Oil Windfalls and a Conditional Political Resource Curse: Evidence from a Natural Experiment in Brazil*

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Abstract

Do natural resource windfalls affect democratic outcomes? We study whether the political resource curse is conditioned by the strength of political institutions. Where institutions are weak, we expect natural resource revenues are diverted towards clientelistic practices, which increase incumbent reelection rates. Where institutions are strong, we expect no such effect. To test this theory, we exploit a natural experiment in Brazil by which municipalities are allocated offshore oil royalties as-if randomly. We confirm that oil resources boost incumbent reelection rates where institutions are weak. We trace the mechanisms through which reelection rates increase: in municipalities with poor institutions, incumbents use resources to increase public employment, spending on administration, election campaign expenditures, and turnout rates. Together, these clientelistic practices increase incumbent reelection rates. Our argument provides a principled way in which to reconcile the divergent findings of the political resource curse literature.

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Is there a political resource curse? Do windfall revenues from natural resources affect democratic outcomes? Political scientists have thought so for some time.[1] Oil resources, in particular, are thought to strengthen autocrats and dampen support for democratization across countries (e.g., Jensen and Wantchekon 2004; Ross 2001). And among democratic regimes, resources are thought to decrease the quality of democracy by strengthening incumbents and stimulating corruption (e.g., Goldberg et al. 2008; Ramsay 2011).

More recent studies question this conventional wisdom, largely on empirical grounds (Haber and Menaldo 2011; Smith and Waldner 2021; Wright and Czelusta 2004). They note that identifying a causal effect of resources on democratic outcomes is complicated by two pitfalls: that politicians themselves choose how much oil to produce and that resource extraction and regime type may be jointly determined by other factors. In other words, the cross-national analyses on which most findings of a resource effect rest may well suffer from the well-known inferential problems associated with endogeneity.

Scholars have tried to resolve this debate in various ways. Some studies argue that the political resource curse obtains only in some time periods (after 1980; Ross 2012) or only in some regions (particularly the Middle East; Smith and Waldner 2021). Others point to causal heterogeneity, positing that preexisting conditions—characteristics like inequality, public versus private resource ownership, or the stability of the ruling coalition—determine when resources become a curse and when they do not (e.g., Dunning 2008a; Jones Luong and Weinthal 2010; Smith 2007). One strand of this work has focused on the role that state institutions play in conditioning the political resource curse. Building on the pioneering insights of Karl (1997), scholars have argued that the preexisting regime type or capacity of the state determine whether oil windfalls will undermine democracy or entrench autocracies (Caselli and Tesei 2016; Harris et al. 2020).[2]

And yet, very few empirical studies have shown how institutional strength conditions the political resource curse, and those that do often struggle with the same in-

[1] For recent reviews of this literature, see Ross (2015) and Smith and Waldner (2021).

[2] Parallel work on the economic resource curse similarly highlights a conditioning role for various aspects of institutional quality (e.g., Mehlum et al. 2006a; Robinson et al. 2006; Torvik 2009).

ferential problems that bedevil research on the broader resource curse. This gap led Smith and Waldner (2021: 58) to note in their exhaustive review of the literature that "[o]ne avenue for fruitful future research would consider the interaction of oil and political institutions."

This paper takes up that call and contributes to the scholarly debate over the political resource curse both theoretically and empirically. At the level of theory, we posit that one reason for the empirical impasse on the political resource curse is that the effect of resources on democratic outcomes depends on the strength of existing political institutions. Where those institutions are weak, windfalls from natural resources will have the deleterious effects that the conventional wisdom expects. But where political institutions are strong, where they can ensure some degree of horizontal accountability, we expect those institutions to prevent incumbents and rent-seeking politicians from using them to stifle democracy. In other words, we argue that institutions condition whether resource windfalls will affect democratic outcomes or not.

We also exploit a natural experiment that addresses the potential endogeneity in typical cross-national analyses. In Brazil, municipalities are allocated a share of oil royalties based on a predetermined formula that is a function of their geographic proximity to offshore oil wells, international oil prices, and population. Once the oil sector was liberalized in 1997, new offshore fields were discovered, oil production more than doubled, and hundreds of municipalities received windfall revenues over which local politicians had no control. The as-if random assignment of oil royalties to municipalities allows us to identify their effect on democratic outcomes by ruling out the potential for endogeneity. The fact that our research design uses subnational data is also an advantage, ruling out the possibility of confounding from country-level factors and allowing us to dig deeper into the mechanisms behind our main finding.

We find that oil resources boost overall incumbent reelection rates, and that they do so particularly in municipalities with weak institutions. Our analysis of the mechanisms by which these effects obtain suggests that in municipalities with weak institutions, windfalls cause politicians to expand public employment and administrative expenses.

Incumbents in these municipalities also increase their campaign expenditures and boost turnout. Together, these results suggest that royalties facilitate clientelistic practices which boost incumbent reelection rates.

