Fiscal Capacity as a Moderator of the Taxation-Accountability Hypothesis[*]

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March 22, 2018

Preliminary Draft. Please do not share or cite without authors' permission.

Abstract

We argue in this paper that the established taxation-accountability hypothesis in which higher taxation is preferred by (some) voters when they expect to benefit from redistribution is conditional on the state having achieved a minimum threshold of fiscal capacity. There is a consensus that taxation strengthens electoral accountability by increasing the bargaining power of taxpaying citizens or by making taxpayers less tolerant of politician misbehavior. One critical but implicit assumption, however, is that states have sufficient capacity to collect taxes efficiently. We contend that in low fiscal capacity settings, citizens expect weaker benefits from taxation and are thus more likely to sanction politicians who increase taxes. We test our argument by examining the relationship between tax collection and subsequent voting behavior in comparable low and high fiscal capacity settings. We take advantage of a program in Brazil (PMAT) that served as a positive shock to fiscal capacity in some localities. Within past recipients and eventual recipients of the program, we compare local tax revenue to local election outcomes. We find that, indeed, the relationship between taxation and voting is highly conditional on fiscal capacity: places that have not yet received PMAT are significantly more likely to punish incumbents for tax increases relative to places that have already received the shock to fiscal capacity.

Key Words: Fiscal Capacity, Taxation, Democracy

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The link between taxation and democratic accountability has long been at the forefront of debates in the political economy literature. Scholars have been particularly interested in whether (1) increasing revenue needs of the state and developing taxation leads citizens to demand more representative institutions (e.g., Bates and Lien, 1985; North and Weingast, 1989; Ross, 2004; Eubank, 2012; De La Cuesta et al., 2017; Weigel, 2018); and, on the flip-side, (2) whether changes in political institutions towards more democratic systems lead to higher levels of taxation (e.g., Timmons, 2010; Acemoglu et al., 2015). A majority of the literature, however, is at least in its theoretical origin based on the experience and development of the European tax state and assumes that states are capable of enforcing tax policies.[1] The state here is generally assumed to be both able and willing to collect taxes efficient and equally.[2] Yet, we know that in many countries around the world this is not the case. Often states are unable (or unwilling) to collect a large share of the revenue they set out to raise, and formal tax laws are undermined by inefficiencies in tax collection and tax evasion. How then does the inefficient and differential enforcement of taxation change the proposed link between taxation and representation?

In this paper, we ask whether a state's fiscal capacity changes voters' attitudes about taxation and their demands on elected officials. We develop an argument that, in low fiscal capacity settings, the majority of citizens has less reason to demand higher taxation and thus are less (more) likely to reward (punish) politicians for tax increases. In an equilibrium where fiscal capacity is low, citizens have little reason to believe that raising tax rates or collection

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[1] In a review of the literature on democracy and taxation (Gould and Baker, 2002), for instance, capacity is never mentioned as a potential moderator of this relationship.

[2] There are of course a number of exceptions to this rule and more recently a number of authors have become interested in the topic of fiscal capacity development in the less developed world (e.g., see: Eubank, 2012; Kasara and Suryanarayan, 2015; De La Cuesta et al., 2017; Weigel, 2018).

capacity will result in sufficient revenue to produce public goods that will benefit them. Further, they more likely believe that any additional increase in taxation only exacerbates problems of differential enforcement. In high capacity settings, on the other hand, we would expect the traditional theoretical argument to hold, such that (low income) voters prefer higher taxation when they benefit from public goods provision or redistribution. In sum, in low capacity settings, politicians are more likely to be punished for tax increases; whereas in high capacity settings, electoral rewards (or at least weaker sanctions) are more likely. In other words, we argue that fiscal capacity works as a moderator in the link between tax policy and electoral politics.

One of the likely reasons there is scant evidence on this question is that the direct or indirect effects of fiscal capacity are hard to identify. Fiscal capacity generally develops slowly and is highly correlated with improvements in other aspects of state capacity and political development. It is thus difficult to identify whether differential effects of taxation on electoral outcomes in high and low fiscal capacity contexts are the result of the theoretical mechanisms we propose above, or other differences plausibly correlated with levels of fiscal capacity such as age of democracy or clientelistic politics. We take advantage of a rare "shock" to fiscal capacity that occurred in some Brazilian municipalities that allows us to find counterfactual municipalities that did not experience the shock but are sufficiently similar to those that did, mitigating concerns of omitted variable bias.

We thus investigate our theoretical predictions by examining cross-municipality variation in tax collection and subsequent voting behavior in Brazil. The fiscal capacity program, or shock, we take advantage of is called PMAT, and allowed municipalities to receive cheap federal loans with the explicit goal of increasing their ability to collect taxes. The onset of

the PMAT program in a given municipality can be considered a shock to fiscal capacity. In line with our theoretical argument, we find that among places with PMAT, higher taxation yields electoral advantages for the incumbent (or at least no punishment). Among similar places without PMAT, higher taxation is associated with worse electoral fortunes for the incumbent party.

We design our study such that we only compare municipalities that receive PMAT at some point over the period studied. This allows us to treat the fiscal capacity shock as if it were randomly assigned thus avoiding one particular threat to inference – namely, that municipalities applying for the grants are different from those that do not. Our results are robust to a number of specifications, including fixed effects models in which we compare elections in the same municipality before and after the PMAT shock.

This study contributes to the theoretical and empirical literature by proposing a novel moderator of a widely examined hypothesis: that taxation affects political accountability. Because much of the existing literature is motivated by theories that assume sufficient fiscal capacity, our insights are particularly relevant for developing countries and young democracies where low fiscal capacity is the norm. A key theoretical contribution is to include the beliefs of voters about what other voters are paying in taxes in the electoral calculus.[3] This innovation has implications for potential interventions to increase tax compliance. While we mainly focus on voter preferences and behavior, we discuss the implications of the voter's calculus for politician behavior. Our conclusions – that politicians in low capacity places have strategic disincentives to invest in fiscal capacity – can partly explain the stickiness of

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[3]Del Carpio (2013) explicitly tests a similar insight when she shows that citizens are more likely to pay taxes when they believe their neighbors are paying as well.

the high and low fiscal capacity equilibira we observe in the world. While these differences are often attributed to capacity only, our theory suggests there may additionally be strategic incentives that further discourage (encourage) taxation by incumbents in low (high) capacity places.

Theory

Models of electoral accountability generally assume that voters reward or punish politicians based on their performance in office. Whether raising taxes sends a good or bad signal to voters about incumbent performance is ambiguous, and depends on what the government does with those taxes. Bates and Lien (1985), for instance, argue that citizens hold preferences not only about tax levels but also about government policies, implying that only knowing tax levels is insufficient to reach a prediction about subsequent electoral behavior. In other models, taxes are more explicitly linked to electoral accountability in that the experience of being taxed increases incentives for voters to monitor politician performance because spending is more closely linked to their own pocketbook (Paler, 2013; Martin, 2014). So while electoral accountability models describe how voters evaluate politicians on the basis of their performance with no direct implication for taxation, the taxation-accountability hypothesis suggests that voters who are taxed relatively more should place more weight on their performance evaluation of the incumbent when making electoral decisions. Though De La Cuesta et al. (2017) find that, at least in Uganda and Ghana, this is not necessarily the case.

We argue that another parameter – fiscal capacity – should enter into the voter's calculus in these latter models, informed by expectations of performance that motivate voter behavior

in the former models. Because governments provide public goods that are financed through collective taxation, effective public spending will depend on how many people are paying taxes, and how efficiently governments collect them. Greater fiscal capacity – or the ability to extract taxes from citizens – thus increases the likelihood that public revenues will be translated into valued public goods.

