The Politics of Property Taxation: Fiscal Infrastructure and Electoral Incentives in Brazil

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Property titling enables tax collection and encourages private investment. Yet, governments across the developing world often fail to invest in land registration systems, such as cadastral maps, that record land ownership and values. In this paper, we describe and estimate the fiscal benefits and political costs that elected officials face when deciding whether to invest in this critical fiscal infrastructure. Focusing on Brazilian municipalities, we find that property tax revenue increases by over 10% following cadastre updates. Officials covet this revenue, but they simultaneously seek to secure their reelection, and investing in the cadastre can generate political costs by angering tax-averse voters or undermining clientelism. When these political costs are large, officials who do not face reelection pressures have greater incentives to invest in the cadastre. Using a close-election regression discontinuity, we find that term-limited incumbents are around 15 percentage points more likely to update the cadastre.

Taxation is a basic government function, enabling states to maintain their monopoly on violence, fund legal institutions, and pay for policies (e.g., Besley and Persson 2011; Hoffman 2015; Tilly 1985). Beyond the simplest poll tax, taxation requires information about who owns taxable assets and in what amounts. To compile this register, governments must build and maintain the fiscal infrastructure to log owners and the value of their properties.

In the case of property taxation, the cadastral map is the cornerstone of this infrastructure. The cadastre stores information about the boundaries of a plot, who owns it, and its valuation. According to Scott (1999, 36), the cadastral map reflects states' efforts to codify property rights and thus enable the taxation of land. "Since the driving logic behind the maps is to create a manageable and reliable format for taxation," he explains, "the map is associated with a property register in which each specified (usually numbered) lot on the maps is linked to an owner who is responsible for paying its taxes." These maps make property tax collection feasible at scale: lacking any local knowledge about property claims, a collector knows whom to tax and in what amount.

As with other types of critical infrastructure, a functional land registry is often taken for granted. Yet, the development of a cadastral map has long been recognized as a transformative political act; by improving the state's ability to assess taxable wealth, technologies like the cadastre helped support the rise of the fiscal state in early modern Europe (e.g., Slantchev and Kravitz 2019). During this period's tax struggles, rulers and ruled were well aware that the controversial cadastral map, because of the information it conveyed, could be used to the advantage of some and the detriment of others (Kain and Baigent 1992). Beyond enabling property taxation, the cadastral map codifies property rights over land, with direct implications for investment economic development.[1]

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1. The "legibility" that the cadastral map provides may also broaden the tax base by encouraging external investment, as in Christensen, Hartman, and Samii (2021).

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We focus in this article on contemporary efforts to sustain working cadastres. Using Brazilian municipalities as a laboratory, we enumerate and estimate the fiscal benefits and political costs that local elected officials face when deciding whether to invest in this fiscal infrastructure.

Past work argues that leaders invest in the cadastre when the expected increase in tax receipts exceeds the surveying costs (Kain and Baigent 1992). In Brazil, cadastral overhauls include reregistering properties with faulty records, updating property boundaries and ownership information, and adjusting assessed values. These investments generate more accurate and current records that support property tax collection. They also reduce the cost to titling informal properties, which, in turn, can increase the tax base. Using a difference-in-differences design that compares changes in property tax revenue in municipalities that update their cadastre, relative to the change in municipalities that do not, we find a sizable, immediate, and persistent fiscal return: property tax revenues rise by over 10%, roughly a quarter of a within-municipality standard deviation. In the subset of municipalities with available data, we also show that the proportion of registered properties increases by about 4 percentage points following cadastre updates. This represents a full (within-municipality) standard deviation increase in registration rates.

Despite these fiscal benefits, uniform investment in local cadastres has not followed: between 2010 and 2015, just over half of Brazil's municipalities met current technical standards by updating their cadastres. Moreover, a simple fiscal cost-benefit explanation cannot account for existing cadastre deficiencies in Brazil. We find that reductions in the cost of investing in the cadastre—measured through access to the Programa de Modernização da Administração Tributária (PMAT), a program of subsidized loans intended specifically to modernize municipal tax administrations, including cadastre updates—do not increase the probability of cadastral overhauls.

We argue, instead, that political costs impede investment. Incumbents in modern democracies face electoral incentives; they may want to enhance local tax efforts, but they simultaneously want to bolster their reelection prospects. Investing in the cadastre could work against the latter goal in two ways: first, voters, including the wealthy, may balk at higher property taxes; second, in a clientelist system, politicians may secure political support from unregistered dwellers (e.g., squatters) by promising protection from eviction or access to public services. By reducing tenure informality, a comprehensive cadastral map could eliminate an important tactic used to mobilize voters.

If electoral costs weigh heavily on incumbents, then we would expect to see greater investment in the cadastre when officials do not face reelection contests. Using a close-election regression discontinuity (RD), we find exactly that: term-limited incumbents are around 15 percentage points more likely to update the cadastre, an increase of almost 40% over the mean in control municipalities. These results are robust to covariate adjustment, as well as different bandwidths and orders of the local polynomial regressions employed to estimate the term limit effect at the discontinuity.

We look for evidence that election-seeking incumbents defer investments because they fear a tax revolt or wish to maintain a larger block of voters susceptible to clientelistic appeals. If an incumbent's primary goal is to increase taxes without triggering voter backlash, including from wealthy property owners, then we would expect a concerted effort to raise tax rates when freed from reelection concerns (e.g., Alt, Bueno de Mesquita, and Rose 2011; Besley and Case 1995; Sances 2016). Yet, beyond updating the cadastre, term-limited incumbents are not more likely to reform local property tax laws (which set tax rates) or revise the formulas that assign the fiscal value of properties. Instead, we find that our estimated term limit effect on cadastral investment is larger in municipalities with high inequality and poverty—conditions that have been identified as conducive to clientelism. This suggests that reelection-seeking officials fear weakening local political machines, which thrive in informal settlements where households require political intermediation to secure public services and are vulnerable to eviction threats.

Past research has highlighted other political determinants of fiscal capacity development. Yet, this primarily historical work has tended to focus on unconstrained autocrats (often monarchs), whose incentives to invest in fiscal capacity were shaped by geographic constraints (e.g., Mayshar, Moav, and Neeman 2017), interstate war (e.g., Queralt 2019; Tilly 1985), intraelite conflict (e.g., Beramendi, Dincecco, and Rogers 2019; Garfias 2018), and institutions of limited government (e.g., Cox 2016; Dincecco 2011; Garfias 2019). More contemporary work, specific to cadastral investments and property taxation, has focused on the role of internal conflict, as well as on the local capture of tax institutions (e.g., Ch et al. 2018; Hollenbach and Silva 2019). We contribute to this body of research by exploring the role of electoral incentives, as well as by presenting quasi-experimental evidence of their relevance in shaping incumbents' decisions to invest in fiscal capacity.

The political costs we identify also help explain a larger puzzle: given the social and individual benefits to secure property rights, why do so many households remain untitled? Our research helps illuminate problems on the supply side. Electoral politics may discourage officials from investing in the land registry and, in so doing, providing the infrastructure required for delineating ownership. This can

contribute to high registration or reregistration costs, which has led to deregularization in some contexts (e.g., Galiani and Schargrodsky 2016; Gutierrez and Molina 2016).[2]

This article also adds to existing empirical work that characterizes the effects of political term limits, particularly in Brazil. In the absence of electoral incentives, mayors find it more tempting to engage in rent-seeking activities such as corruption (Ferraz and Finan 2011). Moreover, when weak parties cannot constrain their members' behavior, term limits may engender a systematic incumbency disadvantage by damaging party brands (Klašnja and Titiunik 2017). This work suggests that accountability is not well served by political term limits. Our findings do not speak to how tax revenues are spent and thus do not challenge this conclusion. We do, however, show that term limits can generate the right incentives to invest in essential fiscal infrastructure.

THE COSTS OF PROPERTY TAXATION

Government officials have an ostensible interest in registering property. Measuring, codifying, and simplifying land tenure stand as central administrative objectives of modern governments (Scott 1999). The cadastral map enables this simplification and provides a manageable and reliable format for taxation. In this sense, the cadastre is a key part of the infrastructure that enhances states' capacity to mobilize revenue, similar to civil registries, statistical offices, and censuses (e.g., Brambor et al. 2020; Lee and Zhang 2017).

The anticipated fiscal benefits of the cadastral map have motivated domestic and donor-led efforts to institute and update land-registration systems. Payne, Durand-Lasserve, and Rakodi (2009, 48–49) note that the "the integration of informal settlements into the formal urban land and housing market is widely held to increase tax revenues to local governments." They cite the cases of Thailand and Ukraine, where titling programs generated large increases in tax revenues.[3] Updates to the cadastre have also been shown to generate a substantial increase in property tax proceeds in Colombia (Martínez 2017; Sánchez Torres and Pachón 2013).

Government investments in the cadastre and land registration systems can increase tax receipts through multiple channels. First, they can improve the capacity of the government to crack down on tax evasion by detecting additional irregular construction on already registered parcels (e.g., Casaburi and Troiano 2015). Second, if investments in the cadastre lower households' land titling costs, the number of formalized properties potentially assessed and taxed can increase. Finally, if a (well-functioning) cadastre increases tenure security or access to credit, it can encourage investments that ultimately increase the value of properties (e.g., Alston, Libecap, and Schneider 1996; Field 2005; Galiani and Schargrodsky 2010). For this to occur, the cadastre must be kept up-to-date in order to reassess properties after households make any investments or market prices change. These channels are not mutually exclusive: investments in land registration could simultaneously affect both the extensive and intensive margins of property taxation, affecting how many properties are registered and the taxes collected on those properties.

Across Brazilian municipalities and cross-nationally, there is wide variation in how much governments invest in their land administrations. Despite a large number of unregistered households—as many as three-quarters of land parcels globally and the housing of half of the Brazilian population (Arsenault 2017; United Nations Task Team on Habitat III 2015, 3)—many governments do not facilitate titling. The fiscal upside that Scott identifies, and that we document for the Brazilian case below, must then sometimes be offset by the administrative or political costs associated with rationalizing land registration.

The administrative costs of updating the cadastre are substantial and up-front. Costs can include surveying, the adjudication of boundary disputes, new information technology infrastructure, and specially trained staff. These investments are financially burdensome for many local governments (e.g., Bahl and Bird 2008; Carvalho 2017). In interviews we conducted with municipal governments across Brazil, these outlays were cited as one reason for forgoing the establishment or maintenance of the cadastre. Even if tax receipts increase in response to public investments, they may do so slowly; the link, for example, between land registration, property investment, and increased tax receipts can operate over years. Elected officials may worry that they will be out of office before their cadastral investments pay off in the form of substantially higher tax receipts. This suggests that incumbents with longer time horizons should be more inclined to invest in their local cadastres. In our context—and assuming the political consequences of cadastre updates are unimportant—first-term mayors should be most likely expend resources on the cadastre, as they can expect to realize the benefits over their remaining years in office.