Natural Resources, Institutions, and Democracy

For several decades, political scientists have maintained that "unearned income"—easily-produced revenues such as those from natural resources like crude oil—is a curse that strengthens autocracies and erodes democratic institutions (Ahmadov 2014; Ahmed 2012; Crespo Cuaresma et al. 2011; Jensen and Wantchekon 2004; Karl 1997; Ross 2001, 2015).[3] Since natural resource rents are akin to "manna from heaven," they lessen states' incentives to tax their citizens. Untaxed citizens, in turn, have lower incentives to hold governments to account. Some governments might, moreover, use revenue from natural resources to buy their citizens' support, thereby making citizens accountable to politicians rather than the reverse (Stokes 2005). Natural resources thus undermine both states' incentives to provide citizens with public services and citizens' incentives to hold the state to account. This makes it easier for autocrats to strengthen their hold on power and to stave off democratization (Mesquita and Smith 2010).

At the same time, scholars have noted that the negative effects of oil resources seem not to obtain always and everywhere. They argue that preexisting conditions may moderate—or completely drive—the apparent effect of resource wealth on autocratic survival (Haber and Menaldo 2011; Liou and Musgrave 2014; Wright and Czelusta 2004; but see Andersen and Ross 2014). Several studies find that contextual factors from social cleavages to inequality to the stability of the ruling coalition condition whether natural resources bolster autocratic survival (Dunning 2008b; Morrison 2010; Smith 2007). Others find that time and region moderate the relationship between resources and autocratic survival, which only obtains after 1980 or only in the Middle East (Ross 2012; Smith and

[3] An extensive body of work also finds that natural resources induce conflict (Collier and Hoeffler 2004; Fearon and Laitin 2003; Humphreys 2005; Koubi et al. 2014) and generate negative economic outcomes (Auty 2001; Ploeg 2011; Sachs and Warner 1999).

Waldner 2021).

There is even less consensus on the political effects of resource windfalls in countries that are already democratic. Although some evidence suggests that resource wealth bolsters regime stability and democratic outcomes (e.g., Dunning 2008b; Morrison 2010; Smith 2004; Tsui 2011), other studies instead find that resources have no political effects in democracies (Al-Ubaydli 2012; Andersen and Ross 2014; Ulfelder 2007; Wiens 2014). Still others find that windfalls do induce incumbents to engage in rent-seeking (Brollo et al. 2013; Carreri and Dube 2017; Goldberg et al. 2008; Ramsay 2011).

Part of this tradition focuses on the moderating role of state capacity.[4] In her pioneering demonstrating how oil resources undermined political institutions, Karl (1997) uses the outlying case of Norway to highlight the important role of prior state capacity (what she calls "stateness") and wealth. Preexisting state institutions, she argues, "counteracted the temptation to accelerate development, defused potentially divisive political issues through the use of routine procedures, developed clear policy alternatives, corrected mistaken policy decisions, and controlled the spread of rent-seeking behavior" (220). At the same time, Norway's preexisting wealth meant that the government, "felt no strong need for a qualitatively new revenue base" (217).

Of course, Norway is but a single case, and there are many preexisting differences between Norway and other oil-producing states like Iran and Venezuela. Moreover, if recent scholars are right that the political oil curse only obtains after 1980 (Andersen and Ross 2014), or only in the Middle East, then do preexisting political institutions still matter?

Building upon Karl (1997) and taking up Smith and Waldner's (2021) call for further theorizing about the heterogeneous effects of oil rents, we argue that the political effect of resource wealth among democracies is conditioned by the preexisting strength

[4] Others point to factors, beyond institutions, that condition the effects of resources on political outcomes. For example, Dunning (2008a) argues that inequality conditions the effects of oil on democracy, whereas Houle (2018) points to the key role of autocratic breakdown in creating the opportunity for resources to affect transitions to democracy.

of institutions.[5] Specifying the argument more concretely, we argue that democracies with strong institutions of horizontal accountability will be largely unchanged by natural resources. Political leaders always have some incentives to engage in corruption and rent-seeking, to use their positions to retain political and economic power. Oil resource revenues increase those incentives for incumbent politicians by increasing the opportunities for rent-seeking (Brollo et al. 2013). But strong institutions of horizontal accountability will prevent incumbents from engaging in rent-seeking and patronage. By contrast, weak institutions will fail to constrain incumbents, allowing them to skim off some state resources to undermine democratic competition and help them stay in power.

How do incumbents use resource revenues to stay in office? In much of the developing world, incumbents can use the power of the purse to benefit their reelection efforts in three ways. First, they can expand government employment to win voters' favor and to recruit political brokers who will then mobilize voters on their behalf (e.g., Colonnelli et al. 2020; Oliveros 2021).

Second, incumbents can also direct resource revenues towards their campaigns, artificially bolstering their campaign war chests (e.g., Fouirnaies and Hall 2014). Finally, incumbents can devote windfall revenues to vote-buying or turnout-buying, giving voters small payments or goods in exchange for their electoral support (e.g., Amat and Beramendi 2020; Gans-Morse et al. 2014; Nichter 2008; Stokes et al. 2013). Incumbents can use their control over government resources to direct windfall revenues toward their own reelection efforts rather than toward providing public services.