Voter Preferences

For taxpayers i and $-i$, there are strategic complementarities to paying taxes: taxpayer i benefits more from paying taxes when more taxpayers $-i$ also pay taxes. Given this, voters should respond to fiscal extraction by high versus low capacity states differently for two reasons. First, the same amount of taxes paid by person i will yield greater benefits to person i in a high fiscal capacity setting where more people are paying taxes relative to a low fiscal capacity setting with fewer taxpayers. We also know people maximize constructs other than material welfare when making costly decisions. If taxpayers care about fairness, then taxpayer i in a high fiscal capacity setting will perceive tax payment as relatively more fair than in a low fiscal capacity setting because more taxpayers $-i$ will also be paying taxes.

Governments can choose to raise revenue by increasing the number of taxpayers or by increasing the tax rate. Irrespective of which mechanism the government chooses, the differential response by taxpayers in high and low capacity settings should follow the pattern described above. First, marginal increases in enforcement in high capacity settings, e.g., the state attempting to register more citizens as tax payers, are more likely to appear to voters as further improvements in the fairness and efficiency of the current tax system. On the other hand, such increases in enforcement in low capacity settings are likely to give

affected tax payers the impression that the government is simply engaging in unsystematic tax extraction accompanied by a weak increase in public revenues. Public spending in such settings is also expected to be uneven across groups, often described as clientelistic targeting. Expectations of unequal spending (rather than unequal payment) is also found to moderate attitudes toward taxation: Sy-Sahande (2017) finds that in one setting with high clientilistic expectations, citizens who learn their district voted more (less) strongly for the winning candidate raised (lowered) their support for taxation.

Second, if a taxpayer observes an increase in tax rates in a low capacity setting, paying more individually will translate into relatively small collective gains. However, in a high capacity setting, the taxpayer will assume that increase translates into a larger total increase in public revenues. Both going from being a non-taxpayer to a taxpayer and going from paying lower to higher taxes are more likely to be tolerated in a high fiscal capacity setting than a low capacity setting.

Electoral Behavior

We have established that citizens have a greater (lesser) aversion to paying taxes in lower (higher) fiscal capacity settings. Introducing the moderator of fiscal capacity into the taxpayer's voting calculus thus yields an important empirical prediction:

HYPOTHESIS 1 *When a low fiscal capacity government raises tax revenue by X, the incumbent will suffer a relatively more substantial electoral sanction in the following election than when a high fiscal capacity government raises tax revenue by the same amount.*

So, while electoral accountability models do not make clear predictions about how in-

creases in taxation condition voter sanctioning (it could go either way depending on how tax revenue is used), our insight offers a clear directional prediction about how voters evaluate marginal increases in tax revenue differently in high and low capacity settings.

Politician Behavior

Given the strategic nature of politician decision-making – politicians seek to maximize electoral returns given voter preferences, our insight about differential voter preferences in high and low capacity settings has implications for optimal politician behavior in each setting. Given greater voter aversion to taxation, in a low fiscal capacity setting, politicians will be disincentivized from tax collection. Since they still need to mobilize voters, they should "perform" in other ways than raising and spending public revenue. Politicians interested in reelection may thus prefer targeted benefits via private goods or forbearance of enforcement. Notably, such a strategy further undermines the state, creating two distinct equilibria: a low capacity equilibrium in which politicians do not invest in raising and spending public revenue, and a high capacity equilibrium in which politicians do invest in raising and spending public revenue.

HYPOTHESIS 2 *In a low fiscal capacity setting, politicians are less likely to make marginal investments in revenue collection than in a high fiscal capacity setting.*

This prediction is consistent with that made in Martin's (2016) formal model that endogenizes fiscal capacity and argues that rent-seeking governments may abstain from taxing groups of citizens to avoid being held accountable by them. It similarly predicts an equilibrium condition in which few taxes are collected and few public goods are provided – which is

supported by politician disincentives to invest in revenue collection. While this paper focus on the politician's incentives, our theory and empirics are more focused on voter preferences and behavior that end up supporting this low fiscal capacity equilibrium.

Alternative Mechanisms

Hypothesis 1 makes a prediction that is observationally equivalent to another common theoretical prediction in the literature: increases in public spending should be rewarded by voters. Since fiscal capacity to tax and bureaucratic capacity to spend are likely highly correlated, our prediction – that voters should sanction incumbent politicians more for marginal tax revenue increases in low fiscal capacity settings relative to high fiscal capacity settings – could be entirely driven by the fact that voters sanction tax increases more when they are met with less public spending in low bureaucratic capacity places.

While we do not dispute that spending levels figure into a voters' calculus when deciding on whether or not to sanction an incumbent politician, we argue that this relationship is also conditioned by voters' perception of how many other citizens are simultaneously paying taxes and growing the public budget. In our empirical analysis, we will attempt to discriminate between whether increases in spending that result from tax revenue increases are responsible for any change in voter behavior, or if there are additional effects of tax increases outside of their direct effect on spending.

Fiscal Capacity Shocks in Brazilian Municipalities

Fiscal capacity generally develops slowly and is highly correlated with improvements in other aspects of state capacity and political development. It is thus difficult to identify whether

8

differential effects of taxation on electoral outcomes in high and low fiscal capacity contexts are the result of the theoretical mechanisms we propose above, or other differences plausibly correlated with levels of fiscal capacity such as age of democracy or clientelistic politics. We thus take advantage of a rare "shock" to fiscal capacity that occurred in some Brazilian municipalities that allows us to find counterfactual municipalities that did not experience the shock but are sufficiently similar to those that did to mitigate concerns of omitted variable bias.

Thus, we investigate our theoretical argument using data on Brazilian municipalities from 2000 to 2012. Municipal governments in Brazil have strong political autonomy when it comes to public spending (especially on elementary education) and the authority to raise tax revenue using multiple tax instruments, such as sales and property taxes (Nickson, 1995; Rodríguez and Velásquez, 1995). Whereas most other political responsibilities still lie with the federal and state governments, municipalities received these substantial powers in the 1988 constitution (Andrade, 2007; Baiocchi, 2006; Samuels, 2004). Moreover, federal and state transfers have been declining, thus increasing pressure on local mayors to raise revenue. One of the main sources of tax revenue for municipalities is the *Imposto Predial e Territorial Urbano* (IPTU) or urban property tax (De Cesare and Ruddock, 1999). For a large number of municipalities, however, collecting and administering taxes is difficult and highly problematic given outdated property registers, low valuations of property, as well as incompetent or corrupt officials. In this paper, we use variation in fiscal capacity across municipalities to understand whether it moderates the electoral response to changes in tax policy.

In particular, we make use of a federal program in Brazil that was designed to increase

the tax and administrative capacity of municipal governments. In 1998, after much dismay with the performance of local tax collection efforts, the Brazilian Development Bank started the so-called *Programa de Modernizaç ão da Administra ção Tributȧria* program (PMAT). PMAT was created to raise the capacity of municipalities to engage in tax collection. Credit lines subsidized by the federal government would allow the municipalities to use these funds to update taxpayer rolls, educate bureaucrats, and improve bureaucratic infrastructure Gadenne (2017a). As Gadenne (2017a) documents, all municipalities that apply to the program eventually are approved to receive loans. Moreover, funds are restricted to investments in local capacity and municipalities that did receive PMAT saw a significant positive effect on tax collection.

We use the municipalities' applications to PMAT and their respective contract years as a positive shock to fiscal capacity. While not exogenous, we argue that PMAT is a unique opportunity to study this question as it is one of the few cases where the tax capacity of administrative units changes significantly over a short period – and where we can take advantage of differential timing of the program to restrict comparisons to places that all eventually apply for and receive PMAT. It, therefore, allows us to study how voters evaluate changes in tax policy differently in localities with differential levels of fiscal capacity.

Selection into PMAT

Of course, municipalities that apply to PMAT to increase fiscal capacity are different from those that do not. They are richer, larger, and more developed. For example, for the 2008 electoral period in our sample, the median GDP for municipalities that receive PMAT at some point is more than ten times the median GDP of municipalities that have not applied.

10

Similarly, the population size of the median municipality for PMAT recipients is about six times larger, while property tax revenues are almost 100 times larger.