2. Recent findings suggest that the demand for titling may be more muted than suggested by earlier research (De Soto 2000). Squatters may not fear eviction, and titling does not seem to ease credit constraints (Galiani and Schargrodsky 2010, 2011), especially in urban settings. As such, despite the documented effects of titling, unregistered households may not anticipate outsized benefits to formalizing their properties.

3. D'Arcy and Nistotskaya (2018) show that European states with a longer history of administering a cadastre have higher tax-to-GDP ratios today.

Elected officials may, however, be concerned about the political ramifications of establishing or maintaining the cadastre. Voters, especially wealthy property owners, reliably resent the regular reassessment of their property values if this implies a firm enforcement of tax obligations—property taxes are, after all, especially salient (e.g., Bordignon, Grembi, and Piazza 2017; Cabral and Hoxby 2012). Moreover, in settings with low initial fiscal capacity, like Brazil, voters may expect little benefit from marginal increases in taxation, which may not be enough to fund public goods (Gottlieb and Hollenbach 2018). Fearing punishment at the polls, reelection-seeking incumbents may trade off increased tax receipts for their political survival (however, see Casaburi and Troiano 2015).

More cynically, incumbents may exploit informal tenure to mobilize voters (e.g., Boone 2009; Collier 1974). In a clientelistic system, incumbents can trade protection for electoral support—for example, promising squatters relief from harassment or eviction threats in return for votes. Formalizing these squatters' property rights eliminates the need for any such exchange. Larreguy, Marshall, and Trucco (2015, 4) make a similar argument in Mexico, observing that "political brokers and municipal government officials often offer squatters protection against eviction and the basic infrastructure that informal communal settlements lack in exchange for political support for the municipal incumbent party. . . . Consequently, the establishment of land property rights has the potential to substantially diminish the dependency of squatters upon incumbent political parties, particularly at the municipal level, and thus break down clientelistic ties." Relatedly, Holland (2016), while not focusing specifically on clientelism, documents how mayors control eviction efforts, including refusing to sign eviction orders or stalling police action in Bogotá and Lima. She emphasizes the political incentives driving these decisions, especially when they affect poor squatters.

The risk of eviction is not the only source of vulnerability for squatters. In cities across the developing world, irregular settlements face challenges—including legal barriers to securing public services, a situation that generates additional opportunities for clientelism. Well-documented examples include irregular settlements in India (e.g., Auerbach 2016; Jha, Rao, and Woolcock 2007), Argentina (e.g., Auyero 2001), Ecuador (e.g., Burgwald 1995), Peru (e.g., Collier 1974; Stokes 1991), Mexico (e.g., Cornelius 1975; Lomnitz 1978; Varley 1994) and Brazil (e.g., Gay 1990, 1994; Perlman 1976).

Incumbents up for reelection may not want to reduce households' costs to registering their properties if informality provides a lever for pushing these households to the polls. In our context, these political considerations weigh most heavily on first-term mayors, who are still eligible for reelection. If these are paramount in incumbents' decision-making, then our prediction is reversed: freed from reelection concerns, second-term mayors should be more inclined to invest in the cadastre.[4]

FORMALIZING THE INCUMBENT'S PROBLEM

We offer a simple formalization to illustrate our argument. An official is elected and can serve up to two terms, provided she wins reelection. Absent any investment, the official can collect $\tau \geq 0$ in property taxes in each term. She values this revenue, which enables the implementation of her preferred policies or can be a source of rents.[5]

The official can pay a one-time investment cost $k \geq 0$ to update the cadastre and thereby increase tax receipts by $e \geq 0$ in every current and subsequent term. We denote this decision $i \in \{0, 1\}$. The downside of this investment is that it reduces the official's reelection probability: $\phi(i) \in (0, 1)$ and $\phi(i = 1) \leq \phi(i = 0)$.[6] That is, updating the cadastre reduces the official's probability of staying in office for a second term.

In the official's second and final term, relieved from any reelection concerns, she chooses to invest if $e \geq k$. This *direct profitability condition* allows for the possibility that administrative costs, k, are simply too high relative to the fiscal benefits of a cadastral overhaul—including instances in which updates bring sizable fiscal benefits that nonetheless are not realized fast enough to offset the up-front investment cost.

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4. In a related argument, Fergusson, Larreguy, and Riaño (2018) describe how entrenched incumbent parties with a comparative advantage in clientelism may have an incentive to dismantle existing capacity to provide public services when faced with intense electoral competition. Beyond the electoral incentives, elite capture remains prevalent in young electoral democracies and stands as a complementary explanation for the observed deficiencies in their fiscal infrastructure (e.g., Acemoglu, Vindigni, and Ticchi 2011; Sánchez-Talanquer 2020). For the case of Brazil, Hollenbach and Silva (2019) show that municipalities with high levels of inequality—where the wealthy have the strongest incentives to capture local administrations—collect less property tax and are less likely to undertake fiscal capacity–enhancing investments.

5. We show below that cadastre updates not only substantially increase property tax revenues, but also lead to greater municipal spending on public works projects (see table B.4; tables A.1, A.2, B.1–B.11, C.1–C.3 are available online). This additional spending on public works projects could benefit incumbents in several ways by realizing their policy priorities or providing vehicles for corruption. Our argument does not require that mayors are benevolent public goods providers; to the contrary, incumbents' investments in fiscal capacity could also be motivated by rent-seeking. We lack the data to empirically assess whether mayors misappropriate new property tax revenues; the well-studied randomized audits of Brazilian municipalities do not track locally generated revenue.

6. This captures two political costs described earlier. First, updating the cadastre reduces the cost of titling for informal households, which in turn weakens political machines that thrive in informal settlements; second, the increased property taxes generate an electoral backlash from property owners, including the wealthy.

Let us assume that the direct profitability condition is met—a claim that we corroborate empirically below. Of course, the official could collect even more tax receipts by making the cadastral investment in her first term. However, she will want to pay the electoral penalty for doing so if and only if

$$(\tau + e - k) + \phi(i = 1)(\tau + e) \geq \tau + \phi(i = 0)(\tau + e - k)$$

$$\frac{e - k}{\tau + e} \geq \underbrace{\phi(i = 0) - \phi(i = 1)}_{\text{Electoral Penalty}}.$$

This *political profitability condition* is more likely to be satisfied when the electoral penalty is small or when the fiscal benefits of the update (e) are larger.

This result is only true if cadastre updates generate an electoral penalty.[7] Consider the possibility that this does not happen: $\phi(i = 0) = \phi(i = 1) = \phi$. When this is the case, the right side of the political profitability condition is zero, and the condition is always satisfied when the direct profitability condition is met.

This simple model generates clear predictions about which incumbents should invest in the cadastre. If administrative costs are overwhelming, then the direct profitability condition is not met, and no incumbent invests in updating the cadastre. When this is not the case, whether first- or second-term incumbents are more likely to invest depends on the magnitude of the electoral penalty. If the electoral penalty is small, then first-term incumbents should be most likely to update the cadastre, as they could enjoy the fiscal benefits over multiple terms. Where the electoral penalty is consequential, we expect greater investment among term-limited officials, who will not face voters again at the polls. To evaluate the role of electoral costs in the decision to invest in the cadastre, we next examine the case of Brazilian municipalities.

LAND ADMINISTRATION AND LOCAL POLITICS IN BRAZIL

Land administration and taxation

Cadastres store data on land parcels: what the boundaries of the plot are, who owns it, how it is zoned, what its fiscal valuation is. Well-functioning cadastres facilitate property registration and provide governments with a solid fiscal foundation. Yet, they are of uneven, often deficient quality in Brazil and more broadly in Latin America (De Cesare 2012).

Despite the formal separation between the cadastre (Cadastro Imobiliario) and the property registry (Cartorio de Registro de Imoveis) in Brazil, updated cadastres provide a formal and reliable record of occupation, which facilitates the registration process. In our interviews, local officials report that a current cadastre can be used to determine whether squatters have been peacefully inhabiting a plot for five years—a requirement for acquiring a formal title. Absent this information, a lengthy and expensive judicial process is required to prove that a plot has no prior owner. Investments in the cadastre can, thus, shave several years and considerable costs off of registering new properties.[8] This is especially relevant for Brazil, where land registration continues to be a major challenge: Carvalho (2006) estimates that only 60% of urban parcels were registered by 2004, and more recent figures from the Ministry of Cities estimate that half of Brazilian households lack full property rights over their dwellings.

Throughout Latin America, cadastres were originally devised to levy property taxes. In Brazil, this tax, the Imposto sobre a Propriedade Predial e Territorial Urbana (IPTU), is administered by municipal governments and based on the fiscal valuation of properties. Cadastres enable governments to collect the IPTU by keeping the official assessments of property values, tax payers, and tax liabilities (De Cesare 2012; Pinto Domingos 2011). Below, we empirically assess the role of cadastre updates on IPTU revenue by compiling comprehensive annual data on local tax revenue in 2015 constant reals from Finanças do Brasil (Secretaria do Tesouro Nacional 2018b), for 2004–12 and from the Sistema de Informações Contábeis e Fiscais do Setor Público Brasileiro (Secretaria do Tesouro Nacional 2018a), for 2013–15.

Property taxes are the second-largest source of local taxes, accounting for roughly a quarter of local tax receipts.[9] There is a widespread recognition that property taxes could play an even larger role in local public finances (e.g., Carvalho2017; De Cesare 2012; Pinto Domingos 2011). These types of taxes have several attractive qualities. They are more likely to be spent in public goods rather than in private rents (e.g., Gadenne 2017;

7. Cadastre updates increase municipal spending on public works projects (see table B.4). Such expenditure could impress and benefit voters, diminishing any electoral penalty. We do not, however, find evidence that these incumbents formally repurpose increased property tax revenues for their reelection campaigns: table A.2 shows no relationship between deciding to update the cadastre prior to 2012 and formal campaign expenditures.

8. The use of new technologies in maintaining the cadastre—including topographical, remote sensing, and photogrammetric surveys—can also help reduce the direct costs of registration for local governments by providing many of the required inputs for land-titling drives (Erba 2007).

9. Municipal government revenue in Brazil comes mostly from federal and state transfers, which account for about 70% of local budgets (68% in 2014). The remaining income comes from fees (11%) and locally generated tax revenue (21%). A local services tax, the Imposto sobre Serviços de Qualquer Natureza, provides 48% of locally generated tax revenue (Ministério da Fazenda do Brasil 2014; Carvalho 2017).