But we argue that not all incumbent politicians will be able to engage in rent-seeking when their governments receive windfall revenues. As with many political decisions, the choice to use resource revenues for personal gain is also a function of the risk of getting caught and losing public support. In some contexts, that probability may be quite low, and the expected benefit of rent-seeking may far outweigh the expected cost. In other contexts, the probability may be quite high, such that the expected costs far

[5] This proposition builds upon similar arguments that institutions condition the effect of natural resources on economic outcomes (Mehlum et al. 2006b; Robinson et al. 2006; Tornell and Lane 1999) and conflict (Morrison 2010).

outweigh the incumbent's expected benefits from succumbing to rent-seeking.

Under what circumstances is the probability of being held to account high? We argue that this occurs when democracies have strong institutions. In contexts where the apparatus of government has the capacity to monitor itself and to provide what O'Donell (1994) calls horizontal accountability, strong institutions make it likely that rent-seeking will be discovered. The non-executive arms of the state—such as the legislature, the judiciary, and independent audit agencies—will be able to check the propensity of executives to engage in clientelistic practices. As a result, we expect incumbents in these contexts not to engage in rent-seeking but instead to expend resource revenues on existing government services. In other words, we expect resource windfalls to have no effect on democratic outcomes where preexisting institutions are strong. Where institutions of horizontal accountability are weak, on the other hand, such checks and balances might be ineffective or entirely lacking. These institutions will in turn shape the incentives and behavior of incumbent politicians.

A Natural Experiment in Brazil

Testing our expectation about the conditioning role of institutions confronts several methodological challenges. Foremost in studies of resource windfalls is the potential for endogeneity: if leaders can endogenously determine how much resource extraction to engage in (Dunning 2010; Menaldo 2016), then it may be political outcomes that drive resource wealth, rather than the other way around. We would be inferring the wrong causal direction from the observed correlations between resources and politics. Moreover, some preexisting differences between countries—like the legacy of colonial institutions—may be driving both resource dependence and political regime (Haber et al. 2003; Manzano et al. 2008), making the correlation spurious (Haber and Menaldo 2011).

A number of studies seek to address these methodological challenges in one of two ways. Some leverage plausibly exogenous changes in natural resource dependence—like oil price shocks (Liou and Musgrave 2014; Ramsay 2011) or new discoveries (Tsui 2011)—

to disentangle the causal effect of resources on political regime. Others shift the analysis from the cross-national to the subnational (Asher and Novosad 2014; Carreri and Dube 2017; Goldberg et al. 2008; Mahdavi 2015).[6] By comparing subnational units within the same national political, economic, and sociological context, this strategy helps to avoid the problem of spuriousness induced by preexisting differences between countries.

A second challenge with empirically studying the conditioning role of institutions is that we need a measure of institutional strength that is comparable across units. Since most studies of the political resource curse use countries (or country-years) as their unit of analysis, it can be difficult to find measures of institutional strength—or, for our purposes, the quality of institutions of horizontal accountability—that mean the same thing across vastly different social, political, and cultural contexts.[7] Again, subnational analysis offers advantages since information about subnational units is more uniformly measured and their characteristics are more readily comparable.

In this paper, we combine these methodological approaches to test the hypothesis of a conditional political resource curse. We exploit subnational variation among roughly 950 Brazilian municipalities. By comparing political outcomes within a nationally democratic and transparent regime, we can help isolate the effect of resources—and the conditioning effect of institutions—on political outcomes.[8] Doing so also helps us to employ comparable measures of our key variables and delve more deeply into the mechanisms underlying our main findings. And it helps us avoid the problem that countries endogenously invest in searching for new oil wells (Brooks and Kurtz 2022), since these decisions are made in Brazil by the federally-owned state oil company and not by

[6] Brollo et al. (2013) and Gervasoni (2010) similarly study subnational variation in local windfalls, focusing on federal transfers.

[7] More broadly, a common critique of cross-national research on democracy is that it relies heavily on coarse and noisy measures of the outcome of interest (e.g., Bollen and Jackman 1989; Elkins 2000).

[8] This strategy is not costless: focusing on subnational variation means that we cannot say for sure that our results would obtain in other country contexts. But we think the methodological benefits outweigh this cost, particularly given the overwhelming focus of prior research on cross-national variation. Building on our work, Katovich (2024) examines the effects of resource discoveries on governance outcomes.

subnational political leaders.[9]

We also improve upon prior identification strategies by leveraging a natural experiment: oil windfalls to Brazilian municipalities over which they had no control and which could not have affected local politics except by increasing municipal revenues.[10] In 1997, Brazil's federal government passed legislation setting out a precise formula by which different levels of government would benefit from royalties paid to the state by the parastatal oil company, Petrobras (Law 9.478/97).[11] As a result of this formula, royalties are allocated to municipalities each month as a function of the geographic location of oil production, international oil prices, and municipality population, as measured by the National Bureau of Statistics (IBGE). Royalties from offshore oil wells are allocated to municipalities based on geodesic orthogonal and parallel lines drawn from each municipality's coastline (Piquet and Serra 2007).[12] As a result, municipalities in Brazil receive oil revenue based on a predetermined formula over which local officials have no discretion.[13]

In the decade after this formula went into effect, Brazil discovered enormous reserves of oil, particularly in offshore wells. Between 1996 and 2012, Brazil's oil output more than doubled from 795 to 2,061 barrels per day, according to the US Energy Information Administration (U.S. Energy Information Administration 2013). With soaring international oil prices following the US invasion of Iraq in 2003, royalties to the median municipality tripled (in real terms).