We, therefore, can not simply compare differences in the relationship between tax policy and electoral outcomes across these different municipalities, as mayors and municipalities that select into PMAT are very distinct from those that do not. Instead, we design our empirical analysis such that we only compare places that receive PMAT at some point over our study period. This strategy increases the comparability of units with and without PMAT at a given moment in time, as the counterfactual observations without PMAT will all select into the program eventually. This identification strategy is similar to that used by Gadenne (2017a) to estimate the effects of PMAT on public spending.

Data

To empirically evaluate the link between fiscal capacity, taxation, and electoral account-ability, we assemble a panel dataset of socio-economic and political variables for Brazilian municipalities from 2000 until 2012. First, we collect data on total tax revenue and property tax revenue raised at the municipal level made available by the Institute of Applied Economic Research (IPEA, 2016). From these data, we create our primary independent variable of interest: tax increases in the mayor's term.

Our main dependent variable of interest is whether incumbents are rewarded or punished for the policies they pursue as mayors. Based on electoral returns for the first round of mayoral elections in 2000, 2004, and 2008 we create two measures of electoral performance. The first is the vote share of the incumbent; the second is the margin of victory (negative or positive) for the incumbent. We code incumbency separately for the individual candidate or

the political party. In addition to the incumbent status and election results, we also coded whether incumbents in a given election were of the same party as the state governor or the President, as well as the incumbent mayors age. Data on election results and candidates were collected from the Superior Electoral Court (TSE do Brasil, 2016) in Brazil. We also add a measure of incumbent party ideology, which is based on roll call votes and surveys of Brazilian legislators (Power and Zucco Jr., 2009, 2012; Samuels and Zucco Jr., 2014; Saiegh, 2015).

We expect fiscal capacity to moderate the relationship between taxation and electoral performance. In this empirical analysis, we use the municipalities' enrollment in PMAT as a shock to fiscal capacity. Recall, PMAT provides municipalities with cheap credit lines to improve the local tax administration. We use the date at which a given municipality and the federal government signed the contract to code a municipalities PMAT status. Municipalities are coded as zero before the year the contract was signed and one for the particular year and going forward.

Given the non-random way in which municipalities raise taxes and apply to PMAT, we add several control variables to our data set. Since economic development is likely to affect voters' evaluations of candidates and tax revenues, we add municipality GDP to our data. Similarly, population size is likely to be correlated with our main variables of interest. The data for GDP and Population are from the Brazilian Institute of Geography and Statistics (IBGE, 2016).

Next, we supplement our dataset with control variables for the rate of urbanization of a given locality from the Brazilian Institute of Geography and Statistics (IBGE, 2016) and transfers the municipality receives from the federal and state government from the Institute

of Applied Economic Research (IPEA, 2016). We also control for total spending at the municipal level in case mayors attempt to improve their electoral fortunes by increasing spending immediately before elections.

Analyses

We test Hypothesis 1 by examining the differential effect of increasing property tax revenue on local political competition, conditional on whether a locality has received PMAT, or a positive shock to fiscal capacity. Our main dependent variable is the vote share of the incumbent mayor (if he or she ran again) or incumbent party. Because we are only interested in how tax revenue affects the fate of the incumbent, we exclude localities in which the incumbent or incumbent party did not run again which accounts for 48% and 38% of the sample, respectively.

Our independent variable is the change in tax revenue over the period of the electoral mandate. Because we are unsure how voters will attribute tax collection in the year of the election (whether they will attribute it to the incoming or outgoing government), we focus on the change in tax revenues in the intervening years, e.g. year t_{-3} to year t_{-1} (tax revenue increases over the period in all but 9% of cases. We correct for skew in our resulting variable by taking the log of the change in tax revenue.

Because tax increases and electoral behavior may be correlated with other economic or political variables such as the level of development or ideological leaning of the locality, we include a range of control variables to mitigate omitted variable bias. The economic variables include the mean Population, mean Urban Population Share, mean GDP, and mean Amount of Transfers (logged) from the government of the locality across the years for which we employ

tax revenue data. The political variables include congruence of the incumbent party with the party of the President or Governor, the mayor's ideology, and the mayor's level of education. Finally, as a test of the alternative mechanism we discussed in the theory section – that voters are rewarding incumbents for increased spending on public goods, we add a control for the change in public spending over the three-year period for which we observe changes in taxation. We always control for the lagged dependent variable as a way to mitigate bias due to other *unobserved* variables – in other words, we control for unobserved differences across localities that make them more or less politically competitive.

For our main specification, we estimate Equation 1, which compares localities that receive PMAT in the first full year of the mayor's mandate, t_{-3}, to localities that will receive PMAT in the same electoral mandate, e.g. between year t_{-2} and year t_{-1}. This is the cleanest comparison as we are only comparing places with mayors that have the political will to implement PMAT. However, the effects of PMAT should be most likely to materialize in places that implement it in the first year of the mandate. We code a binary variable *Treated* as 1 if the locality received PMAT in year t_{-3} and as 0 if the locality received PMAT between year t_{-2} and year t_{-1}. Of the 353 cases where the incumbent party runs again, 53% are coded as treated.

$$\text{DV}_{i,t} = \Delta\text{Tax}_{i,t_{-3}-t_{-1}} + \text{Treat}_{i,t} + \Delta\text{Tax}_{i,t_{-3}-t_{-1}} \times \text{Treat}_{i,t} + \text{Controls}_{i,t} + \varepsilon \qquad (1)$$

There is a statistically significant difference in the relationship between increases in tax revenue and incumbent vote share conditional on being treated, indicated by the positive coefficient on the interaction term in Table 1. Columns 1 and 3 restrict the sample to cases

in which the incumbent mayor ran again while columns 2 and 4 include places in which the incumbent party ran again. As illustrated in the left panel of Figure 1, in places that receive PMAT late in the mandate, larger increases in tax revenue are increasingly bad for the incumbent. As shown in the right panel, the marginal effect of tax increases among places without PMAT has a statistically significant negative effect on the incumbent's vote share. However, the onset of PMAT in the first year of the mayor's mandate undermines any negative trend; the marginal effect of tax increases among this group is not different from zero. This implies that increasing fiscal capacity can remove the electoral disincentives of increasing tax revenues.

Figure 1: Relationship between Δ Tax Revenues and Electoral Outcome, by PMAT Status
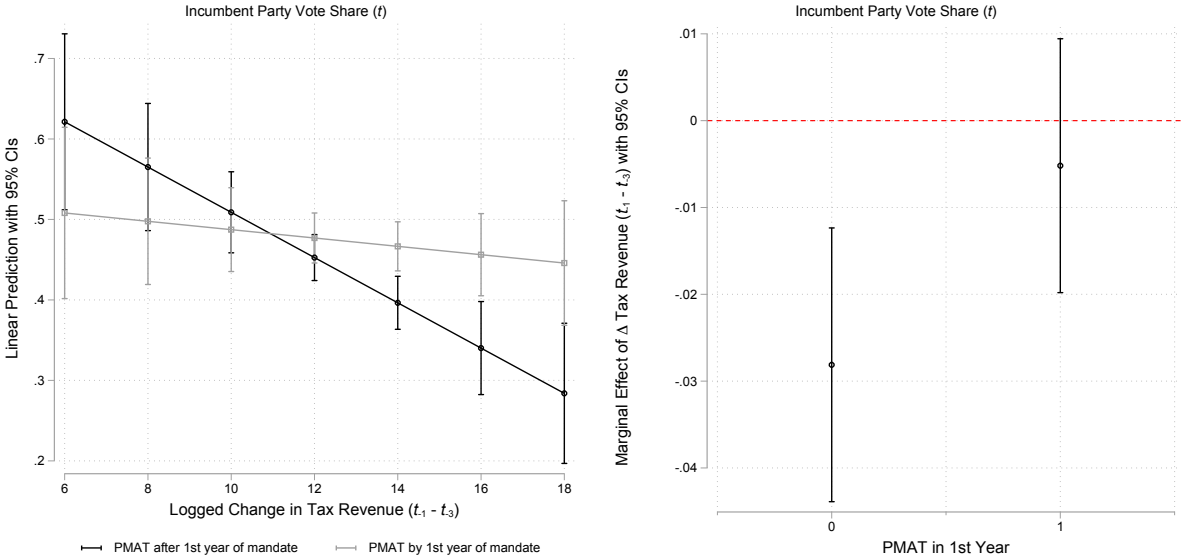
We further check the robustness of our main specification to alternate measures of the dependent and independent variables. First, we investigate whether other measures of political competition similarly have a conditional relationship with fiscal capacity and taxation. In particular, we examine the incumbent's margin of victory (positive or negative)