Martínez 2017).[10] Property taxes also provide a stable and predictable source of revenue. Finally, among different types of taxes, these generate the least-negative effect on economic growth (Organization for Economic Cooperation and Development 2010). When households can choose where to relocate among many jurisdictions, property taxes are equivalent to user fees (e.g., Glaeser 1996; Oates 1969).

In our empirical analysis, we focus on cadastre updates, given the importance of these investments for land registration and property tax collection.[11] We use data from the Pesquisa de Informações Básicas Municipais 2015, which reports the last year that each municipality updated its cadastre in its entirety. The overhaul includes reinspecting properties to identify physical and ownership changes and ultimately reassessing their cadastral or fiscal value. Reregistration of properties with faulty records is also common. (We identify cadastre updates separately from reforms to the property tax rates and revisions to the formulas used to determine fiscal land values, which need not occur simultaneously.) Cadastral updates entail high upfront costs: highly skilled staff, aerial imagery, and tax mapping, in addition to extensive fieldwork and organized record keeping (Carvalho 2017). International organizations recommend that cadastres be updated every four years, and no longer than every six years (IAAO 2013; Pinto Domingos 2011); yet, as table 1 shows, only roughly half of Brazil's municipalities follow these guidelines.

This low level of investment does not result from legal constraints on mayors. Mayors (*prefeitos*) in Brazil play a decisive role in local land administration and property taxation. There are a number of important measures that mayors can implement by executive decree without the approval of the city council (Câmara de Vereadores). One of these measures is the cadastre update, which includes reassessing properties as well as rebasing land values using the national inflation rate. Other policies that do require the ratification of the city council include major reforms to the local property tax law, the modification of tax rates, or the revision of the assessment formulas in ways that effectively increase fiscal values above the inflation rate.

Mayoral politics

Since 1996, Brazilian mayors (*prefeitos*) are elected for four-year periods by plurality and are eligible for reelection once.[12] By and large, mayoral positions do not serve as a launching pad for higher offices: from 1996 to 2008, only 1.6% of mayors moved to a state or federal office, and 96.1% either won reelection (38.1%) or left electoral politics altogether (58%; Magalhães and Hirvonen 2015, 16).[13]

Mayors and city councilors engage in vote buying across Brazil, where clientelism has deep historic roots and remains widespread (Gingerich 2014; Hagopian 1996; Roniger 1987; Speck 2003). Under anti-vote-buying legislation, for instance, 667 politicians were removed from local office from 2000 to 2008 (Nichter 2011). In a nationally representative survey, 28% of respondents reported witnessing vote buying during the 2014 electoral cycle.[14] Conditions for clientelistic exchanges are particularly prevalent in irregular settlements, where tenure insecurity can be exploited for political gain. In these settlements, public services and safety are deficient, creating opportunities for political entrepreneurs who trade handouts and protection for support (Gay 1990; 1994; Nichter and Peress 2016). Fernandes (2006, 155) summarizes the precarious situation of untitled households in Brazil: "The residents remain politically vulnerable and become regular pawns in political games involving service provision, the implementation of infrastructure and land titling, thus reinforcing clientelist relations." In a more recent report, Fernandes (2011, 36) describes efforts to regularize informal settlements in Brazil as "titles for votes" schemes. This characterization is reflected in interviews conducted by Coates and Garmany (2017, 50) in irregular settlements: "It's a case of 'I'll help you if you can get me a vote, your family's votes, understand? Or I will not help you legalize your house"' (see also Perlman 2010 on how clientelism exploits and perpetuates informality and exclusion).

10. Conversely, federal transfers or natural resource rents reduce spending in public goods and increase local corruption (Brollo et al. 2013; Caselli and Michaels 2013). These findings are in line with a larger literature that characterizes fiscal contracts that link taxation to state performance (e.g., Levi 1988; Paler 2013; Timmons 2005; Timmons and Garfias 2015).

11. We do not focus on the initial decision to set up a cadastre as a result of our data limitations; by 2012, almost 93.9% of Brazilian municipalities already had a cadastre, which leaves little variation to explore. We use the phrases cadastre "investment," "renovation," and "update" synonymously.

12. In municipalities with populations higher than 200,000, a runoff election is held if no candidate wins a simple majority. Mayors, even term-limited ones, can run for office in a later, nonconsecutive term.

13. While Brazil displays a very strong federalism, and municipalities have substantial policy responsibilities—including education, health, transportation, local infrastructure, and land management—subnational political power lies at the state level (Samuels 2000, 2004). Furthermore, while incumbents elsewhere generally possess an electoral advantage when seeking reelection, this is less clear for Brazilian mayors, who have been shown to face an incumbency disadvantage (Brambor and Ceneviva 2011; Titiunik 2009; but see Boas and Hidalgo 2011 and Magalhães 2015). At the municipal level, this disadvantage may be linked to Brazil's notoriously weak party system, where party switching is pervasive (Desposato 2006; Klašnja and Titiunik 2017; Novaes 2017).

14. Survey conducted by Checon Pesquisa/Borghi Lowe and commissioned by the Tribunal Superior Eleitoral: 1,914 respondents in all states.

Table 1. Last Year of Cadastre Update as of 2015

Years since Last Update	Period of Last Update	Number of Municipalities	Percentage of Municipalities
More than 6	2009 or before	2,177	39
Up to 6	2010–15	2,944	53
Up to 4	2012–15	2,452	44

Source. Instituto Brasileiro de Geografia e Estatística (2015).
Note. Percentages do not add to 100% because of nonreporting municipalities.

To study the role of mayoral time horizons and political incentives on their decision to update the cadastre, we use electoral data from the 2012 local election from the Tribunal Superior Eleitoral, which includes election returns and individual characteristics of candidates.

ESTIMATING THE BENEFITS AND COSTS OF PROPERTY TAXATION

We turn now to the ramifications, both fiscal and political, of updating the local cadastre. In this section, we show that cadastre updates are followed by a sizable, differential increase in property tax revenues. The results point to a clear and immediate fiscal upside (*e*, in our formalization). We do not see a simultaneous increase in other local taxes, suggesting the revenue increases are attributable to the updates. We also find that updates increase property registration rates.

We then characterize the determinants of these cadastre updates. First, we show that effective reductions in administrative costs (*k*, in our formalization) have no impact on the likelihood of cadastre overhauls. This casts doubt on a straightforward budgetary explanation for infrequent updates—if subsidized loans for local fiscal capacity do not increase the likelihood of updates, then the direct profitability condition is unlikely to bind. These first two analyses—how cadastre updates affect property tax revenues (see next section) and how subsidized loans affect the likelihood of cadastre updates—employ difference-in-differences designs.

Second, we estimate the political cost of cadastre overhauls using a close-elections regression discontinuity design (see "The political determinants of cadaster updates" below). We show that second-term mayors who cannot run for reelection are substantially more likely to invest. This suggests a consequential electoral penalty (i.e., $\phi(i = 0) > \phi(i = 1)$). Term-limited mayors do not, however, institute other reforms that raise tax revenue. Descriptively, we also find that differential cadastral investments between reelection-eligible and term-limited mayors are more likely in more unequal municipalities with high poverty rates—settings that past work suggests are conducive to clientelism. These findings suggest that consequential political costs can rationalize the prevalent underinvestment in the cadastre and, more broadly, defective systems of land administration and property taxation.

The effect of cadastre updates

First, we evaluate whether updating the cadastre leads to higher property tax revenues. If this is not true, then it is not so puzzling that mayors fail to invest. We implement a difference-in-differences estimation strategy, comparing changes in IPTU in municipalities that update their cadastre, relative to the change in municipalities that do not or are yet to update. Our basic specification is

$$\log(\text{IPTU}_{it}) = \beta \text{Cadastre Update}_{it} + \lambda_t + \gamma_i + \varepsilon_{it}, \quad (1)$$

where $\log(\text{IPTU}_{it})$ is the logged property tax revenue in municipality *i* in year *t*; $\text{Cadastre Update}_{it}$ is an indicator that takes the value of one when the cadastre is updated and in subsequent years; λ_t and γ_i are year and municipality fixed effects, respectively; and ε_{it} is an error term. We cluster all standard errors at the municipality level.

We amend this base model, adding indicators for related reforms, such as revisions to the fiscal land values and local property tax laws. To further demonstrate robustness, we also add year-by-state fixed effects and include the time-interacted last year of a cadastre update for those municipalities that do not update under the period of analysis.[15]

The updating of the cadastre is surely affected by municipal-specific factors, such as the economic structure and geography, that may also correlate with property tax revenues. However, our empirical strategy accounts for these factors so long as they do not vary over the period of analysis.[16] This design invokes

15. Our control municipalities include those that have yet to update their cadastre and those that never do during the 2004–12 period. We include time-interacted year of a last cadastre update prior to 2004 to account flexibly for differential time trends by time since the last update.

16. We include GDP per capita (logged) as a time-varying control. We also run additional robustness checks: (1) substituting the municipality fixed effects for municipality-by-term fixed effects to account for some time-varying confounds at the municipal level, such as mayoral elections (see table B.2); and (2) including transfers from federal and state governments (logged) as a time-varying control (see table B.3). We lag the transfers variable to reduce concerns about endogeneity (e.g., transfers responding to local tax revenue).

the standard parallel-trends assumption: that, in the absence of the update, the trends in property tax revenue (logged) in municipalities that do and do not update would have remained parallel.[17] We provide supportive evidence of parallel trends prior to treatment in figure 1*B*. The event study coefficient estimates to the left of zero are negligible, indicating that property tax revenues do not increase in anticipation of treatment (i.e., pretrends are not diverging).

Table 2 presents the main results. Columns 1 and 2 report estimates from the basic specification, while columns 3 and 4 include additional covariates. Columns 4–6 present similar estimates but are limited to the 2012–15 period, which is the focus of our subsequent analysis. We find positive and statistically significant coefficients on the cadastre update in all specifications. The magnitude is economically meaningful: updating the cadastre increases property tax revenue by over 10%.

Figure 1 presents the results of an event study graphically and further shows that the effect of cadastre updates emerges immediately and persists for the next few years. This pattern suggests that elected officials who may be considering investing in improving the cadastre can reasonably expect fiscal benefits over the short term.[18]

In appendix section B1, we also show the effect of cadastre updates on property registration rates. These data are not collected systematically by the central government, so we rely on census-based estimates of property registration rates and survey responses by local tax officials. This reduces the number of municipalities with registration rate estimates in at least two points in time to approximately 60. Despite this much smaller sample, we find an increase in the rate of property registration of around 4 percentage points—an effect that is close to a full within-municipality standard deviation in registration rates over time—using a similar difference-in-differences approach as above.

