willingness to pay, this result is compelling. It is hard to reconcile with the idea that the "rich" should be opposed to taxation in places where land is concentrated. However, it is consistent with our explanation. Landowners may be more reticent to pay taxes in unequal places in some contexts, for instance when tax revenues finance mainly redistributive public goods. But in others, like the one we study, inequality may precisely help to coordinate between landowners and the government.

5 Discussion of Results and Conclusion

"One of the basic arguments linking political centralization with economic reward rests upon the desire of people to benefit from the gains in welfare which can be reaped from markets. In essence, the argument is Ricardian. Rather than attempting to be self-sufficient, different portions of society, it is held, can do better by specializing in the production of those goods in which, by

dint of their resource endowments, they hold a comparative advantage, and by exchanging portion of those goods for those made by persons with different resource endowments. In the context of this argument, the contribution of the state is to provide order and peace and thereby to render production and exchange possible for members of society. The origins of the state, then, lie in the welfare gains that can be reaped through the promotion of markets. This argument, of course, has been advanced in fields other than African history. Indeed, its most notable development has been in the history of Europe. In a large variety of guises, the basic argument is repeatedly advanced: that the growth of the market leads to the emergence of centralized political forms."

Robert Bates (1987). Essays on the Political Economy of Rural Africa.

This paper is an attempt to examine Robert Bates' insight about the process of state formation and its relationship with development. Based on Adam Smith's ideas in Book V of the Wealth of Nations, Bates summarizes an argument that had a long standing tradition in explaining Sub Saharan Africa's pattern of development (**????**). Gains from centralization are proportional to the welfare gains from engaging in markets.

We translate an interpretation of this idea into the language of game theoretical models. Our simple model starts from the assumption that landowners take tax policy as given, and only decide whether to comply or evade taxes. We are abstracting from a relevant discussion about power and the ability of landowners to dispute tax obligations. One interpretation may be that by complying with tax obligations, landowners are tacitly supporting the state, or "centralized political forms" as Bates calls it.

We interpret "gains in welfare which can be reaped from markets" as improvements in the marginal returns to production inputs that get priced in land values. Importantly, if we changed the gains from government action as a pure public goods, we get a classic free-rider result, with a different prediction for the relationship between inequality and tax revenues.

On the government side, we model a simple capacity constraint where the probability of enforcement of the tax code is decreasing in the number of landowners. However, the results from our model hold if we leave this probability fixed. The main dynamic in the model is therefore how government action increases the value of assets.

We validate the model using historical data from 20th-century Colombia and find strong empirical support for its predictions: more unequal land distributions are associated with higher tax compliance and increased local revenues. While our empirical analysis is based on a specific country and period, the model's core mechanisms are relevant beyond this context. They illustrate how states in early stages of development can

be understood beyond redistributive conflicts that may be more salient in later stages of development.

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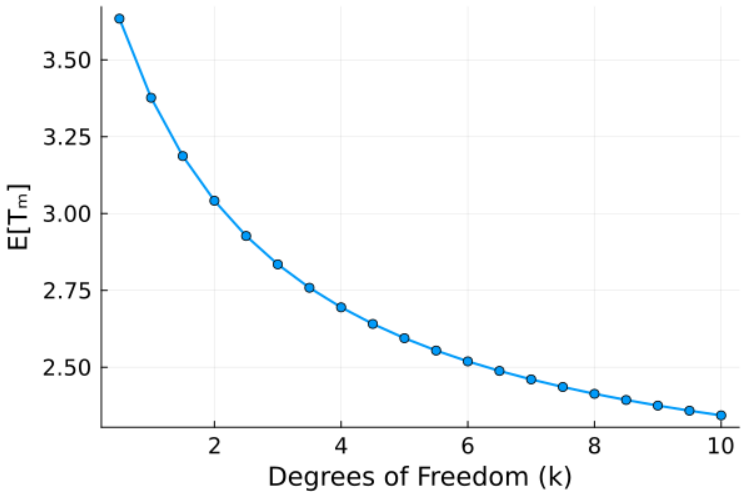
Exhibits