A subset of Brazilian municipalities thus received substantial windfalls of oil rev-

[9] Brazil is also a particularly useful case because it helps to address what Ross (2012) calls "Latin American exceptionalism:" the fact that countries in Latin America democratized even when they had access to oil. Our subnational analysis suggests that the focus in this research on regimes at the country-level may be masking important subnational heterogeneity.

[10] Scholars have exploited the same natural experiment to study economic and social outcomes (Caselli and Michaels 2013; Ferraz and Finan 2011).

[11] The primary purpose of the law was to end Petrobras's monopoly and spur international competition in the oil sector.

[12] We provide a graphical depiction of these lines in Appendix A, along with further details about the precise formula used to distribute royalties.

[13] We corroborated that the actual monthly oil royalties Brazilian municipalities received between July 2007 and September 2013 followed this precise formula. Our calculated royalties are very highly correlated with actual royalties received by municipalities.

enue because of an exogenous shock and factors entirely outside local political control, making the assignment of royalties to municipalities as-if random (see Dunning 2012). We confirm that royalties are indeed orthogonal to a number of observable predetermined confounds (that are anyway controlled for in our analysis by fixed effects) in Appendix D.2. The plausibly random assignment of royalties allows us to identify the effect of resource wealth on democratic outcomes without being concerned that oil wealth may be endogenously determined. Since local politicians cannot affect any of the variables that determine the allocation of oil royalties—their geographic location and population, the amount of oil being produced, and international oil prices—they have no control over the size of the oil windfalls they receive, allowing us to rule out reverse causation.

Still, there may be ways for local politicians to benefit from local oil production indirectly, not just through the windfall of royalties. Onshore oil production can affect municipal budgets by, for instance, bringing to the municipality oil-sector workers who patronize local businesses or by creating demand for investment to support oil production. The same is not true of offshore oil, however. Offshore wells are hundreds of miles from the coast and are serviced from a central port city near Petrobras's headquarters in Rio de Janeiro. Unlike onshore oil, offshore oil wells thus have no effect on the local economy except through the royalties distributed to the municipality.[14] Since we want to isolate the effect of oil revenues on municipal budgets to see if budget windfalls affect democratic outcomes, we therefore focus our analysis on offshore oil royalties. Our regression analyses use our calculation of offshore oil royalties as an instrument for the reported total royalties each municipality received in each period. Because offshore oil windfalls affect municipal budgets only through their effect on royalties, they meet the exclusion restriction.

Our data on both total oil royalties and offshore oil royalties come from Brazil's National Agency of Petroleum, Natural Gas, and Biofuels (ANP). The online appendix offers a detailed discussion of how we calculated annual offshore oil royalties for each

[14] Indeed, Monteiro and Ferraz (2012: 13) show that offshore oil production does not affect the number of firms in any sector, the number of private employees, or private-sector payrolls in municipalities that receive oil royalties. They also note that the infrastructure that supports and services offshore extraction is highly geographically concentrated, located almost entirely in the port city of Macaé. Katovich (2024) reports similar results.

municipality. We take the average of each during the four-year period between each municipal election.[15]

Our key dependent variable is a dummy for whether or not an incumbent mayor is reelected. To measure this, we gathered data on Brazil's municipal elections in 2000, 2004, 2008, and 2012 from Brazil's Supreme Electoral Commission (TSE) and the statistical database IPEADATA maintained by the Office of the Presidency of the Federal Republic of Brazil.[16] Our panel ends in 2012 because in 2013, Brazil's federal government effectively eliminated municipalities' discretion over how they spend oil royalties, mandating that revenues must be allocated toward spending on education and health.[17] This makes it very difficult for mayors to use these oil rents for personal gain and nearly impossible for us to detect it if they do so.[18]

Like prior scholars, we examine whether resources directly affect political outcomes. But we are specifically interested in whether a municipality's preexisting institutions condition the political effect of resources. Here, again, our focus on Brazilian municipalities offers empirical advantages. By most measures, the institutional quality of Brazilian municipalities varies tremendously. Scholars frequently employ taxes as a percent of GDP as a proxy measure for institutional capacity in cross-national studies (e.g., Besley and Persson 2014; Kasara and Suryanarayan 2015). This measure helps us to capture the capacity of the municipality to collect taxes, a defining feature of institutional strength (see Hendrix 2010) that is widely thought to be positively associated with economic and political development (see Besley and Persson 2011).[19] Among Brazil's municipalities, the typical municipality collects between 1% and 5% of GDP in taxes,

[15] For the 2000 election, we take the average for 1999 and 2000 since we were only able to collect royalties data as far back as 1999.