Table 1: Relationship between Δ Taxation ($t_{-1} - t_{-3}$) and Incumbent Vote Share (t) Conditional on PMAT

	Incumbent Runs Again		Incumbent Party Runs	
	(1)	(2)	(3)	(4)
Δ Tax Revenue (logged)	-0.008	-0.030^{***}	-0.016^{**}	-0.028^{***}
	(0.006)	(0.008)	(0.005)	(0.008)
PMAT in 1st year	-0.213^{*}	-0.271^{*}	-0.195^{*}	-0.268^{*}
	(0.108)	(0.112)	(0.096)	(0.107)
Δ Tax Revenue (logged) $\times$ PMAT in 1st year	0.019^{*}	0.021^{*}	0.018^{*}	0.023^{**}
	(0.009)	(0.009)	(0.008)	(0.008)
Vote Share Prior Election	0.303^{**}	0.297^{*}	0.264^{**}	0.329^{**}
	(0.107)	(0.117)	(0.094)	(0.112)
Population (logged)		-0.025		-0.004
		(0.028)		(0.032)
Urban Population Share		0.000		0.000
		(0.000)		(0.000)
GDP Growth		-0.122^{*}		-0.050
		(0.048)		(0.059)
Amount of Transfers (logged)		0.059^{+}		0.019
		(0.033)		(0.038)
Party of the Governor		0.009		0.038^{+}
		(0.021)		(0.022)
Party of the President		0.016		0.045
		(0.034)		(0.032)
Mayor Ideology Prior Election		0.022		0.016
		(0.016)		(0.016)
Mayor Education Prior Election		-0.003		0.010
		(0.007)		(0.007)
Δ Spending		0.000		-0.000
		(0.000)		(0.000)
Constant	0.440^{***}	-0.087	0.506^{***}	0.200
	(0.099)	(0.329)	(0.096)	(0.330)
Observations	270	239	328	295

OLS models with robust standard errors. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

and the Herfindahl index of vote shares of the parties competing in the election in year $t \in \{2004, 2008\}$. In Table tab:otherDVs, we show that, indeed, there is a statistically significant and positive coefficient on the interaction term on both measures of electoral concentration. This implies that increasing taxes in lower fiscal capacity places has the effect of making future elections more competitive for the incumbent.

Finally, in Table A.2, we check the robustness to using an alternative independent variable. Instead of changes in the property tax (IPTU), we instead examine changes in total tax revenue. In our view, using revenue from the IPTU is the more appropriate test two reasons. First, one of the primary uses of PMAT funds was the improvement of property registers and valuations (see Gadenne (2017b)). Second, since property taxes are one of the most important local tax sources in Brazil and require high levels of capacity to collect, we any effect of PMAT on collection capacity would be most immediate and important for the property tax relative to other local taxes.

Fixed Effects Model

In the previous analysis, we compared elections in municipalities that agreed to receive PMAT at least three years before the election to all municipalities that would eventually receive PMAT. As an even more conservative test, we now estimate models with municipality and election fixed effects. The estimated coefficients are therefore only based on changes within the individual municipalities, i.e., what is the differential effect of changes in taxation before and after the introduction of PMAT in municipality i?

To estimate the fixed effects model we first create a panel data set based on the three elections in our data: 2000, 2004, and 2008. Given that we are only interested in observations

that receive PMAT at some point in the period studied, we then drop all "never takers" from the data. This leaves us with 282 unique municipalities and 846 observations in total. Once we reduce the sample to those elections in which the incumbent party is running again, however, we end up with 292 unique municipalities of which only approximately 80 have elections with and without PMAT. While this sample is becoming very small, the conservative test of the fixed effects model can lend additional credibility to the above findings.

Next, we estimate our preferred specification with incumbent party vote share as the dependent variable. As before, the model is estimated as OLS with robust standard errors but now includes fixed effects for both municipalities and elections years. The results are therefore more robust to other potential omitted variables at the municipal level that are constant over time or election-specific trends. In addition, the interpretation of our estimand changes such that it is now based on changes within municipalities, i.e. differences in electoral results before and after PMAT.

Our main interest again lies in the interaction between changes in taxation and the introduction of PMAT at $t - 3$. Table 2 shows the results from three models. The first column presents the result when we only include the interaction and its constituent terms (plus fixed effects) in the regression. In the second column, we include what we view as the most important set of controls: logged population size, GDP growth, logged transfers, and share of the urban population. In the last column, we also control for congruence of the incumbent with the president's or governor's party, the ideological score of the incumbent party, the incumbent's education level, as well as spending changes before the election.

As in the models presented above, the effect of changes in taxation on incumbent party vote share is clearly moderated by fiscal capacity. The interaction effect in all three models is

estimated to be positive and significant ($p \leq 0.1$ for columns 1 & 3 and $p \leq 0.05$ for column 2).

Table 2: Fixed Effects Regression Estimating Effect of Δ Taxation ($t_{-1} - t_{-3}$) on Incumbent Party Voteshare (t) Conditional on PMAT

	(1)	(2)	(3)
Δ Tax Revenue (logged)	−0.017	−0.020	−0.067[+]
	(0.026)	(0.028)	(0.034)
PMAT in 1st year	−0.362*	−0.423*	−0.510[+]
	(0.158)	(0.170)	(0.278)
Δ Tax Revenue (logged) × PMAT in 1st year	0.021[+]	0.025*	0.035[+]
	(0.012)	(0.012)	(0.020)
Population (logged)		−0.271	0.512
		(0.696)	(0.833)
GDP Growth		−0.181	−0.361[+]
		(0.156)	(0.210)
Amount of Transfers (logged)		−0.139	−0.403
		(0.254)	(0.316)
Urban population share (logged)		−0.000	−0.000
		(0.001)	(0.001)
Party of the President			0.102
			(0.095)
Party of the Governor			−0.028
			(0.055)
Δ Spending			0.000
			(0.000)
Mayor Ideology Prior Election			−0.074
			(0.056)
Mayor Education Prior Election			−0.010
			(0.020)
Constant	0.648[+]	6.146	2.803
	(0.347)	(6.623)	(8.648)
Observations	316	316	279
Municipal FE	Yes	Yes	Yes
Election FE	Yes	Yes	Yes

[+]$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

As in the regression models above, positive changes in taxes before the election are associated with lower incumbent vote shares in low capacity settings (though statistically

indistinguishable from zero). In high capacity settings, on the other hand, the marginal effect of positive changes in taxation is slightly positive (again, however, statistically indistinguishable from zero). While both marginal effects are not significantly different from zero, the marginal effect of changes in taxation with and without PMAT is statistically different: the marginal effect in places without PMAT is significantly smaller than that of elections in which PMAT was present ($p \leq 0.1$ for columns 1 & 3 and $p \leq 0.05$ for column 2).

In the Appendix, we present results for the model with the limited set of control variables (column 2 in Table 2) with alternative dependent variables. Table A.3 shows the results from the fixed effects models when we use the incumbent party's margin of victory, the individual incumbent's vote share, or individual incumbent's margin of victory as the dependent variable. Across all models, while not significant at conventional levels, the coefficient estimate on the interaction is in the expected direction.

Lastly, Table A.4 shows the results from the first fixed effects models when we keep observations for elections in which the incumbent party is not running. Instead of coding those results as missing and effectively dropping them, we code the electoral results for incumbent parties that are not running as zero. Again, the interaction is positive, but only significant in the model with the full set of controls.