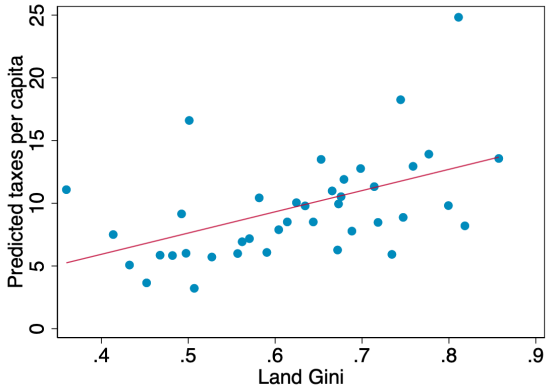
Figure 1: $Chi^2(k)$ Inequality and $E[T_m]$



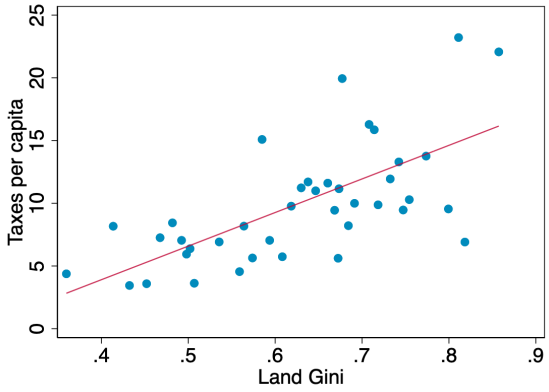
Note: This figure plots simulated levels of taxes per capita for different levels of land inequality, captured by the parameter in a chi-squared distribution. Lower values of k imply higher land inequality.

Figure 2: Tax Revenue and Inequality (Cundinamarca Sample 1960)

(a) Simulated Correlation



(b) Observed Correlation



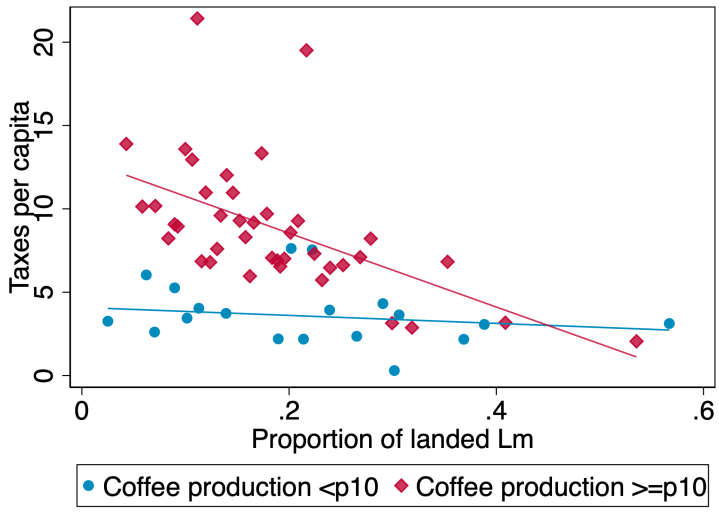
Note: Panel (a) plots the correlation between land gini in 1890 and predicted tax revenues per capita in 1960. Panel (b) replicates the same correlation but using observed tax revenues. Both figures are binscatters, where each dot represents the average level of taxation for bins of land inequality.