The fiscal determinants of cadastre updates

Cadastre updates are followed by persistently higher property tax revenues within just two years. These fiscal benefits, however, need to be weighed against the administrative and political costs of an update. Here, we focus on whether administrative costs are so high that mayors opt not to invest (i.e., the direct profitability condition is not met).

To evaluate whether this simple fiscal calculus explains the prevalence of deficient cadastres, we leverage a national program implemented by the Brazilian Development Bank. The PMAT grants subsidized loans to municipalities to enable three types of investments in fiscal capacity: bolstering enforcement through audits; increasing tax compliance by expanding and simplifying payment options; and increasing monitoring capacity by updating tax registries, including the cadastre. We use data on the PMAT from 1998 to 2004, compiled by Gadenne (2017), which includes the time of application and receipt of the first subsidized loan, as well data on the last year of a complete cadastre update, from the Pesquisa de Informações Básicas Municipais 2004.

Past work has shown that participation in the PMAT increases municipal tax revenue (Gadenne 2017). However, despite explicitly targeting cadastre updates and reducing their cost, the PMAT has no discernible impact on the probability that a municipality undertakes this specific investment. Figure 2 illustrates the null effect of receiving the PMAT on the probability of a cadastre update, by comparing those municipalities that receive the PMAT earlier in the period to those that receive it later. In appendix section B6, we present estimates of the impact of the PMAT on cadastre updates, using a difference-in-differences approach similar to equation (1), employing alternative control groups, and expanding the analysis to 2011. The results consistently show no impact of lowering the cost of fiscal-capacity investments on cadastre updates.

For the municipalities that apply to the PMAT, administrative costs do not seem to explain the paucity of cadastre updates. This sample is not representative; yet, despite being richer and larger, 40% of PMAT municipalities' cadastres had failed to update in the last four years (by 2004), and 30% had last let them lapse for longer than six years (Instituto Brasileiro de Geografia e Estatística 2004). While these figures are smaller than those for 2015 shown in table 1, the rates are similar to the universe of Brazilian municipalities, with 37% and 28% failing to update in the last four and six years, respectively.

The political determinants of cadastre updates

Given the demonstrable fiscal upside and affordable administrative costs, we argue that two political considerations might discourage reelection-seeking mayors from investing: higher effective tax rates might anger property owners, tenure insecurity may be the basis for clientelistic exchanges, or both. This leaves first-term mayors facing a difficult trade-off (characterized by our earlier political profitability condition). On the one hand, early investments in the cadastre offer the largest

17. More technically, $\hat{\beta}$ estimates the average causal effect of cadastre updates on those municipalities that update when $E(\varepsilon_{it}|\text{Cadastre Update}_{it}, \lambda_t, \gamma_i) = 0$.

18. In app. sec. B.4, we show that cadastre updates do not affect the other major source of local tax revenue, the services tax. This suggests that the estimated effect of updates on property tax revenue does not simply reflect a general effort to increase tax collection, but the impact of the update specifically.

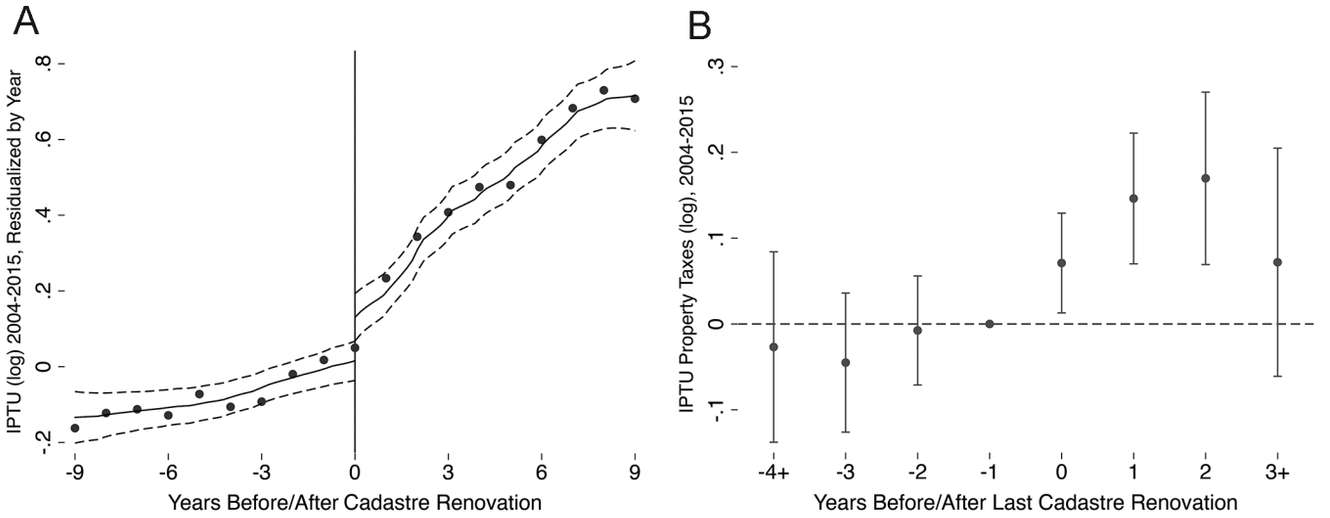

Figure 1. Cadastre updates and property tax revenue. *A*, Nadaraya-Watson regression of logged IPTU, after partialling out calendar-year fixed effects, on the years before and after the cadastre update. Scatter points bin and average the residualized logged IPTU taxes. *B*, Sample restricted to municipalities that update. Point estimates and 95% confidence intervals from an event study estimation that includes municipality and year fixed effects. The initial lead is equal to 1 for every year prior to four years before the update, and the final lag is equal to 1 for every year beginning with the third year after the update. The omitted category corresponds to the year before the update.

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Table 2. Cadastre Updates and Property Tax Revenue, IPTU (log)

	2004–15			2012–15		
	(1)	(2)	(3)	(4)	(5)	(6)
Cadastre update	.14***	.10***	.12***	.084***	.13***	.10***
	(.025)	(.025)	(.026)	(.027)	(.035)	(.036)
Revision to fiscal		.019		.090***		.071**
Land values formula		(.027)		(.027)		(.034)
Reform to IPTU law		.23***		.18***		.19***
		(.034)		(.034)		(.065)
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	No	No	No
GDP per cap (log)	No	No	Yes	Yes	Yes	Yes
Year by state FE	No	No	Yes	Yes	Yes	Yes
Year FE × year of last pre-2004 cadastre update	No	No	Yes	Yes	Yes	Yes
Within-municipality mean of DV	11.1	11.1	11.4	11.4	11.7	11.7
Within-municipality SD of DV	.84	.84	.77	.77	.47	.47
R^2	.84	.84	.86	.86	.92	.92
Observations	62,161	61,360	49,086	48,475	19,096	18,858
Number of municipalities	5,401	5,331	5,121	5,057	5,098	5,034

Note. DV = dependent variable; FE = fixed effects; GDP = gross domestic product; IPTU = Imposto sobre a Propriedade Predial e Territorial Urbana; SD = standard deviation. OLS estimations. See eq. (1) for the econometric specification. The unit of analysis is the municipality-year. Standard errors (clustered at the municipality level) in parentheses.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

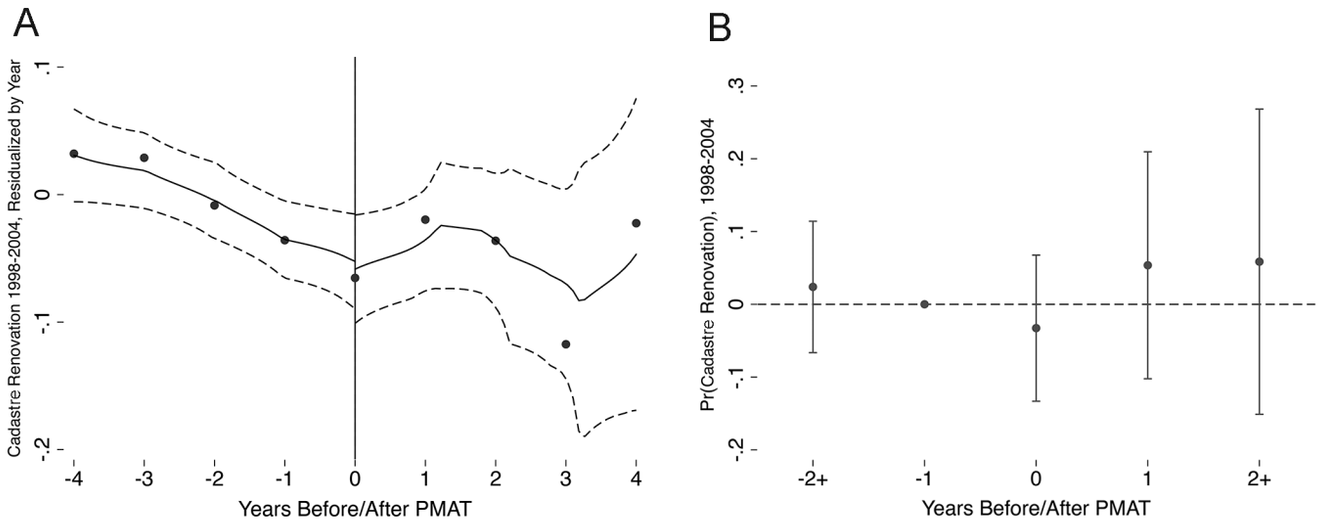

Figure 2. PMAT program and cadastre updates. *A*, Nadaraya-Watson regression of cadastre update, after partialling out calendar year fixed effects, on the years before and after receiving the PMAT program. Scatter points bin and average the residualized cadastre update. *B*, Point estimates and 95% confidence intervals from an event study estimation, including municipality and year fixed effects, as well as indicator variables for one lead and two lags of receiving the PMAT. The lead is equal to 1 for every year prior to one year before receiving the PMAT, and the final lag is equal to 1 for every year beginning with the second year after receiving the PMAT. The omitted category corresponds to the year before receiving the PMAT. The data correspond to 248 municipalities that received the PMAT between 1998 and 2004.

expected stream of fiscal benefits; on the other, updating the cadastre could imperil a mayor's chance of winning reelection.

For second-term mayors things are simpler: while they have less time in office to enjoy the increased tax receipts, there is no political downside to overhauling the cadastre.[19] In this section, we empirically evaluate which mechanism—time horizons or political constraints—dominates in Brazilian municipalities. To do this, we compare rates of cadastre update among mayors facing term limits versus those with the possibility of running for reelection.