Relationship between Fiscal Capacity and Tax Increases

Hypothesis 2 suggests that places with low fiscal capacity should be less likely to increase taxes, given expectations of electoral retribution, relative to places with higher fiscal capacity. Here, we provide a suggestive empirical test of this theoretical implication, though it is subject to greater concerns of omitted variable bias than our prior tests of Hypothesis 1.

20

Because places that sign their PMAT contract at different times during the electoral mandate are arguably "as-if" randomly assigned, or similar on all other dimensions except for the receipt of PMAT, these are not appropriate comparison groups for a test of Hypothesis 2. In this theoretical prediction, we expect politicians are responding to different equilibrium conditions and that many more aspects of localities should thus differ across equilibria. As a result, we compare places that never receive PMAT in our data to places that do. Because we know these groups differ on many other qualities besides fiscal capacity, we control for all the same variables as in Equation 1.

To test the relationship between fiscal capacity and tax increases, we first disaggregate our main independent variable, a proxy for fiscal capacity, by the timing of the receipt of PMAT: whether the locality received PMAT prior to the electoral mandate during which tax changes are being measured, during that mandate, or subsequent to that mandate. We then regress the change in taxes on this independent variable of interest and all controls. In column 1 of Table 3, the dependent variable is raw changes in tax revenue in 1000 $R; in column 2, we take the log of the raw data. Because we are now interested in both increases and decreases in tax changes (relative to Equation 1 where we only examine tax increases), we use a log-negative transformation where we log the absolute value of the change and then multiply originally negative values by -1.

The results provide suggestive evidence in line with Hypothesis 2: in both specifications, places with PMAT are more likely to raise taxes than places without PMAT. This is especially true for places that receive PMAT in that mandate, which is unsurprising given the objective of PMAT. However, we additionally see a negative though insignificant coefficient in column 1 on localities that receive PMAT before the electoral mandate in question. This could

reflect a regression to the mean after a prior mandate in which tax revenue was substantially

raised.

Table 3: Relationship between Δ Taxation $(t_{-}1 - t_{-}3)$ and PMAT by year $(t_{-}3)$

	Δ Tax Revenue (1,000 \$R)	Δ Tax Revenue (log-negative)
PMAT pre-mandate	−1200.968	1.726***
	(771.549)	(0.192)
PMAT during mandate	899.846**	1.970***
	(331.279)	(0.199)
PMAT post-mandate	416.859	1.768***
	(416.569)	(0.346)
Vote Share Prior Election	120.614	−0.043
	(257.415)	(0.213)
Population (logged)	267.782**	0.052
	(82.642)	(0.052)
GDP Growth	−116.556*	0.092
	(57.098)	(0.081)
Amount of Transfers (logged)	−810.547*	1.074***
	(389.779)	(0.069)
Party of the Governor	−36.531	0.119*
	(67.372)	(0.059)
Party of the President	−263.612+	−0.046
	(142.599)	(0.096)
Δ Spending	0.000***	0.000*
	(0.000)	(0.000)
Mayor Ideology Prior Election	31.432	−0.069+
	(48.789)	(0.037)
Mayor Education Prior Election	25.947*	0.054***
	(12.058)	(0.013)
Incumbent Reelected Prior Election	−69.532	−0.340***
	(76.609)	(0.078)
Constant	9935.705+	−16.054***
	(5344.348)	(0.778)
Observations	9373	9373

OLS models with robust standard errors. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Potential Threats to Causal Inference

One potential problem with the models presented above is that PMAT can have both a direct and indirect effect on the outcome of interest, and we are conflating the two in our current specification. We are less interested in the direct effect – how PMAT directly increases tax revenues and thereby effects voting behavior, and more interested in the indirect or moderated effect – how PMAT changes voter expectations such that a similar increase in taxes in PMAT and non-PMAT places leads to differential electoral outcomes. Consider our main independent variable Δ Tax. In cases where PMAT is introduced, we could decompose changes in tax revenue into those directly caused by PMAT policies ($\Delta\ Tax_{PMAT}$) and those due to other policy changes by elected officials ($\Delta\ Tax_{policy}$). In the models above, however, we are only able to estimate the moderating effect of PMAT on the total change in tax revenue. Thus, our results may suffer from a kind of "post-treatment" bias in which our moderator (PMAT) has a positive effect on the treatment (ΔTax) (as we show it does above).

Ideally, we would like to isolate the two different effects of PMAT: the moderating effect and the direct effect on changes in tax revenue. In this section, we, therefore, attempt to empirically decompose Δ Tax into $\Delta\ Tax_{PMAT}$ and $\Delta\ Tax_{policy}$. We then estimate the same model from above but using only the estimated $\Delta\ Tax_{policy}$ as our treatment variable of interest.

Based on previous work in the biostatistics literature (e.g., VanderWeele and Robins, 2007b; VanderWeele and Robins, 2007a), Wodtke and Almirall (2017) propose the structural nested means model as a way to correct for post-treatment bias in models where the moder-

ator is partly affected by earlier treatments. The idea is to regress the moderator on earlier treatments and then "purge" the post-treatment part by only including the residuals from the first stage in the actual model of interest. While our problem is not quite the same, we adjust this strategy for our purposes. We regress our independent variable of interest Δ *Tax* on PMAT. By predicting changes in tax revenue with PMAT can then isolate the part that is due to its introduction. Next, we use the residuals from the first stage (or Δ Tax_{policy} as the independent variable in our main model. Specifically, we estimate the following two stage model:

$$\Delta\text{Tax} \sim \alpha_1 + \delta\text{PMAT} + \varepsilon_1$$

$$\Delta\hat{\text{Tax}}_{\text{policy}} = \Delta\text{Tax} - \Delta\hat{\text{Tax}}$$

$$\text{Voteshare} \sim \alpha_2 + \beta_1\Delta\hat{\text{Tax}}_{\text{policy}} + \beta_2\text{PMAT}_{i,t} + \beta_3\Delta\hat{\text{Tax}}_{\text{policy}} \times \text{PMAT}_{i,t} + \gamma\text{Controls}_{i,t} + \varepsilon_2$$

The idea is that by residualizing the change in tax revenue, we are able to isolate the changes that are not directly caused by PMAT and can, therefore, estimate the moderating effect of fiscal capacity on taxes without conflating it with the effect of PMAT on revenues. Given that our independent variable in the second stage is based on estimates from the first stage, standard errors have to be adjusted. Often this is done by bootstrapping. Instead, we estimate both stages as a Bayesian model in which both stages are estimated sequentially at each iteration of the sampler. Thus, the uncertainty from the first stage estimation is automatically accounted for in the estimates of the second stage model.

We estimate the models using Hamiltonian Monte Carlo in Stan (Team, 2017). We specify uninformative Gaussian (0, 10) priors for all coefficient estimates and Cauchy priors for the errors in both stages. We run four chains of 4000 iterations (1000 warmups) and save every 3rd iteration, which leaves us with 4000 draws from the posterior distribution. All evidence suggests that the chains are converged.

Table 4: Results from Second Stage Model

Parameter	Rhat	n_eff	mean	sd	2.5%	50%	97.5%
Constant	1.000	3641	0.278	0.134	0.017	0.277	0.535
Vote Share Prior Election	0.999	3812	0.270	0.081	0.111	0.268	0.431
Population (logged)	1.000	3550	0.002	0.011	-0.020	0.002	0.023
GDP Growth	1.000	4000	-0.036	0.060	-0.155	-0.037	0.079
Residualized Δ Tax	1.000	3589	-0.018	0.008	-0.035	-0.018	-0.002
PMAT in 1st year	1.000	4000	0.036	0.019	-0.003	0.036	0.075
PMAT $\times$ Residualized Δ Tax	0.999	3885	0.019	0.009	0.002	0.019	0.036

Table 4 shows the results for the second stage of the model with incumbent party vote share as the dependent variable. These results correspond to those in Table 1 above, except that we here residualize the Δ *Tax* variable first. The results are quite similar; the only stark difference is that the coefficient on the constituent PMAT term become positive. This suggests that it potentially suffered from post-treatment bias in the previous specification. Importantly, however, the interaction is positive, and the 95% credible interval does not include zero. Similarly, Figure 2 shows the marginal effect of changes in tax revenue for municipalities with and without PMAT. The results are very similar to those presented above. Contrary to the visual impression, the two marginal effects are significantly different from each other, i.e., the 95% credible interval for the difference between the two marginal effects does not include zero.