[16] Summary statistics for key variables in the dataset are provided in Table C.1 in the appendix.

[17] Law 12.858/2013 established that a fixed share of oil and gas royalty revenues must be allocated to public education (75%) and health (25%) at the federal, state, and municipal levels. See: https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2013/lei/l12858.htm.

[18] In future versions of this paper, we intend to collect the post-2012 data to use as a placebo test.

[19] As Besley and Persson (2014: 114) note, using taxation levels as a proxy for institutional capacity is appropriate because it reflects "the common determinants of state effectiveness in multiple dimensions—what... we refer to as *development clusters*. Different capacities of the state coevolve both because state competence increases in general and because of common underlying determinants, including institutions."

thereby encompassing much of the range across countries.

Using data from Brazil's Treasury, our measure of municipal taxes as a percentage of GDP includes revenue from the three taxes Brazilian municipalities are allowed to levy: a property tax on urban real estate (*Imposto Sobre Propriedade Predial e Territorial Urbana*, IPTU), a tax on services (*Imposto sobre Serviços*, ISS), and a tax on the transfer of real estate (*Imposto sobre a Transmissão de Bens Imóveis*, ITBI).[20] Since we are interested in institutional strength prior to receiving oil windfalls, we measure taxes in 2000, prior to our data on oil revenue. This also avoids the problem that resource revenues may themselves undermine the strength of institutions (e.g., Karl 1997; Sala-i Martin and Subramanian 2013; Wiens 2014).

Our dataset pools observations for each municipality across four municipal elections between 2000 and 2012. We focus our analysis on those coastal municipalities that received oil royalties at some point during our sample period (Figure B.2 displays their exact locations within Brazil). Since Brazilian mayors are elected for four-year terms, this means that we end up with a sample of four observations for each of 939 municipalities.[21]

We must also account for the fact that mayors in Brazil can only be elected for two consecutive terms.[22] This means that, in some elections in our data, the incumbent will be eligible for reelection, while in others the incumbent is term-limited. This distinction doubtless affects political competition, so our models also account for whether or not each election has an open seat. In order to account for time-invariant differences between municipalities, we use municipal fixed effects. To account for municipality-invariant differences across time, we employ time fixed effects.[23] In order to test whether institutional strength conditions the effects of these oil resources, we interact royalties with predeter-

[20] For details on these taxes, see Ferraz et al. (2024) and Souza (2004).

[21] To put this in perspective, Brazil had approximately 5,568 municipalities in 2012, the last year of our analysis. Our study therefore covers roughly 17% of all municipalities. These municipalities are spread across 15 of Brazil's 27 states.

[22] Prior to 1998, mayors could only serve a single term. As a result, every incumbent mayor was eligible to run for reelection in 2000.

[23] We do not include lagged dependent variables because of the well-known biases associated with doing so in the context of fixed-effects models with a small number of time periods.

mined levels of taxation. Our instrumental variable models, therefore, are specified as follows:

$$\widehat{\text{oil}}_{it} = \alpha_1 \text{offshore}_{it} + \alpha_2 \text{openseat}_{it} + \gamma_i + \delta_t + \varepsilon_{it} \tag{1}$$

$$\text{reelected}_{it} = \beta_1 \widehat{\text{oil}}_{it} + \beta_2 \left(\widehat{\text{oil}}_{it} \times \text{taxes}_i\right) + \beta_3 \, \text{openseat}_{it} + \gamma_i + \delta_t + \varepsilon_{it} \tag{2}$$

where $\widehat{oil}$ is our measure of oil royalties, which is instrumented by offshore royalties, denoted by *offshore*, *taxes* is our measure of institutional strength, *openseat* is a dummy for whether incumbents are term-limited and therefore the seat is open, and γ_i and δ_t are municipal and time fixed effects, respectively.

Our empirical strategy allows us to identify the causal effect of natural resources on reelection rates. As we show below, it also allows us to use fine-grained measures to test the mechanisms by which resources have their effects. By exploiting a natural experiment and studying subnational units within Brazil, we can address major questions about the political effects of resource revenues in ways that cross-national analysis cannot.

Oil Royalties and Reelection in Brazil

Do natural resources affect democratic outcomes? In Table 1, we examine the effects of resources on the chances that the incumbent was reelected.[24] Model 1 reports the simple bivariate relationship between royalties and these variables. Model 2 controls for whether incumbents were term-limited, and for municipal and period fixed effects. The point estimate suggests that royalties boost the chances of incumbent reelection, with a standard deviation increase in log royalties increasing the chances of reelection by 2.4 percentage points or 8.1%. This result is only statistically significant at the 10% level.