We recognize that simple comparisons between first- and second-term mayors may be misleading. Reelected mayors and the municipalities they govern are likely different along many unobserved dimensions. Any of these unobserved factors can spuriously generate differences in the rate of cadastre updates. We overcome these difficulties by evaluating cadastre updates in closely contested elections. By focusing on narrow victories, we can reasonably assume random assignment of term limits at the victory threshold, which allows us to estimate the local average treatment effect of term limits on the probability of a cadastre update.[20]

We estimate a sharp RD. Adopting the potential outcomes notation, we define $Y_i(1)$ and $Y_i(0)$ as the outcome of interest in municipality i—that is, a cadastre update in the 2013–15 period—under a term-limited (treatment) or first-term (control) mayor, respectively. Assignment to treatment occurs if the incumbent candidate wins—that is, the margin of victory is positive ($V_i \geq 0$).[21] We focus on the sharp average treatment effect at the threshold, $\tau = E\{Y_i(1) - Y_i(0) | V_i = 0\}$, and estimate

$$\tau = \mu_+ - \mu_-, \tag{2}$$

where $\mu_+ = \lim_{v \downarrow 0} \mu(v)$, $\mu_- = \lim_{v \uparrow 0} \mu(v)$, and $\mu(v) = E(Y_i | V_i = v)$. We employ the following local polynomial RD estimator:

$$\hat{\tau}_p = \hat{\mu}_+(h) - \hat{\mu}_-(h),$$

where h is a positive bandwidth, and $\hat{\mu}_+(h)$ and $\hat{\mu}_-(h)$ correspond to the intercept at the electoral victory threshold ($v = 0$) of a weighted pth order polynomial regression for treatment and control municipalities, respectively.

In figure 3*A*, we visualize the discontinuity. There is a visible jump at the electoral threshold in the probability of cadastre updates in treated municipalities, where an incumbent is reelected and now faces a term limit. In table C.1, we also present evidence of balance at the discontinuity on other covariates, including incumbent candidate characteristics (gender, college education, affiliation with the Partido dos Trabalhadores

19. A term-limited incumbent may still worry about the electoral penalty if an ally or family member plans to run for office. Despite this, the difference in political incentives for term-limited mayors persists; after all, first-term mayors will also consider their allies' prospects.

20. We consider updates that occur in the 2013–15 period to avoid attributing overhauls that started during the 2008–12 term to the incoming administration.

21. We drop municipalities with no first-term mayor running for reelection.

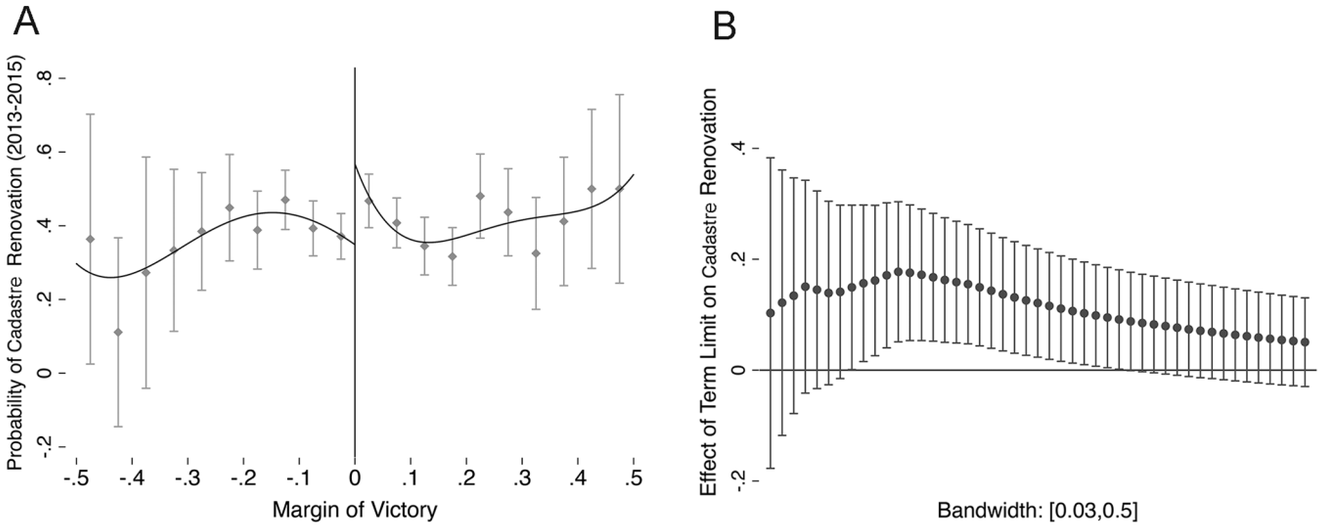

Figure 3. Mayoral term limits and cadastre updates in close elections. *A*, Graphical representation of discontinuity. Each line is a fourth-order polynomial fitted over the interval [−50%, +50%] in the vote-share margin of victory of incumbent mayors. Scatter points are sample averages over 10-unit intervals. *B*, Point estimates and 95% conventional confidence intervals on first-order local-polynomial RD estimates at variable bandwidths, ranging from 3% to 25%. We use triangular kernels.

[PT]), pre-2012 municipal characteristics (population, proportion rural, any IPTU collected, Gini coefficient, proportion poor), and the number of candidates contesting the election. This demonstrates that other covariates do not change sharply at the discontinuity, bolstering the identifying assumption.

Table 3 presents estimates of the local average treatment effect of mayoral term limits on the probability of a cadastre update. Each estimate is based on data-driven MSE-optimal bandwidths described in Calonico, Cattaneo, and Titiunik (2014) and different orders of the local polynomial regressions. Figure 3*B* also plots estimates at varying bandwidths. These results are largely robust to adjusting for covariates (cols. 5–8) and to other alternative bandwidth selection procedures (table C.2). Across columns, the effect of mayoral term limits is

Table 3. Effect of Mayoral Term Limits on Cadastre Updates in Close Elections, 2013–15

	No Covariate Adjustment				Covariate Adjustment			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Incumbent won in 2012	.13**	.18***	.20***	.19**	.10*	.17***	.19***	.20***
	(.059)	(.064)	(.075)	(.088)	(.057)	(.064)	(.075)	(.077)
	[.031]	[.0059]	[.0076]	[.035]	[.069]	[.0071]	[.0099]	[.0089]
Robust SEs	.070	.072	.084	.096	.067	.071	.084	.082
Robust *p*-value	.018	.0047	.014	.063	.040	.0056	.019	.014
Order of the local polynomial	0	1	2	3	0	1	2	3
Covariate adjustment	No	No	No	No	Yes	Yes	Yes	Yes
Bandwidth	.044	.14	.23	.30	.042	.13	.22	.39
Mean of control	.37	.41	.41	.41	.37	.41	.40	.40
Observations	364	1,036	1,402	1,547	347	998	1,360	1,642

Note. SE = standard error. See eq. (2) for the econometric specification. The unit of analysis is the municipality. Conventional standard errors and *p*-values in parentheses and brackets, respectively. MSE-optimal bandwidths and heteroskedasticity-robust nearest-neighbor standard errors described in Calonico et al. (2014). We use triangular kernels. Covariates include the incumbent candidate's gender, college education, and affiliation to the PT; the municipalities' logged population, Gini index, and % poor in 2010; and average 2009–11 logged total budget and any IPTU collection by 2012.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

positive and large. It hovers around 15 percentage points, which corresponds to close to a 40% increase with respect to the mean of the control group.

For first-term mayors in competitive municipalities, these results suggest that the political consequences of updating the cadastre dominate its potential fiscal benefits. Yet, for second-term mayors, the opposite is true, despite the strict limits on their remaining time in office.[22] Our theory implies that, unless the electoral penalty of a cadastre update is very large, our local average treatment effects are unlikely to generalize to politically uncompetitive municipalities: in an uncompetitive setting, updating the cadastre may not meaningfully change an incumbent's chances at the polls—they are going to win (or lose) regardless. In such cases, updating the cadastre will not depend on whether an incumbent is term limited.[23]

First-term mayors' reluctance to update the cadastre could result from fears that (1) reducing tenure informality eliminates certain clientelistic exchanges or (2) increasing property taxation will anger voters. In Latin American democracies, including in Brazil, incumbent politicians often exploit citizens' vulnerability to secure their political support. Such practices include offering particularistic benefits in exchange for votes (e.g., Bobonis et al. 2017; Diaz-Cayeros, Estévez, and Magaloni 2016; Gans-Morse, Mazzuca, and Nichter 2013; Hicken 2011; Hidalgo and Nichter 2016; Stokes 2005). Untitled households face threats of eviction and challenges accessing public services. These voters are particularly susceptible to local politicians' contingent promises of protection or access in return for electoral support (e.g., Collier 1974; Holland 2016; Larreguy et al. 2015). This is not lost on reelection-seeking politicians. They recognize that facilitating formalization by improving the cadastre eliminates this strategy for mobilizing political support. However attractive the fiscal windfall might appear to first-term mayors, the prospect of losing such a powerful political tool may guide their decision-making.

We first note that the effect of cadastre updates on property registration rates described above (and in app. sec. B.1) is consistent with this mechanism: newly titled property owners are more difficult for politicians to mobilize electorally.[24] In table 4, we look for additional evidence in support of this clientelistic mechanism. Systematic data on the presence and strength of local political machines is unavailable for Brazilian municipalities. We instead focus on observable conditions that have been identified as conducive to clientelism: income inequality and poverty (e.g., Nichter and Peress 2016; Robinson and Verdier 2013).[25] Columns 1 and 2 split our sample into municipalities with below- and above-median municipal Gini, respectively. Consistent with a clientelistic mechanism, the term limit effect is twice as large in high-inequality municipalities. This gap in the term limit effect is similar when estimating the RD on municipalities with both above-median Gini and poverty incidence (col. 4) or not (col. 3).[26]

A second possible political cost does not depend on clientelistic motives. Voters, especially wealthy property owners, may simply punish reelection-seeking mayors who increase tax obligations, either through higher rates or improved enforcement (e.g., Alt et al. 2011; Besley and Case 1995; Gottlieb and Hollenbach 2018; Sances 2016). This alternative political mechanism does not explain the heterogeneous effects presented in table 4, but it is also not ruled out by them.[27] We more directly test for this second mechanism by estimating the effect of term limits on two other property tax reforms that are unrelated to land registration costs: first, revisions to fiscal land values formulas, which specify how properties are appraised; and second, any reforms to the IPTU law, which

22. Among second-term mayors, we find that the probability of a cadastre update peaks early in their term (in the second year) and then falls off sharply by their final year in office (see fig A.1). This pattern is consistent with term-limited mayors initiating updates early in their term to benefit from increased property tax revenues and those cadastre updates then being completed in years 2 and 3 of their administration, given the time required for implementation.