Figure 2: Marginal Effect of Residualized Δ Tax Revenues on Incumbent Party Vote-share given PMAT Status
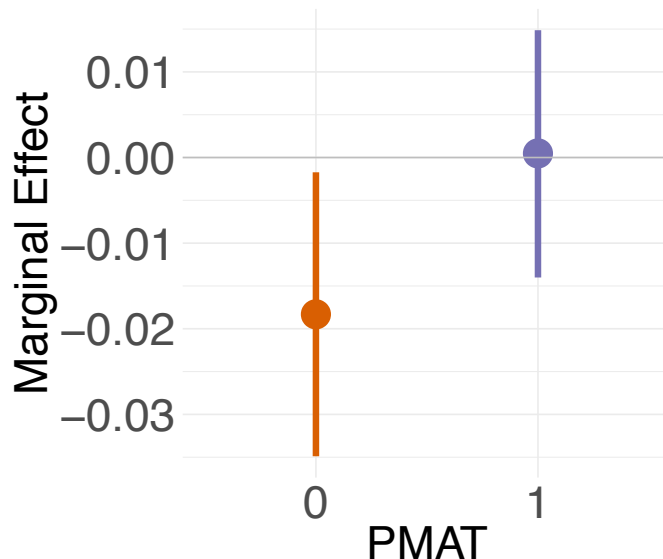
Alternative Explanations

We attempted to rule out a key concern that changes in electoral behavior are being driven by changes in public spending rather than perceived or actual changes in fiscal capacity by including changes in spending as a control in our specification. Here, we discuss and refute two additional alternative explanations: 1) that increased mobilization rather than changed voter preferences, and 2) that political business cycles are driving the outcomes.

Several studies suggest that being taxed at a higher rate can mobilize voters to turn out. For instance, Weigel (2018) finds that increased tax collection is associated with more political participation of citizens. Kasara and Suryanarayan (2015) additionally find that the turnout behavior is sensitive to fiscal capacity – while the rich vote more than the poor where concerns about redistribution are high (in high fiscal capacity settings), this is not true in places with low fiscal capacity. To rule out this potential explanation, we re-run

Equation 1 with turnout as the dependent variable. We find no effect of fiscal capacity or of tax increases on local election turnout.

Another possible mechanism driving a relationship between taxation and electoral outcomes is political business cycles where incumbents purposefully manipulate tax collection just before an election. Cheibub (1998), for instance, finds that tax revenues go down in election years compared to non-election years. And just focusing on Africa where we would expect fiscal capacity to be generally low, Block (2002) finds evidence of the same trend. However, greater fiscal deficits in election years are driven by increased expenditures rather than decreased tax revenue. We test for the existence of political business cycles in our data and find no evidence either in the full data, or differentially across places with and without PMAT, that tax revenues are decreasing in the run-up to elections.

Discussion

As we discuss above, municipalities that have applied for and received PMAT are significantly different from those municipalities that have not. One of the advantages of our research design is that we only compare places that are contracted to receive PMAT earlier in an electoral mandate to those who sign the contract later in a mayor's mandate. Thus we do not have to worry about our inference being threatened by a difference between PMAT and non-PMAT observations in our sample. Rather, the assignment of the fiscal capacity shock is arguably "as-if" random.

On the other hand, this research design also has drawbacks. For example, the estimated effect is hardly generalizable to all municipalities, let alone other countries. Instead, our estimand is similar to an average treatment effect on the treated (ATT). In a difference-in-

differences design, the estimated effect of the treatment is the ATT, as one compares units that have received treatment before and after the treatment occurred (as similar to our fixed effect model above). By design, all the empirical models testing Hypothesis 1 in this paper only use data on municipalities that eventually receive PMAT. Our estimate of both the moderated effect, changes in tax revenue, and all other covariates should, therefore, be interpreted similarly to a treatment effect on the treated.

It is hard to speculate whether the effects we uncovered would also be present in those municipalities that did not select into PMAT at some point. At a minimum, similar shocks to fiscal capacity should have similar effects in places that look like our counterfactual localities – places where there is political will to increase capacity. On the other hand, as we discuss above, when states or administrative units are in a low fiscal capacity equilibrium, minor improvements in capacity may not be enough to change the equilibrium pattern of behavior. It is possible that those municipalities that did select to apply for PMAT already had higher initial levels of capacity, which made the capacity shock more impactful in changing the electoral behavior.

We do not see this generalizability concern as a problem, but rather a potential feature of the multiple equilibria we describe in our theory. It may be that places with initially very low capacity additionally face strong electoral incentives *not* to increase tax revenue, and so an available fiscal capacity shock should not be expected to work there in the same way it works in places with higher initial capacity. It is also possible that local governments face different strategic incentives than national governments. Eubank (2012), for instance, finds that in the low-capacity setting of Somaliland, a lack of access to foreign aid made the central government more likely to tax and be responsive to citizens relative to its aid-prone

neighbors. This could imply that the kinds of goods that a central government provides, such as security, may generate greater incentives to raise revenue than the local public goods that municipal governments tend to provide.

As one demonstration of the possible generalizability of these multiple equilibria, however, we conduct a cross-national test of whether there is a differential relationship between tax increases and electoral behavior in low and high fiscal capacity settings at the national level. To do so, we run a cross-country panel regression (1984-2014) with 79 countries. Our dependent variable is the margin of victory in executive elections from V-Dem (Coppedge et al., 2017) and our independent variable is tax revenue (ICTD/UNU-WIDER, 2017). As a moderating variable that proxies for fiscal capacity, we use ICRG's 4-point scale of *Bureaucratic Quality*. As shown in Figure 3, there is a negative marginal effect of tax increases on the executive's margin of victory in the subsequent election, implying that increases in taxation make electoral races more competitive. This is not true of places with higher bureaucratic capacity, however. As in our data, we find a null relationship between tax increases and electoral outcomes in higher capacity places.

Figure 3: Cross-national Panel Regression: Margin of Victory on Δ Tax Revenues, by Bureaucratic Quality
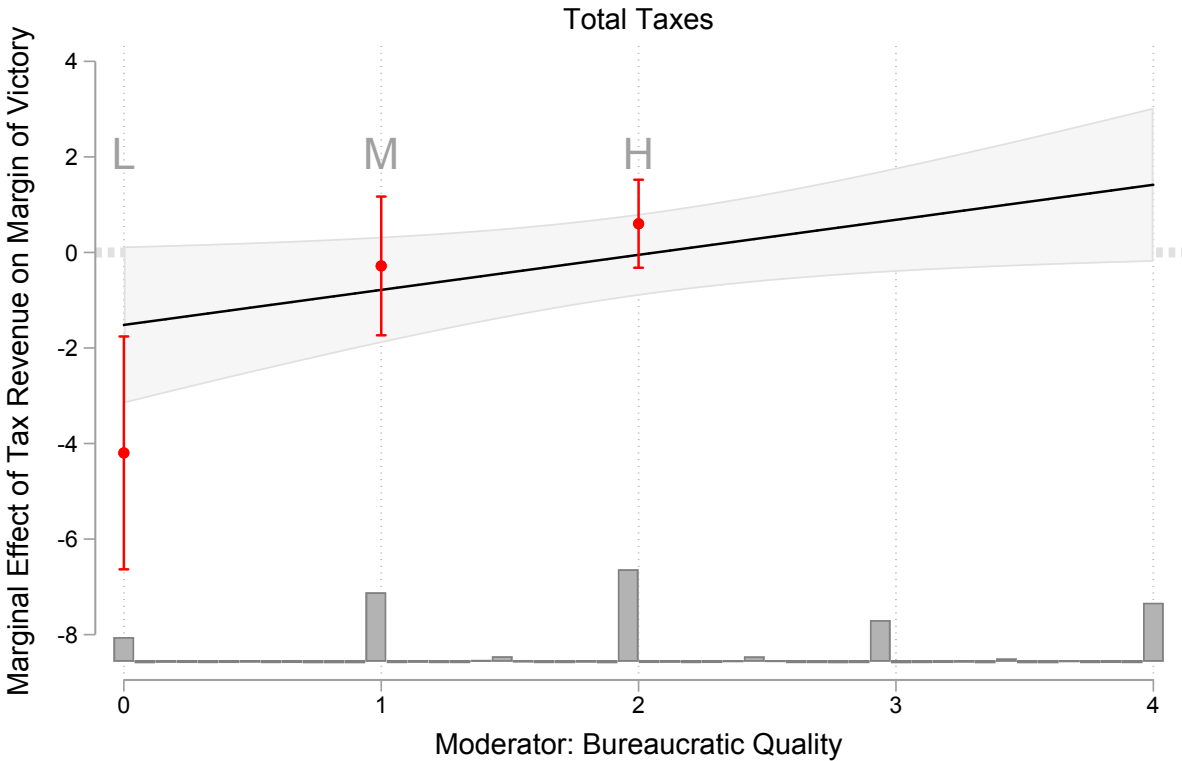
References