Table 1: Share of Landowners L_m and Taxation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent Variable: Tax revenue per capita						
Source:		All		Direct	Indirect	All	
Landowner share L_m (SD)	-1.789***	-1.088***	-0.864***	-0.739***	-0.125*	-0.678***	-0.669***
	(0.202)	(0.210)	(0.196)	(0.153)	(0.072)	(0.210)	(0.205)
Coffee trees per capita						-1.183	0.136
						(3.045)	(3.070)
Cattle production per capita						14.132***	14.274***
						(5.008)	(5.365)
Indigenous population, 1535 (=1)							0.445
							(0.554)
Encomienda, 1550 (=1)							1.110**
							(0.469)
Observations	702	702	702	702	702	702	702
R-squared	0.063	0.261	0.351	0.354	0.284	0.361	0.367
Department FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Employment Share Controls	No	No	Yes	Yes	Yes	Yes	Yes
Capital Dummy	No	No	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	7.519	7.519	7.519	5.574	1.945	7.519	7.519

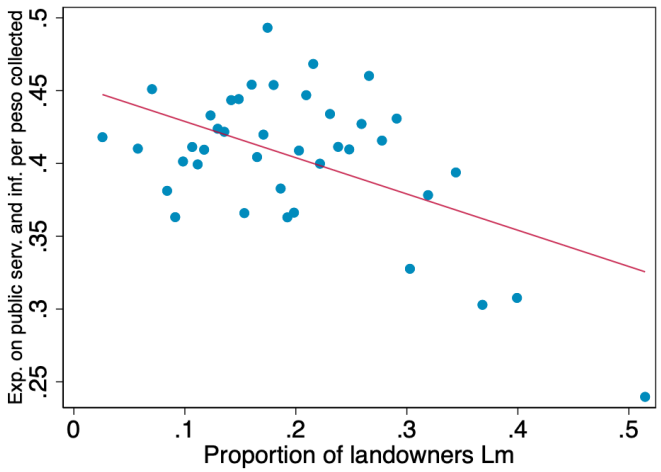
Note: This table presents the coefficients of a regression of taxes per capita (1960) on the share of landowners L_m (1938) for 702 municipalities. Proportion of landowners is standardized, so coefficients can be interpreted as the change in taxes moving one standard deviation. Dependent variable is the level of pesos per capita raised in taxes in 1960. All columns, except for (4) and (5), use total tax revenues. Columns (4) and (5) use direct and indirect taxes per capita as dependent variable. Employment controls are the 1912 manufacturing and services employment shares. Robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure 3: Taxes and land concentration by coffee production



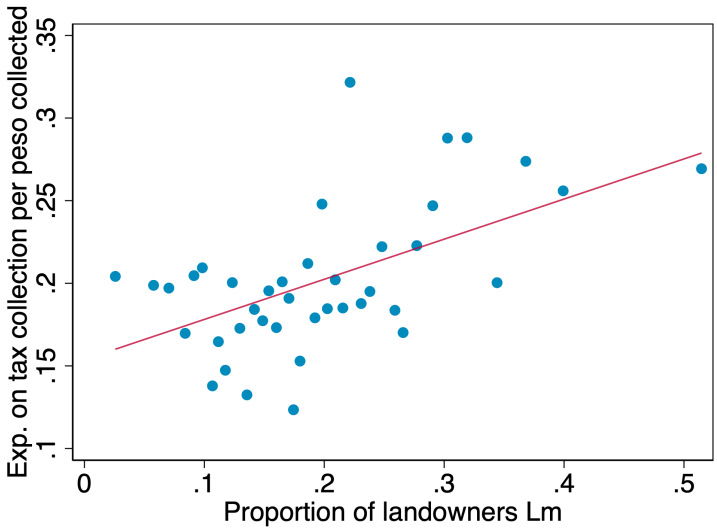
Note: the figure shows a bin-scatter that illustrates the correlation between 1938 landowner share (landowners as proportion of agricultural workers) and 1960 tax revenues per capita for the full sample, splitting municipalities in two groups: places specializing in coffee cultivation (over the 10th percentile, measured as coffee trees per person in 1925) and the rest.

Figure 4: Expenditure on public services and infrastructure per peso collected and land concentration



Note: the figure shows a bin-scatter that illustrates the correlation between 1938 landowner share (landowners as proportion of agricultural workers) and 1960 expenditures on public services and infrastructure per peso collected.