23. In terms of our formalization, in an uncompetitive municipality there may not be a consequential electoral penalty: $\phi(i = 1) \approx \phi(i = 0)$. In such settings, an incumbent will invest if the direct profitability condition is met—a decision rule that does not differ for first- and second-term incumbents.

24. Furthermore, these new registered properties are likely contributing to the documented higher property tax outlays. While some municipalities waive property taxes to poor residents, this is hardly the norm. For instance, in a sample of 50 municipalities, only a third reported some form of exemptions based on income or ability to pay (Lincoln Institute of Land Policy 2015).

25. These variables are highly correlated (0.6 across all municipalities), but measure distinct features of municipalities' social structure. An alternative measure that directly identifies irregular settlements—*aglomerados subnormais*—using the 2010 population census is unfortunately only available for a small subset of municipalities and has little overlap with our RD. Both Gini and poverty, however, are positively correlated with this measure (see fig A.2).

26. To identify these heterogeneous effects, we need to further assume that the relationship between the margin of victory and the probability of a cadastre update are equal across subsamples. While these differences in magnitude are notable, we cannot reject the null of no difference between the coefficients in models 1 and 2 or 3 and 4; in table B.6, we estimate local linear models that allow to test directly for the difference in the coefficients; this difference remains substantively large, but is not significantly different from zero.

27. We also note that the estimates in table 4 are uninformative about the direct relationship between the presence of a wealthy elite that resists taxation and the likelihood of fiscal capacity investments such as cadastre updates, which has been the focus of other work (e.g., Acemoglu et al. 2011; Hollenbach and Silva 2019; Sánchez-Talanquer 2020).

Table 4. Effect of Mayoral Term Limits on Cadastre Updates in Close Elections: Heterogeneous Effect by Income Inequality and Poverty, 2013–15

	By Gini Coefficient		By Gini Coefficient and % Poor	
	Below Median (1)	Above Median (2)	Below Median (3)	Above Median (4)
Incumbent won in 2012	.12	.22**	.12*	.24**
	(.086)	(.094)	(.073)	(.11)
	[.16]	[.020]	[.091]	[.036]
Robust SEs	.10	.11	.085	.13
Robust *p*-value	.17	.015	.12	.025
Order of the local polynomial	1	1	1	1
Covariate adjustment	No	No	No	No
Bandwidth	.15	.14	.16	.13
Mean of control	.41	.40	.38	.44
Observations	546	541	698	391

Note. SE = standard error. See eq. (2) for the econometric specification. The unit of analysis is the municipality. Conventional standard errors and *p*-values in parentheses and brackets, respectively. MSE-optimal bandwidths and heteroskedasticity-robust nearest-neighbor standard errors described in Calonico et al. (2014). We use triangular kernels. The median municipal Gini and proportion poor are 0.49 and 18.2%, respectively. These measures are computed from the 2010 population census.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

sets tax rates.[28] We estimate equation (2) employing the RD design introduced earlier.

The results are reported in table 5. In contrast to cadastre updates, the local average treatment effect of term limits on these other tax-increasing policies is estimated to be zero across specifications and bandwidth-selection procedures. If an incumbent's primary hang-up was that voters revolt in response to higher property taxes, we would expect the mayor to ramp up tax obligations when freed from reelection concerns. This is not borne out in our data and indirectly suggests that clientelistic concerns may weigh more heavily on the mayor's mind.[29] These results are not dispositive: sophisticated voters could hold divergent preferences over these fiscal policy instruments, in which case election-seeking incumbents face different political costs to implementation. If, for example, voters are particularly hostile to cadastre updates but less concerned about these other tax reforms, then an incumbent's decision to put off cadastre updates to her final term could still reflect concerns about an electoral backlash.[30]

CONCLUSION

In this article, we offer a political explanation for faulty cadastres. While there is mounting evidence that land titling encourages private investment and can increase tax revenues, governments across the developing world frequently fail to build this critical fiscal infrastructure or allow it to fall into disrepair.

Cadastral maps make property visible to the state and were originally developed in nondemocratic settings—from the *tabularia* in Ancient Rome and the Domesday Book in medieval England to Spain's Catastro de Ensenada and the modern Napoleonic cadastre in revolutionary France (Kain and Baigent 1992). Historically, monarchs and other autocrats put off investing in fiscal infrastructure because of sizable, up-front administrative costs and the risks of rebellion or threatening powerful private interests (e.g., Besley and Persson 2011; Garfias 2018; Garfias and Sellars 2021).[31]

28. Reforms to the IPTU law and major revisions to the fiscal land values require approval from city council. However, smaller revisions to fiscal land values formulas, up to the national inflation rate, can be enacted by mayoral decree (Pinto Domingos 2011).

29. Our heterogeneous effects and null results on other tax reforms also cast doubt on another alternative explanation for our findings—namely, that second-term mayors are more experienced and thus better able to institute reforms. An account based on mayors' experience does not predict that inequality or poverty moderate the term limit effect, nor does it imply that reform efforts concentrate on the cadastre.

30. We find no effect of cadastre updates on reported campaign expenditures in table A.2; if cadastre updates anger voters in ways that reduce their campaign contributions, this not reflected in incumbents' campaign expenditures.

31. Political institutions that solve commitment problems between rulers and taxpayers have also enabled investments in fiscal capacity; such

Table 5. Null Effect of Term Limits on Other Property Tax Reforms

	No Covariate Adjustment				Covariate Adjustment			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Revision to Fiscal Land Values Formula, 2012–15							
Incumbent won in 2012	.0096	.018	.015	.018	−.0067	−.0046	−.0092	−.0018
	(.039)	(.056)	(.071)	(.085)	(.037)	(.056)	(.070)	(.083)
	[.80]	[.75]	[.83]	[.83]	[.85]	[.93]	[.89]	[.98]
Robust SEs	.052	.067	.080	.092	.049	.066	.078	.091
Robust *p*-value	.75	.80	.84	.82	.94	.86	.90	.96
Order of the local polynomial	0	1	2	3	0	1	2	3
Covariate adjustment	No	No	No	No	Yes	Yes	Yes	Yes
Bandwidth	.091	.17	.24	.30	.095	.16	.23	.28
Mean of control	.30	.31	.32	.33	.30	.31	.32	.32
Observations	752	1,220	1,468	1,593	781	1,167	1,434	1,564
	Reform to IPTU Law, 2012–15							
Incumbent won in 2012	−.0044	.010	.0073	−.021	−.00042	.0096	.0060	−.013
	(.023)	(.029)	(.035)	(.045)	(.024)	(.030)	(.036)	(.044)
	[.85]	[.72]	[.84]	[.64]	[.99]	[.75]	[.87]	[.77]
Robust SEs	.029	.034	.039	.049	.029	.034	.040	.046
Robust *p*-value	.80	.67	.87	.58	.72	.74	.95	.69
Order of the local polynomial	0	1	2	3	0	1	2	3
Covariate adjustment	No	No	No	No	Yes	Yes	Yes	Yes
Bandwidth	.080	.19	.28	.27	.073	.17	.25	.27
Mean of control	.083	.096	.099	.100	.083	.095	.099	.099
Observations	684	1,331	1,585	1,555	629	1,247	1,495	1,554

Note. SE = standard error. See eq. (2) for the econometric specification. The unit of analysis is the municipality. Conventional standard errors and *p*-values in parentheses and brackets, respectively. MSE-optimal bandwidths and heteroskedasticity-robust nearest-neighbor standard errors described in Calonico et al. (2014). We use triangular kernels. Covariates include the incumbent candidate's gender, college education, and affiliation to the PT; the municipalities' logged population, Gini index, and % poor in 2010; and average 2009–2011 logged total budget and any IPTU collection by 2012.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

In present-day democracies, such as Brazil, political conflict within the political elite is mediated by electoral institutions, with candidates competing for office. These officials, just as autocratic rulers do, value higher tax receipts, which enable them to implement their agendas or secure rents. Yet, they must also consider how investments in the cadastre affect their reelection prospects. Voters qua taxpayers might revolt against higher effective property taxes. Alternatively, enabling registration may reduce tenure informality and thereby the efficiency of political machines that mobilize electoral support through promises to unregistered households. These political costs do not fall evenly on candidates—in particular, incumbents who do not expect to continue their political careers are not affected. If the political costs are substantial, we argue that these term-limited officials should be more likely to implement cadastre overhauls.

To assess these ideas, we use subnational data from Brazilian municipalities, which enjoy broad legal authority to

institutions helped to sustain fiscal pacts in which taxes were traded for public services (e.g., Bates and Lien 1985; Dincecco 2011) or in which tax policies were constrained by taxpayers (e.g., Cox 2016; Garfias 2019). To a large extent, this is the trajectory of local property taxes in the United States (e.g., Sokoloff and Zolt 2007; Wallis 2001). It may be harder for these fiscal pacts to emerge for property taxation in settings like Brazil, where local budgets are covered mostly by transfers from other levels of government.

implement local taxation and manage their cadastres. First, using a difference-in-differences design, we show that cadastre updates produce a roughly 10% increase in property tax receipts, the second most important source of locally generated revenue in Brazilian municipalities. This effect is immediate and persists over the next few years. We also find that the rate of property registration rises by about 4 percentage points following cadastre overhauls among the subset of municipalities with available data. This represents a (within-municipality) standard deviation increase in registration rates. We rule out the straightforward explanation that investments in the cadastre are simply too costly; we find that reductions in the cost of updates, through subsidized loans earmarked to modernize the local tax administration, do not increase the likelihood of investing in updating the cadastre.

We then turn to evaluate a political explanation. We focus on close local elections between new challengers and incumbents, who become term limited if they win. Using a close-election RD, we find that term-limited mayors are around 15 percentage points more likely to update the local cadastre. The political effect we document—by definition a local average treatment effect of term limits at the electoral discontinuity—could account for a sizable share of all cadastre updates in Brazil if we extrapolated across the country: it corresponds to 34% of the overall updates that occur within the recommended periods.[32] We also show that this term limit effect is strongest in highly unequal and poor municipalities. This suggests that the political costs faced by incumbents arise from the weakening of local political machines, which lose influence when households gain formal tenure. In contrast, we find that term-limited mayors are no more likely to reform the local property tax law or to revise the formulas that determine the fiscal assessment of properties. These findings are inconsistent with an account in which incumbents fear punishment from voters for raising effective tax rates.