Acemoglu, Daron, Suresh Naidu, Pascual Restrepo and James A. Robinson. 2015. Democracy, Redistribution and Inequality. In *Handbook of Income Distribution*, ed. Anthony B. Atkinson and Francois Bourguignon. Vol. 2 Elsevier B.V. chapter 21, pp. 1885–1966. `http://economics.mit.edu/files/9396` (Accessed November 27, 2013).

Andrade, Luis Aureliano de. 2007. O Município na Política Brasileira: Revisitando Coronelismo, enxada e voto. In *Sistema Político Brasileiro: Uma Introdução*, ed. Lúcia Avelar and Antônio Octávio Cintra. São Paulo: Editora Unesp pp. 243–260.

Baiocchi, Gianpaolo. 2006. *Decentralization and Local Governance in Developing Countries: a comparative perspective.* Cambridge: MIT Press.

Bates, Robert H and Donald Da-Hsiang Lien. 1985. "A note on taxation, development, and representative government." *Politics & Society* 14(1):53–70.

Block, Steven A. 2002. "Political business cycles, democratization, and economic reform: the case of Africa." *Journal of Development Economics* 67(1):205–228.

Cheibub, José Antonio. 1998. "Political regimes and the extractive capacity of governments: Taxation in democracies and dictatorships." *World Politics* 50(3):349–376.

Coppedge, Michael, John Gerring, Staffan I. Lindberg, Svend-Erik Skaaning, Jan Teorell, David Altman, Michael Bernhard, M. Steven Fish, Adam Glynn, Allen Hicken, Carl Henrik Knutsen, Anna Lührmann, Kyle L. Marquardt, Kelly McMann, Valeriya Mechkova, Moa Olin, Pamela Paxton, Daniel Pemstein, Josefine Pernes, Constanza Sanhueza Petrarca, Johannes von Römer, Laura Saxer, Brigitte Seim, Rachel Sigman, Jeffrey Staton, Natalia Stepanova and Steven Wilson. 2017. "V-Dem Dataset v7.1." *Varieties of Democracy (V-Dem) Project* .

De Cesare, Cláudia and Les Ruddock. 1999. The Property Tax System in Brazil. In *Property Tax: An International Comparative Review*, ed. William McCluskey. United Kingdom: Ashgate Publishing Ltd chapter 13, pp. 266–282.

De La Cuesta, Brandon, Helen V. Milner, Daniel L. Nielson and Stephen Knack. 2017. "Taxation without Representation? Experimental Evidence from Ghana and Uganda on Citizen Action toward Taxes, Oil, and Aid." `https://www.princeton.edu/~hmilner/uganda-survey-experiment.pdf` (Accessed March 2018).

Del Carpio, Lucia. 2013. "Are the Neighbors Cheating? Evidence from a Social Norm Experiment on Property Taxes in Peru." Working Paper.

Eubank, Nicholas. 2012. "Taxation, Political Accountability, and Foreign Aid: Lessons from Somaliland." *Journal of Development Studies* 48(4):465–480.

Gadenne, Lucie. 2017*a*. "Tax me, but spend wisely? Sources of public finance and government accountability." *American Economic Journal: Applied Economics* 9(1):274–314.

Gadenne, Lucie. 2017b. "Tax me, but spend wisely? Sources of public finance and government accountability – Online Appendix." `https://7e66e44e-a-62cb3a1a-s-sites.` `googlegroups.com/site/lgadenne/home/research/Appendix_Gadenne_` `Tax_Me_2016.pdf?attachauth=ANoY7cofjEr6SzmGEFttXpnWqc9pdsPc_` `fTj76Bw83lG7IkyUZSlSdQRhoe6ViduF2j6Ja5JKJcwIYBRuruJrU1JCqEUIzJi9UsChGRcWEg1lAJKiSSkNb4` `cW1jGmcMgK1XSQloZ4SAt5b0qBgESkIUmr908zzdXN9NBjsUnOXSr9hkDQNVmwqSKkPSblgM16Y4CzoCW5jP8M` `attredirects=0` (Accessed March, 2018).

Gould, Andrew C. and Peter J. Baker. 2002. "Democracy and Taxation." *Annual Review of Political Science* 5:87–110.

IBGE. 2016. "Brazilian Institute of Geography and Statistics." `http://www.ibge.gov.br/` (Accessed January 2016).

ICTD/UNU-WIDER. 2017. "Government Revenue Dataset.".
   URL: *https: // www. wider. unu. edu/ project/ government-revenue-dataset*

IPEA. 2016. "Institute of Applied Economic Research." `http://www.ipeadata.gov.br` (Accessed January 2017).

Kasara, Kimuli and Pavithra Suryanarayan. 2015. "When do the rich vote less than the poor and why? Explaining turnout inequality across the world." *American Journal of Political Science* 59(3):613–627.

Martin, Lucy. 2014. "Taxation, loss aversion, and accountability: theory and experimental evidence for taxations effect on citizen behavior.".
   URL: *https: // sites. duke. edu/ 2014bmp/ files/ 2014/ 10/ Martin_ TaxAcc. pdf*

Martin, Lucy. 2016. "Strategic Taxation: A model of taxation and accountability by rent-seeking governments.".

Nickson, R. Andrew. 1995. *Local Government in Latin America.* Boulder: Lynne Rienner Publishers.

North, Douglass C. and Barry R. Weingast. 1989. "Constitutions and Commitment: The Evolution of Institutional Governing Public Choice in Seventeenth-Century England." *The Journal of Economic History* 49(4):803–832.

Paler, Laura. 2013. "Keeping the public purse: An experiment in windfalls, taxes, and the incentives to restrain government." *American Political Science Review* 107(4):706–725.

Power, Timothy and Cesar Zucco Jr. 2009. "Estimating Ideology of Brazilian Legislative Parties, 1990-2005: A Research Communication." *Latin American Research Review* 44(1):218–246.

Power, Timothy and Cesar Zucco Jr. 2012. "Elite Preferences in a Consolidating Democracy: The Brazilian Legislative Surveys, 1990-2009." *Latin American Politics and Society* 54(4):1–27.

Rodríguez, Alfredo and Fabio Velásquez, eds. 1995. *Municípios y Servícios Públicos: Gobiernos Locales en Ciudades Intermédias de América Latina*. Santiago: Ediciones Sur.

Ross, Michael L. 2004. "Does taxation lead to representation?" *British Journal of Political Science* 34(2):229–249.

Saiegh, Sebastián. 2015. "Using Joint Scaling Methods to Study Ideology and Representation: Evidence from Latin America." *Political Analysis* 23(3):363–384.