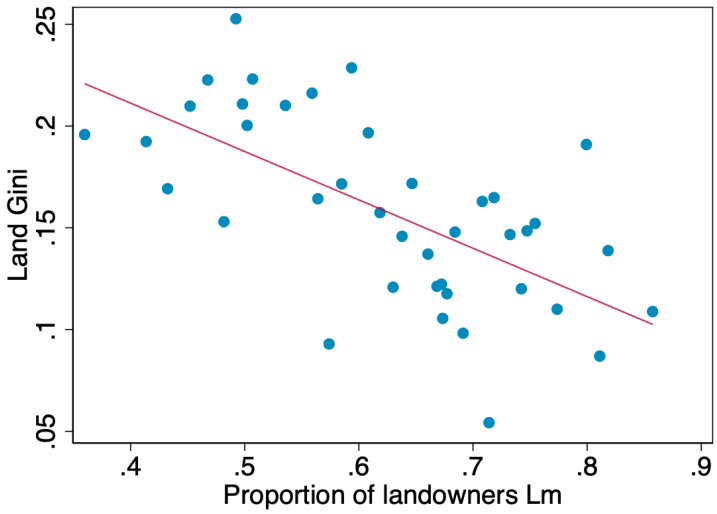
Figure 5: Expenditure per peso of tax revenue and land concentration



Note: the figure shows a bin-scatter that illustrates the correlation between 1938 landowner share (landowners as proportion of agricultural workers) and 1960 tax efficiency for the full sample. Tax efficiency is defined as total expenditure in tax collection over total revenue.

Appendix A Supporting Exhibits

Figure A.1: Share of Landowners Lm and Land Gini Cundinamarca 1890



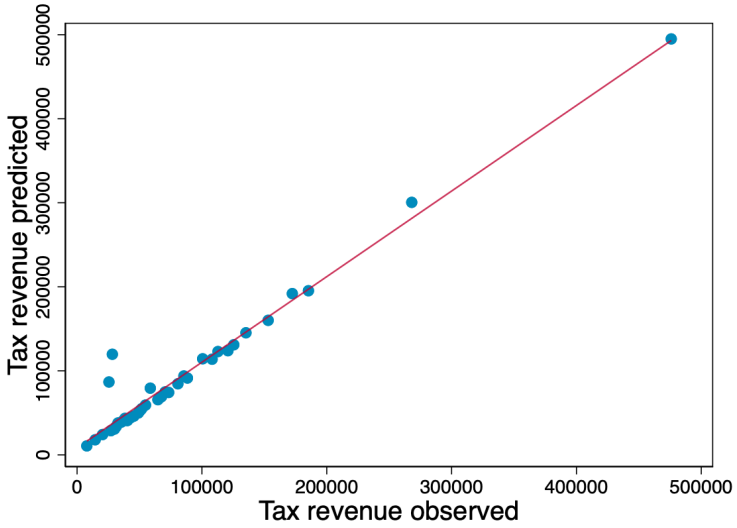
Note: This figure shows a binscatter plot comparing the 1938 landowner share with 1890 land gini for each municipality m (L_m) in the Cundinamarca sample. These measures are computed from the fiscal statistics of 1960 and the Cundinamarca Cadastre of 1890.

Table A.1: Share of Landowners L_m and Taxation per Hectare

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent Variable: Tax revenue per Hectare						
Source:	All			Direct	Indirect	All	
Landowner share L_m (SD)	-1.872***	-1.657**	-1.234**	-0.876**	-0.357*	-1.221*	-1.229*
	(0.565)	(0.649)	(0.612)	(0.417)	(0.205)	(0.676)	(0.687)
Coffee trees per capita						-0.008*	-0.006
						(0.004)	(0.004)
Cattle production per capita						4.996	8.494
						(7.028)	(6.922)
Indigenous population, 1535 (=1)							-0.674
							(1.139)
Encomienda, 1550 (=1)							3.223***
							(0.856)
Observations	676	676	676	676	676	676	676
R-squared	0.019	0.090	0.200	0.201	0.188	0.201	0.210
Department FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Employment Share Controls	No	No	Yes	Yes	Yes	Yes	Yes
Capital Dummy	No	No	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	7.372	7.372	7.372	5.496	1.876	7.372	7.372