Of course, total oil royalties may not be exogenous to local politics. Model 4

[24] Although incumbent reelection is a binary variable, we use a linear probability model for ease of interpretation, since all but one of the predicted reelection rates are between 0 and 1, and since using fixed effects with a instrumental variables probit regression is not possible.

Table 1: Effects of oil royalties on incumbent reelection

	OLS		2SLS		2SLS
			1st stage	2nd stage	2nd stage
Model	(1)	(2)	(3)	(4)	(5)
Variables					
Ln royalties	0.00268**	0.00560*		0.00708**	0.01976***
	(0.00135)	(0.00317)		(0.00357)	(0.00708)
Ln royalties ×					
Ln Taxes/GDP, 2000					-0.00885**
					(0.00405)
Term-limited incumbent		-0.60908***	0.02777	-0.60914***	-0.61269***
		(0.01324)	(0.05730)	(0.01324)	(0.01336)
Ln offshore royalties			0.83980***		
			(0.02074)		
Municipality FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Fit statistics					
Observations	3,756	3,756	3,756	3,756	3,706
Adjusted R^2	0.00	0.19	0.90	0.19	0.20
Mean of dependent variable	0.296	0.296	0.00	0.296	0.297
1st stage F for royalties			11,279		
1st stage F for interaction					2,538

Notes: This table reports OLS and 2SLS estimates from Equation 2. The dependent variable is incumbent reelection. Columns 1 and 2 show OLS estimations. Column 3 shows the first-stage regression; Columns 4–5 show second-stage results. All models include year and municipality fixed effects, with standard errors clustered (in parentheses) at the municipality level. The sample size varies across columns depending on data availability. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

therefore reports our two-stage least squares estimates of the effects of oil royalties – instrumented by offshore oil royalties – on reelection.[25] When compared with OLS, the 2SLS specification yields a slightly larger point estimate of the effects of royalties on reelection, but this effect is now statistically distinguishable from zero at the 5% level. There is, therefore, statistical evidence for the direct effects of resources on incumbent reelection rates in Brazil.[26]

In model 5 of Table 1, we examine the heterogeneous treatment effects of resources, inquiring whether the causal effect of resources is contingent – as our theory suggests – on municipalities' preexisting institutional strength, as measured by taxes as a percentage of GDP. Strong institutions might work to ensure that oil royalties are not deployed to boost

[25] As expected, offshore royalties perform well as an instrument: they are highly correlated with total royalties ($\rho = 0.9$) and yield a first stage F-statistic of over 1,000, well-above the conventional threshold of 10 for a strong instrument (Table 1, Model 3).

[26] (see Model 1 of Appendix Table E.5). That said, we do not find that the conditional effect of royalties on reelection diminishes over time (Model 2).

incumbent reelection rates. To investigate this possibility, we interact royalties with this measure of institutional strength. We employ our two-stage least squares framework for this analysis, instrumenting the interaction of royalties and taxes with the interaction of offshore royalties and taxes.[27]

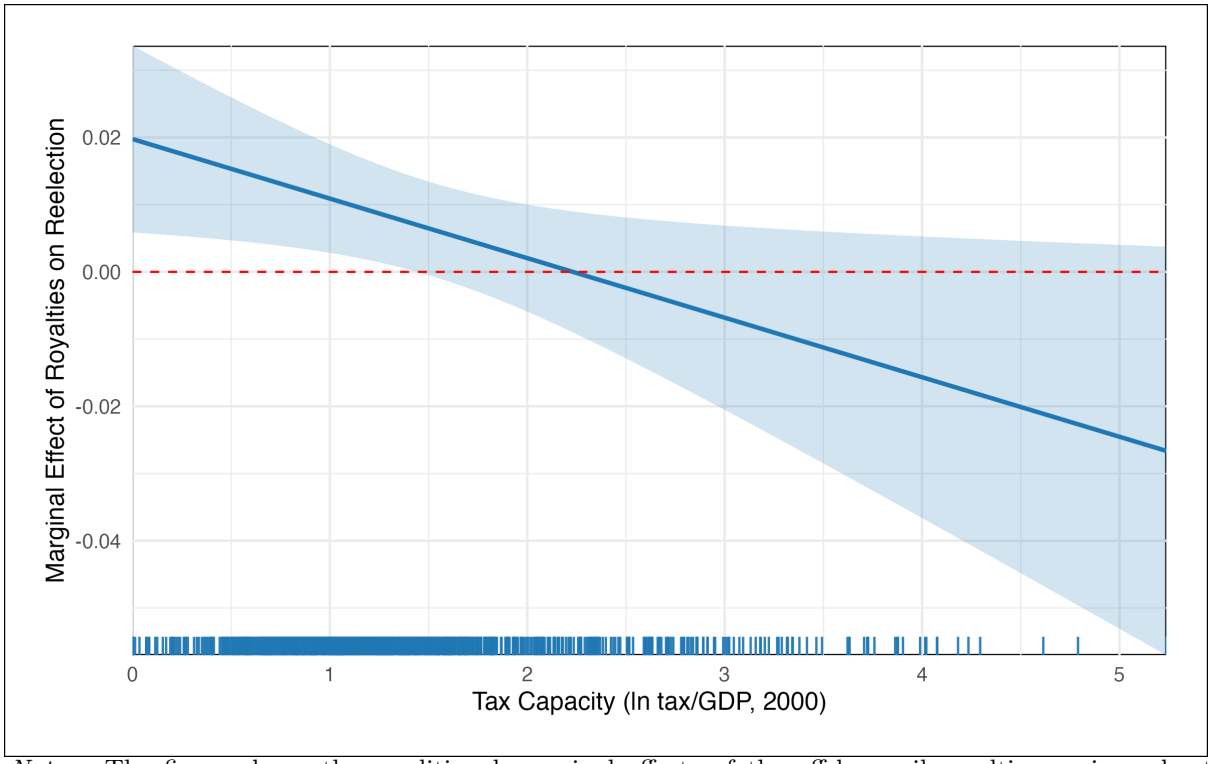
Figure 1 plots the marginal effects of the interaction term, suggesting that resources boost the reelection rate of incumbents to a statistically significant degree among municipalities that collect less than about 4% of GDP in taxes (corresponding to a value of ln (tax/GDP) below 1.44), which represents approximately 60% of municipalities. In a municipality that collects one standard deviation below the mean taxes, a one standard deviation increase in royalties boost reelection rates by a statistically significant 6.46 percentage points, or around 22%. Conversely, in a municipality with one standard deviation above the mean taxes, a standard increase in royalties has a substantively and statistically *insignificant* effect on the reelection of an incumbent.[28]