While we study Brazilian municipalities, our findings can help inform the varying quality of the local tax infrastructure elsewhere in Latin America. Mexico, for instance, has until very recently lacked municipal reelection, but unlike Brazil, the country has strong parties that discipline mayors who seek to climb the party ranks or to become embedded in patronage networks (e.g., Langston 2009). Under these conditions, our argument implies that local officials, even if uniformly term limited, will have weaker incentives to update the cadastre. In Colombia, on the other hand, cadastre overhauls are administered by a federal agency, which likely mitigates local political backlash for mayors (e.g., Martínez 2017). In line with our ideas, while Mexico displays one of the lowest rates of property tax collection as a proportion of GDP in the region, Colombia is one of the top performers, and Brazil sits in between (De Cesare 2012).

Our findings also suggest that the problem of deficient fiscal infrastructure may not be entirely technological. Promising new technologies reduce the cost of cadastre overhauls, such as the use of satellite imagery described by Ayalew Ali, Deininger, and Wild (2018). These are important innovations, but may not, on their own, ultimately provide a durable solution in the presence of the political costs that we document.

32. Along many dimensions, the RD sample is similar to other Brazilian municipalities excluded from the analysis (see table A.1).

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REFERENCES

Acemoglu, Daron, Andrea Vindigni, and Davide Ticchi. 2011. "Emergence and Persistence of Inefficient States." *Journal of the European Economic Association* 9 (2): 122–208.

Alston, Lee J., Gary D. Libecap, and Robert Schneider. 1996. "The Determinants and Impact of Property Rights: Land Titles on the Brazilian Frontier." *Journal of Law, Economics, and Organization* 12 (1): 25–61.

Alt, James, Ethan Bueno de Mesquita, and Shanna Rose. 2011. "Disentangling Accountability and Competence in Elections: Evidence from US Term Limits." *Journal of Politics* 73 (1): 171–86.

Arsensault, Chris. 2017. "Half of Brazil's Population Lack Full Property Rights, Government Says." Reuters, January 28. https://www.reuters.com/article/us-brazil-landrights-politics/half-of-brazils-population-lack-full-property-rights-government-says-idUSKBN15C0OA.

Auerbach, Adam M. 2016. "Clients and Communities: The Political Economy of Party Network Organization and Development in India's Urban Slums." *World Politics* 68 (1): 111–48.

Auyero, Javier. 2001. *Poor People's Politics: Peronist Survival Networks and the Legacy of Evita*. Durham, NC: Duke University Press.

Ayalew Ali, Daniel, Klaus Deininger, and Michael Wild. 2018. "Using Satellite Imagery to Revolutionize Creation of Tax Maps and Local Revenue Collection." World Bank Policy Research Working paper 8437, World Bank, Washington, DC.

Bahl, Roy, and Richard Bird. 2008. "Subnational Taxes in Developing Countries." *Public Budgeting and Finance* 28 (4): 1–25.

Bates, Robert, and Da-Hsiang Lien. 1985. "A Note on Taxation, Development, and Representative Government." *Politics and Society* 14 (1): 53–70.

Beramendi, Pablo, Mark Dincecco, and Melissa Rogers. 2019. "Intra-Elite Competition and Long-Run Fiscal Development." *Journal of Politics* 81 (1): 49–65.

Besley, Timothy, and Anne Case. 1995. "Incumbent Behavior: Vote-Seeking, Tax-Setting, and Yardstick Competition." *American Economic Review* 85 (1): 25–45.

Besley, Timothy, and Torsten Persson. 2011. *Pillars of Prosperity: The Political Economics of Development Clusters*. Princeton, NJ: Princeton University Press.

Boas, Taylor C., and F. Daniel Hidalgo. 2011. "Controlling the Airwaves: Incumbency Advantage and Community Radio in Brazil." *American Journal of Political Science* 55 (4): 869–85.

Bobonis, Gustavo J., Paul Gertler, Marco Gonzalez-Navarro, and Simeon Nichter. 2017. "Vulnerability and Clientelism." Working paper 23589, National Bureau of Economic Research, Cambridge, MA.

Boone, Catherine. 2009. "Electoral Populism Where Property Rights Are Weak: Land Politics in Contemporary Sub-Saharan Africa." *Comparative Politics* 41 (2): 183–201.

Bordignon, Massimo, Veronica Grembi, and Santino Piazza. 2017. "Who Do You Blame in Local Finance? An Analysis of Municipal Financing in Italy." *European Journal of Political Economy* 49:146–63.

Brambor, Thomas, and Ricardo Ceneviva. 2011. "Incumbency Advantage in Brazilian Mayoral Elections." Working paper.

Brambor, Thomas, Agustín Goenaga, Johannes Lindvall, and Jan Teorell. 2020. "The Lay of the Land: Information Capacity and the Modern State." *Comparative Political Studies* 53 (2): 175–213.

Brollo, Fernanda, Tommaso Nannicini, Roberto Perotti, and Guido Tabellini. 2013. "The Political Resource Curse." *American Economic Review* 103 (5): 1759–96.

Burgwald, Gerrit. 1995. *Struggle of the Poor: Neighborhood Organization and Clientelist Practice in a Quito Squatter Settlement*. Amsterdam: CEDLA.

Cabral, Marika, and Caroline Hoxby. 2012. "The Hated Property Tax: Salience, Tax Rates, and Tax Revolts." NBER Working paper 18514, National Bureau of Economic Research, Cambridge, MA.

Calonico, Sebastian, Matias D. Cattaneo, and Rocio Titiunik. 2014. "Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs." *Econometrica* 82 (6): 2295–326.

Carvalho, Jr., Pedro Humberto Bruno de. 2006. "IPTU no Brasil: Progressividade, Arrecadação e Aspectos Extra-Fiscais." IPEA Texto para Discussão 1251, Instituto de Pesquisa Econômica Aplicada, Brasilia, Brazil.

Carvalho, Jr., Pedro Humberto Bruno de. 2017. *Property Tax Performance and Potential in Brazil*. PhD diss., University of Pretoria.

Casaburi, Lorenzo, and Ugo Troiano. 2015. "Ghost-House Busters: The Electoral Response to a Large Anti-Tax Evasion Program." *Quarterly Journal of Economics* 131 (1): 273–314.

Caselli, Francesco, and Guy Michaels. 2013. "Do Oil Windfalls Improve Living Standards? Evidence from Brazil." *American Economic Journal: Applied Economics* 5 (1): 208–38.

Ch, Rafael, Jacob Shapiro, Abby Steele, and Juan F. Vargas. 2018. "Endogenous Taxation in Ongoing Internal Conflict: The Case of Colombia." *American Political Science Review* 112 (4): 996–1015.

Christensen, Darin, Alexandra C. Hartman, and Cyrus Samii. 2021. "Legibility and External Investment: An Institutional Natural Experiment in Liberia." *International Organization*. First Print, April 29. https://doi.org/10.1017/S0020818321000187.

Coates, Robert, and Jeff Garmany. 2017." The Ecology of Citizenship: Understanding Vulnerability in Urban Brazil." *International Development Planning Review* 39 (1): 37–56.

Collier, David. 1974. *Squatters and Oligarchs: Authoritarian Rule and Policy Change in Peru*. Baltimore: Johns Hopkins University Press.

Cornelius, Wayne A. 1975. *Politics and the Migrant Poor in Mexico City*. Stanford, CA: Stanford University Press.

Cox, Gary. 2016. *Marketing Sovereign Promises: Monopoly Brokerage and the Growth of the English State*. New York: Cambridge University Press.

D'Arcy, Michelle, and Marina Nistotskaya. 2018. "The Early Modern Origins of Contemporary European Tax Outcomes." *European Journal of Political Research* 57 (1): 47–67.

De Cesare, Claudia. 2012. "Improving the Performance of the Property Tax in Latin America." Policy focus report, Lincoln Institute of Land Policy, Cambridge, MA.

De Soto, Hernando. 2000. *Mystery of Capital*. New York: Basic.

Desposato, Scott. 2006. "Parties for Rent? Ambition, Ideology, and Party Switching in Brazil's Chamber of Deputies." *American Journal of Political Science* 50 (1): 62–80.

Diaz-Cayeros, Alberto, Federico Estévez, and Beatriz Magaloni. 2016. *Strategies of Vote Buying: Democracy, Clientelism and Poverty Relief in Mexico*. New York: Cambridge University Press.

Dincecco, Mark. 2011. *Political Transformations and Public Finances: Europe, 1650–1913*. New York: Cambridge University Press.

Erba, Diego A. 2007. *Catastro multifinalitario aplicado a la definición de políticas de suelo Urbano*. Cambridge, MA: Lincoln Institute of Land Policy.

Fergusson, Leopoldo, Horacio Larreguy, and Juan Felipe Riaño. 2018. "Political Competition and State Capacity: Evidence from a Land Allocation Program in Mexico." LACEA Working paper.

Fernandes, Edesio. 2006. "Main Aspects of the Regulatory Framework Governing Urban Land Development Processes." In *Inputs to a Strategy for Brazilian Cities*. Washington, DC: World Bank, 137–67.

Fernandes, Edesio. 2011. "Regularization of Informal Settlements in Latin America." Policy focus report, Lincoln Institute of Land Policy, Cambridge, MA.

Ferraz, Claudio, and Frederico Finan. 2011. "Electoral Accountability and Corruption: Evidence from the Audits of Local Governments." *American Economic Review* 101 (4): 1274–311.

Field, Erica. 2005. "Property Rights and Investment in Urban Slums." *Journal of the European Economic Association* 3 (2–3): 279–90.

Gadenne, Lucie. 2017. "Tax Me, but Spend Wisely? Sources of Public Finance and Government Accountability." *American Economic Journal: Applied Economics* 9 (1): 274–314.

Galiani, Sebastian, and Ernesto Schargrodsky. 2010. "Property Rights for the Poor: Effects of Land Titling." *Journal of Public Economics* 94 (9–10): 700–729.

Galiani, Sebastian, and Ernesto Schargrodsky. 2011. "Land Property Rights and Resource Allocation." *Journal of Law, Economics, and Organization* 54 (4): 329–45.

Galiani, Sebastian, and Ernesto Schargrodsky. 2016. "The Deregularization of Land Titles." *Man and the Economy* 3 (2): 169–88.

Gans-Morse, Jordan, Sebastián Mazzuca, and Simeon Nichter. 2013. "Varieties of Clientelism: Machine Politics during Elections." *American Journal of Political Science* 58 (2): 415–32.

Garfias, Francisco. 2018. "Elite Competition and State Capacity Development: Theory and Evidence from Post-Revolutionary Mexico." *American Political Science Review* 13 (1): 89–117.

Garfias, Francisco. 2019. "Elite Coalitions, Limited Government, and Fiscal Capacity Development: Evidence from Bourbon Mexico." *Journal of Politics* 81 (1): 94–111.