Samuels, David. 2004. The Political Logic of Decentralization in Brazil. In *Decentralization and Democracy in Latin America*, ed. Alfred Montero and David Samuels. Indiana: University of Notre Dame Press pp. 67–93.

Samuels, David and Cesar Zucco Jr. 2014. "The Power of Partisanship in Brazil: Evidence from Survey Experiments." *American Journal of Political Science* 58(1):212–225.

Sy-Sahande, Sanata. 2017. "Taxing Clients: The Effects of Clientelism on Citizen Tax Attitudes." Working Paper. `https://www.dropbox.com/s/7gbsvweu77miwtu/sy_jmp17.pdf?dl=0` (Accessed March 2018).

Team, Stan Development. 2017. "Stan Modeling Language Users Guide and Reference Manual." Version 2.17.0. `http://mc-stan.org` (accessed March 2018).

Timmons, Jeffrey F. 2010. "Taxation and representation in recent history." *The Journal of Politics* 72(1):191–208.

TSE do Brasil. 2016. "Tribunal Superior Eleitoral do Brasil." `http://www.tse.jus.br/` (Accessed January 2017).

VanderWeele, Tyler J. and James M. Robins. 2007*a*. "Directed Acyclic Graphs, Sufficient Causes and the Properties of Conditioning on a Common Effect." *American Journal of Epidemiology* 166(9):1096–1104.

VanderWeele, Tyler J. and James M. Robins. 2007*b*. "Four Types of Effect Modification: A Classification Based on Directed Acyclic Graphs." *Epidemiology* 18(5).

Weigel, Jonathan L. 2018. "Building State and Citizen: How Tax Collection in Congo Engenders Citizen Engagement with the State." `https://static1.squarespace.com/static/59832fbcf9a61eb15deffb3c/t/5a538aa053450aea1743e2e5/1515424426024/weigel_jmp.pdf` (Accessed March 2018).

Wodtke, Geoffrey T. and Daniel Almirall. 2017. "Estimating Moderated Causal Effects with Time-Varying Treatments and Time-Varying Moderators: Structural Nested Mean Models and Regression with Residuals." *Sociological Methodology* 47(1):212–245.

Supporting Information:
Fiscal Capacity as a Moderator of the Taxation-Accountability Hypothesis

A Robustness to Different Dependent Variables

Table A.1: Relationship between Δ Taxation $(t_{-1} - t_{-3})$ and Electoral Outcome (t)

	Margin of Victory		Herfindahl Index	
	(1)	(2)	(3)	(4)
Δ Tax Revenue (logged)	−0.008	−0.035**	−0.018***	−0.020***
	(0.008)	(0.012)	(0.003)	(0.006)
PMAT in 1st year	−0.192	−0.286+	−0.193**	−0.235**
	(0.140)	(0.159)	(0.062)	(0.073)
Δ Tax Revenue (logged) × PMAT in 1st year	0.019+	0.025*	0.017***	0.020***
	(0.011)	(0.012)	(0.005)	(0.005)
Margin of Victory Prior Election	0.313**	0.337**		
	(0.105)	(0.119)		
Population (logged)		0.018		−0.007
		(0.048)		(0.021)
Urban Population Share		0.000		0.000
		(0.000)		(0.000)
GDP Growth		0.046		−0.062
		(0.078)		(0.046)
Amount of Transfers (logged)		0.027		0.007
		(0.054)		(0.025)
Party of the Governor		0.068*		0.001
		(0.033)		(0.015)
Party of the President		0.071		−0.005
		(0.046)		(0.018)
Mayor Ideology Prior Election		0.025		0.003
		(0.025)		(0.010)
Mayor Education Prior Election		0.023*		−0.001
		(0.010)		(0.005)
Δ Spending		−0.000		−0.000
		(0.000)		(0.000)
Herfindahl Prior Election			0.157*	0.181*
			(0.062)	(0.073)
Constant	0.064	−0.521	0.588***	0.550*
	(0.106)	(0.453)	(0.053)	(0.221)
Observations	324	293	328	295

OLS models with robust standard errors. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

B Robustness to a Different Independent Variable

Table A.2: Relationship between Δ Taxation ($t_{-1} - t_{-3}$) and Incumbent Vote Share (t) Conditional on PMAT

	(1)	(2)
Δ Total Tax Revenue (logged)	-0.010	-0.007
	(0.007)	(0.013)
PMAT in 1st year	-0.203	-0.282^{+}
	(0.138)	(0.157)
Δ Total Tax Revenue (logged) $\times$ PMAT in 1st year	0.017^{+}	0.022^{*}
	(0.010)	(0.011)
Vote Share Prior Election	0.291^{**}	0.361^{***}
	(0.092)	(0.108)
Population (logged)		-0.026
		(0.033)
Urban Population Share		0.000
		(0.000)
GDP Growth		-0.037
		(0.060)
Amount of Transfers (logged)		0.017
		(0.038)
Party of the Governor		0.032
		(0.022)
Party of the President		0.053
		(0.032)
Mayor Ideology Prior Election		0.018
		(0.016)
Mayor Education Prior Election		0.010
		(0.007)
Δ Spending		-0.000
		(0.000)
Constant	0.424^{***}	0.212
	(0.119)	(0.333)
Observations	348	312

OLS models with robust standard errors. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

C Robustness Checks for Fixed Effects Model

Table A.3: Fixed Effects Regression Estimating Effect of Δ Taxation $(t_{-1} - t_{-3})$ on Electoral Outcomes (t) Conditional on PMAT

	Inc Party Margin (1)	Inc Ind Voteshare (2)	Inc Ind Margin (3)
Δ Tax Revenue (logged)	−0.036	−0.001	−0.027
	(0.039)	(0.056)	(0.030)
PMAT in 1st year	−0.331	−1.291**	−0.503+
	(0.224)	(0.495)	(0.274)
Δ Tax Revenue (logged) × PMAT in 1st year	0.011	0.047	0.027
	(0.016)	(0.040)	(0.022)
Population (logged)	1.100	−3.167*	−0.401
	(0.854)	(1.525)	(0.436)
GDP Growth	−0.267	0.848*	−0.136
	(0.205)	(0.410)	(0.164)
Amount of Transfers (logged)	−0.587+	−1.926	−0.497
	(0.355)	(1.301)	(0.451)
Urban population share (logged)	0.000	0.003	0.001
	(0.001)	(0.002)	(0.001)
Constant	−1.654	67.978*	13.627+
	(8.919)	(26.272)	(7.349)
Observations	315	196	261
Municipal FE	Yes	Yes	Yes
Election FE	Yes	Yes	Yes

$^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table A.4: Fixed Effects Regression Estimating Effect of Δ Taxation $(t_{-1}-t_{-3})$ on Incumbent Party Voteshare (t) Conditional on PMAT

	(1)	(2)	(3)
Δ Tax Revenue (logged)	-0.012	-0.015	-0.067^+
	(0.023)	(0.023)	(0.034)
PMAT in 1st year	-0.168	-0.266	-0.510^+
	(0.172)	(0.180)	(0.278)
Δ Tax Revenue (logged) $\times$ PMAT in 1st year	0.005	0.011	0.035^+
	(0.013)	(0.013)	(0.020)
Population (logged)		-0.480	0.512
		(0.583)	(0.833)
GDP Growth		-0.151	-0.361^+
		(0.155)	(0.210)
Amount of Transfers (logged)		0.033	-0.403
		(0.250)	(0.316)
Urban population share (logged)		-0.000	-0.000
		(0.001)	(0.001)
Party of the President			0.102
			(0.095)
Party of the Governor			-0.028
			(0.055)
Δ Spending			0.000
			(0.000)
Mayor Ideology Prior Election			-0.074
			(0.056)
Mayor Education Prior Election			-0.010
			(0.020)
Constant	0.414	5.260	2.803
	(0.306)	(6.381)	(8.648)
Observations	508	508	279
Municipal FE	Yes	Yes	Yes
Election FE	Yes	Yes	Yes

$^+p < 0.10$, $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$