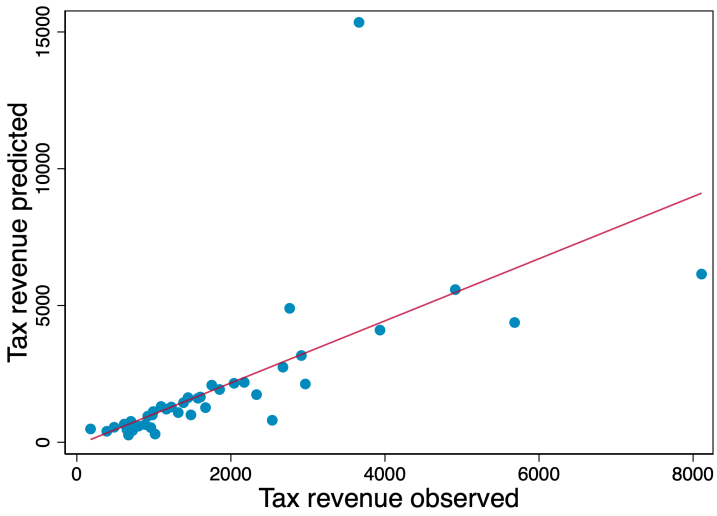
Note: This table presents the coefficients of a regression of taxes per hectare (1960) on the share of landowners L_m (1938) for 676 municipalities that have information of hectares of land from the agricultural census. Proportion of landowners is standardized, so coefficients can be interpreted as the change in taxes moving one standard deviation. Dependent variable is the level of pesos per hectare of land raised in taxes in 1960. All columns, except for (4) and (5), use total tax revenues. Columns (4) and (5) use direct and indirect taxes per hectare of land as dependent variable. Employment controls are the 1912 manufacturing and services employment shares. Robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure A.2: Predicted and observed tax revenue, Cundinamarca Sample 1960



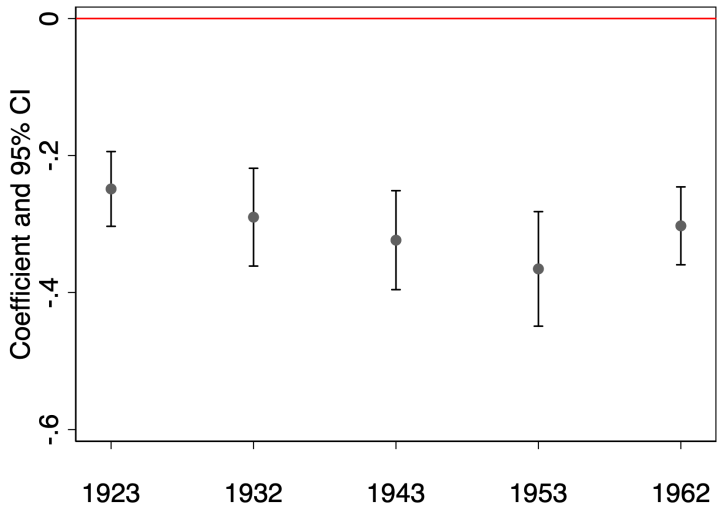
Note: This figure plots municipal tax revenues predicted using the model, fiscal policy parameters, and detailed land distributions for each municipality in the Cundinamarca sample, against observed revenues, reported in the fiscal data.

Figure A.3: Predicted and observed tax revenue, Cundinamarca Sample 1923



Note: This figure plots municipal tax revenues predicted using the model, fiscal policy parameters, and detailed land distributions for each municipality in the Cundinamarca sample, against observed revenues, reported in the fiscal data.

Figure A.4: Tax revenue and proportion of landowners Lm over time



Note: This figure plots correlation coefficients between land inequality (landowner share) and tax revenues for selected years in our sample.