These results suggest there is a conditional political resource curse. In municipalities that had weak institutions prior to oil windfalls, incumbents are able to use oil resources to boost their chances of reelection. Where municipalities instead had strong institutions, oil windfalls seem to have no effect on incumbents' reelection rates.

[27] The first stage F-statistic for the interaction term is greater than 1,000, again well-above the conventional threshold of 10 for strong instrumentation (Table 1, Model 5).

[28] A potential concern with our interaction effect is its reliance on the assumption of linearity. As Hainmueller et al. (2019) note, violations of this assumption can make estimates highly model-dependent. To examine whether this is an issue, we use their binning estimator, which calculates effects at low, medium, and high levels of the moderator. Figure E.3 in the appendix shows that these binned estimates closely match the linear marginal effects based on the continuous tax capacity variable (Figure 1), suggesting that the linearity assumption is reasonable in this case.

Figure 1: Conditional effect of oil royalties on incumbent reelection



Notes: The figure shows the conditional marginal effects of the offshore oil royalties on incumbent reelection. The coefficients for the plot are from Model 5 of Table 1. The unit of analysis is the municipality, and the specification includes municipality and period fixed effects. The shaded region represents the 95% confidence interval. The rug plot at the bottom plots the distribution of municipalities by their tax capacity.

Robustness Checks

To gain confidence in our results, we test their robustness to a number of changes in our empirical strategy. First, we check that our results are unchanged when we employ an alternative measure of oil royalties. In column 1 of Table E.6 in the Appendix, we replace log royalties (our key independent variable) and log offshore royalties (our instrument) with log royalties per capita and log offshore royalties per capita. Previous studies have used both measures to investigate the effects of resources (compare, for example, Brollo et al. 2013 and Haber and Menaldo 2011). Whether we measure oil royalties in absolute or per capita terms has no bearing on our substantive results.

We next verify that our results are robust to using an alternative measure of institutional strength. One common, if crude, measure of institutional strength is GDP per capita (see, e.g., Fearon and Laitin 2003). When we replace our main measure of institutional strength – taxes as a percentage of GDP – with GDP per capita in 1999

(logged), our results (column 2, Appendix Table E.6) are substantively unchanged, although less precisely estimated. We also consider the possibility that fiscal capacity may not fully capture horizontal institutional constraints on incumbents' political power. While this is a valid concern, a large body of research has consistently linked fiscal state capacity to political development (e.g., Besley and Persson 2014; Dincecco and Wang 2022; Hanson and Sigman 2021), providing reassurance that fiscal capacity captures the institutional constraints emphasized in our argument. In line with this interpretation, Appendix E.1 Table E.4 shows that proxies for horizontal accountability, namely local councils and transparency laws, are positively correlated with our measure of fiscal capacity in 2000.[29]

To move beyond these correlations, we also construct an alternative measure of institutional capacity that is more directly linked to horizontal accountability. In particular, we examine whether municipalities with more local councils overseeing core public goods (education, public security, and urban planning) moderate the electoral returns to oil windfalls. In Brazil, these councils provide formal spaces for civil society to monitor and influence municipal governments, making them a suitable proxy for horizontal institutional constraints.[30] To create a measure comparable to our fiscal capacity indicator, we count the number of councils in each municipality overseeing education, public security, and urban planning. This measure captures variation in institutional capacity across municipalities—such as whether a municipality has no councils or several—without relying on any single type of council. Because systematic data on councils are only available starting in 2004, we use the first recorded information on each council between 2005 and 2008. This allows us to assess council presence for at least two electoral cycles and therefore restricts the analysis to the 2008 and 2012 elections. Using the same IV specification as in equation 2, we show in Appendix E.1 that municipalities with a greater number

[29] We discuss these proxies—local councils and transparency law—in detail in Appendix E.1, including their data sources and how they are measured and used in the correlation analyses.