Garfias, Francisco, and Emily A. Sellars. 2021. "From Conquest to Centralization: Domestic Conflict and the Transition to Direct Rule." *Journal of Politics* 83 (3): 992–1009.

Gay, Robert. 1990. "Community Organization and Clientelist Politics in Contemporary Brazil: A Case Study from Suburban Rio de Janeiro." *International Journal of Urban and Regional Research* 14 (4): 648–66.

Gay, Robert. 1994. *Popular Organization and Democracy in Rio De Janeiro: A Tale of Two Favelas*. Philadelphia: Temple University Press.

Gingerich, Daniel W. 2014. "Brokered Politics in Brazil: An Empirical Analysis." *Quarterly Journal of Political Science* 9 (3): 269–300.

Glaeser, Edward L. 1996. "The Incentive Effects of Property Taxes on Local Governments." *Public Choice* 89 (1–2): 93–111.

Gottlieb, Jessica, and Florian Hollenbach. 2018. "Fiscal Capacity as a Moderator of the Taxation-Accountability Hypothesis." Working paper.

Gutierrez, Italo A., and Oswaldo Molina. 2016. "Reverting to Informality: Unregistered Property Transactions and the Erosion of the Titling Reform in Peru." RAND Working paper series.

Hagopian, Frances. 1996. *Traditional Politics and Regime Change in Brazil*. New York: Cambridge University Press.

Hicken, Allen. 2011. "Clientelism." *Annual Review of Political Science* 14:289–310.

Hidalgo, Daniel, and Simeon Nichter. 2016. "Voter Buying: Shaping the Electorate through Clientelism." *American Journal of Political Science* 60 (2): 436–55.

Hoffman, Philip T. 2015. "What Do States Do? Politics and Economic History." *Journal of Economic History* 75 (2): 303–32.

Holland, Alisha C. 2016. "Forbearance." *American Political Science Review* 110 (2): 232–46.

Hollenbach, Florian, and Thiago Silva. 2019. "Fiscal Capacity and Inequality: Evidence from Brazilian Municipalities." *Journal of Politics* 81 (4): 1434–45.

IAAO (International Association of Assessing Officers). 2013. *Standard on the Mass Appraisal of Real Property*. Chicago: IAAO.

Instituto Brasileiro de Geografia e Estatística. 2004. Pesquisa de Informações Básicas Municipais.

Instituto Brasileiro de Geografia e Estatística. 2015. Pesquisa de Informaçóes Básicas Municipais.

Jha, Saumitra, Vijayendra Rao, and Michael Woolcock. 2007. "Governance in the Gullies: Democratic Responsiveness and Leadership in Delhi's Slums." *World Development* 35 (2): 230–46.

Kain, Roger J. P., and Elizabeth Baigent. 1992. *The Cadastral Map in the Service of the State: A History of Property Mapping*. Chicago: University of Chicago Press.

Klašnja, Marko, and Rocio Titiunik. 2017. "The Incumbency Curse: Weak Parties, Term Limits, and Unfulfilled Accountability." *American Political Science Review* 111 (1): 129–48.

Langston, Joy. 2009. "Instituciones políticas y reclutamiento político en México." *Foro Internacional* 49 (2): 237–70.

Larreguy, Horacio, John Marshall, and Laura Trucco. 2015. "Breaking Clientelism or Rewarding Incumbents? Evidence from an Urban Titling Program in Mexico." Working paper.

Lee, Melissa M., and Nan Zhang. 2017. "Legibility and the Informational Foundations of State Capacity." *Journal of Politics* 79 (1): 118–32.

Levi, Margaret. 1988. *Of Rule and Revenue*. Berkeley, CA: University of California Press.

Lincoln Institute of Land Policy. 2015. Database of Property Tax in Latin America. https://www.lincolninst.edu/research-data/data/property-tax-latin-america (accessed July 14, 2021).

Lomnitz, Larissa A. 1978. "Mechanisms of Articulation between Shantytown Settlers and the Urban System." *Urban Anthropology* 7 (2): 185–205.

Magalhães, Leandro de. 2015. "Incumbency Effects in a Comparative Perspective: Evidence from Brazilian Mayoral Elections." *Political Analysis* 23 (1): 113–26.

Magalhães, Leandro de, and Salomo Hirvonen. 2015. "Multi-Office Incumbency Advantage: Political Careers in Brazil." University of Bristol Discussion paper 15/662, University of Bristol, Bristol, UK.

Martínez, Luis R. 2017. "Sources of Revenue and Government Performance: Evidence from Colombia." Working paper.

Mayshar, Joram, Omer Moav, and Zvika Neeman. 2017. "Geography, Transparency and Institutions." *American Political Science Review* 111 (3): 622–36.

Ministério da Fazenda do Brasil. 2014. "Carga Tributária no Brasil 2013: Análise por Tributos e Bases de Incidência." Receita Federal, Subsecretaria de Tributação e Contencioso.

Nichter, Simeon. 2011. "Vote Buying in Brazil: From Impunity to Prosecution." Working paper.

Nichter, Simeon, and Michael Peress. 2016. "Request Fulfilling: When Citizens Demand Clientelist Benefits." *Comparative Political Studies* 50 (8): 1086–117.

Novaes, Lucas M. 2017. "Disloyal Brokers and Weak Parties." *American Journal of Political Science* 62 (1): 84–98.

Oates, Wallace E. 1969. "The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis." *Journal of Political Economy* 77 (6): 957–71.

Organization for Economic Cooperation and Development. 2010. *Tax Policy Reform and Economic Growth*. OECD Tax Policy Studies 10. Paris: OECD.

Paler, Laura. 2013. "Keeping the Public Purse: An Experiment in Windfalls, Taxes, and the Incentives to Restrain Government." *American Political Science Review* 107 (4): 706–25.

Payne, Geoffrey, Alain Durand-Lasserve, and Carole Rakodi. 2009. "Social and Economic Impacts of Land Titling Programs in Urban and Periurban Areas: A Short Review of the Literature." In Somik V. Lall, Mila Freire, Belinda Yuen, Robin Rajack, and Jean-Jacques Helluin, eds., *Urban Land Markets: Improving Land Management for Successful Urbanization*. New York: Springer.

Perlman, Janice. 2010. *Favela: Four Decades of Living on the Edge in Rio de Janeiro*. New York: Oxford University Press.

Perlman, Janice. 1976. *The Myth of Marginality, Urban Poverty and Politics in Rio de Janeiro*. Berkeley, CA: University of California Press.

Pinto Domingos, Omar. 2011. "Implementing Local Property Tax Reform in Brazil." *Land Lines* 23 (1): 2–8.

Queralt, Didac. 2019. "War, International Finance, and Fiscal Capacity in the Long Run." *International Organization* 73 (4): 713–53.

Robinson, James A., and Thierry Verdier. 2013. "The Political Economy of Clientelism." *Scandinavian Journal of Economics* 115 (2): 260–91.

Roniger, Luis. 1987. "Caciquismo and Coronelismo: Contextual Dimensions of Patron Brokerage in Mexico and Brazil." *Latin American Research Review* 22 (2): 71–99.

Samuels, David J. 2000. "Concurrent Elections, Discordant Results: Presidentialism, Federalism, and Governance in Brazil." *Comparative Politics* 33 (1): 1–20.

Samuels, David J. 2004. "The Political Logic of Decentralization in Brazil." In Alfred P. Montero and David J. Samuels, eds., *Decentralization and Democracy in Latin America*. Notre Dame, IN: University of Notre Dame Press.

Sances, Michael W. 2016. "The Distributional Impact of Greater Responsiveness: Evidence from New York Towns." *Journal of Politics* 78 (1): 105–19.

Sánchez-Talanquer, Mariano. 2020. "One-Eyed State: The Politics of Legibility and Property Taxation." *Latin American Politics and Society* 62 (3): 65–93.

Sánchez Torres, Fabio, and Mónica Pachón. 2013. "Descentralization, Fiscal Effort and Social Progress in Colombia at the Municipal Level, 1994–2009: Why Does National Politics Matter?" IDB Working paper series 396.

Scott, James C. 1999. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press.

Secretaria do Tesouro Nacional. 2018a. "Contas Anuais dos Municípios." SICONFI.

Secretaria do Tesouro Nacional. 2018b. "Finanças do Brasil: Dados Contábeis dos Municípios." FINBRA.

Slantchev, Branislav L., and Tory A. Kravitz. 2019. "No Taxation Without Administration: Wealth Assessment in the Formation of the Fiscal State." Working paper.

Sokoloff, Kenneth L., and Eric M. Zolt. 2007. "Inequality and the Evolution of Institutions of Taxation: Evidence from the Economic History of the Americas." In Sebastian Edwards, Gerardo Esquivel, and Graciela Màrquez, eds., *The Decline of Latin American Economies: Growth, Institutions, and Crises*. Chicago: University of Chicago Press, 83–138.

Speck, Bruno Wilhelm. 2003. "A compra de votos—uma aproximação empírica." *Opinão Pública* 9 (1): 148–69.

Stokes, Susan C. 1991. "Politics and Latin America's Urban Poor: Reflections from a Lima Shantytown." *Latin American Research Review* 26 (2): 75–101.

Stokes, Susan C. 2005. "Perverse Accountability: A Formal Model of Machine Politics with Evidence from Argentina." *American Political Science Review* 99 (3): 315–25.

Tilly, Charles. 1985. "War Making and State Making as Organized Crime." In Peter B. Evans, Dietrich Rueschemeyer, and Theda Skocpol, eds., *Bringing the State Back In*. New York: Cambridge University Press, 169–91.

Timmons, Jeffrey F. 2005. "The Fiscal Contract: States, Taxes, and Public Services." *World Politics* 4 (57): 530–67.

Timmons, Jeffrey F., and Francisco Garfias. 2015. "Revealed Corruption, Taxation, and Fiscal Accountability: Evidence from Brazil." *World Development* 70:13–27.

Titiunik, Rocio. 2009. "Incumbency Advantage in Brazil: Evidence from Municipal Mayor Elections." Working paper.

United Nations Task Team on Habitat III. 2015. *The Habitat III Issue Papers*. New York: United Nations.

Varley, Ann. 1994. "¿Clientelismo o tecnocracia? La lógica política de la regularización de la tierra urbana, 1970–1988." *Revista Mexicana de Sociología* 56 (4): 135–64.

Wallis, John J. 2001. "A History of the Property Tax in America." In Wallace E. Oates, ed., *Property Taxation and Local Government Finance: Essays in Honor of C. Lowell Harriss*. Cambridge, MA: Lincoln Institute of Land Policy, 123–49.