[30] Importantly, these local councils are not mere formalities or easily captured by local executives. Rather, recent studies in Brazil suggest that they can effectively prevent political mismanagement. In public security, local security councils constrain law-and-order candidates, and municipalities that have such councils are associated with lower homicide rates (e.g., Novaes 2024).

of councils reduce incumbents' reelection rates (Table E.4), a result consistent with our primary regressions. While reassuring, we caution the reader to interpret this finding with caution, as councils may be post-treatment, although institutions typically evolve slowly over time.

To confirm that our results are not sample-dependent, we examine the robustness of our results by using a larger sample of municipalities – all the municipalities in coastal states – rather than just the municipalities that received some oil royalties in the period we study (column 3). In another specification, we restrict the data to municipalities where incumbents are not term-limited (column 4). As shown in Appendix Table E.6, our results are robust to both changes.

We also check whether our results are robust to several specification changes. In Appendix Table E.7 column 1, we interact instrumented oil royalties with lagged institutional strength rather than the 2000 value of institutional strength. This model accounts for the possibility that municipalities' institutional strength might vary over the period under study. Although this modification does not affect our results, we prefer models that measure institutional strength prior to the entire windfall period. That is because research has shown that resource revenues can undermine institutions, and especially taxation (e.g., Sala-i Martin and Subramanian 2013; Wiens 2014). A second modification in column 2 winsorizes the interaction between oil royalties and institutional strength. This reduces the influence of extreme values and alleviates concerns that outliers may be driving our results. Reassuringly, the coefficients remain stable and, if anything, the estimated effects increase in magnitude relative to the baseline specification. A third specification incorporates state-by-year fixed effects in addition to municipality fixed effects, accounting for both time-invariant municipal characteristics and state-level shocks or policies that vary over time. Our findings remain robust under this stricter specification (column 3). In column 4, we implement a reduced-form model in which reelection is simply regressed on exogenous offshore royalties. Again, our substantive results remain unchanged. We do not employ this as our main specification because our estimand of interest is the effect of royalties per se rather than offshore royalties. Finally, column 5

presents the results of a placebo test. If our empirical strategy is sound – and if offshore oil royalties are indeed exogenous to political outcomes – we should see no relationship between incumbents' reelection chances and future royalties received by their municipality.

Another concern might be that the interaction between oil windfalls and fiscal state capacity, our primary proxy for institutional strength, may be correlated with other factors that also influence political outcomes, potentially introducing omitted-variable bias. To address this, we replicate our primary analysis while including a set of pretreatment covariates commonly associated with institutional strength, each interacted with a linear time trend.[31] If the original interaction effects were driven by these observable factors rather than institutional strength, accounting for their evolution over time should reduce the estimated coefficients. As shown in Appendix Table E.8, both the magnitude and statistical significance of the interaction effect remain largely unchanged, suggesting that our results are unlikely to be driven by omitted-variable bias.[32]

Using a unique natural experiment, and no matter how we slice the data, vary the fixed effects, change the set of controls, alter the baseline specification, or use different estimators, there appears to be evidence of a conditional political resource curse in Brazil.

Mechanisms

Among Brazilian municipalities, exogenous resource windfalls appear to boost incumbent reelection rates only where preexisting institutions are weak. In this section, we ask two questions. First, how do resources have their effects in municipalities with poor institutions? And second, is this evidence of a resource curse? After all, mean reelection rates for Brazilian mayors are unusually low (Klašnja and Titiunik 2017; Novaes and Schiumerini 2022), so increasing the incumbency advantage may be desirable in this

[31] These covariates include the share of rural population, literacy rate, total population, municipal GDP, poverty rate, inequality, and radio/TV coverage.

[32] While these checks do not directly test the exclusion restriction, they also provide indirect support for its plausibility.

context. The question is whether the boost in reelection chances for mayors receiving resource windfalls is the result of undesirable practices.

We have argued that when existing institutions are weak, incumbents can divert resource revenue to bolster their political campaigns by putting political brokers on the municipal payroll and channeling state resources to fund their campaigns, practices that facilitate both vote buying and turnout buying. These kinds of clientelistic practices are, by definition, difficult to observe, particularly in cross-national studies. Our subnational research design again allows us to exploit a richer set of measures that point toward clientelism as the mechanism at work. In Table 3 and Figure 2, we use our standard 2SLS regression framework to estimate the causal effect of oil royalties on a number of additional dependent variables. Of course, even these measures can only be considered proxies, and our analysis cannot directly demonstrate that they indeed mediate the relationship between oil royalties and reelection rates. Still, taken together, they paint a strongly suggestive picture, certainly one that is more precise than cross-national studies have been able to uncover.

If our theory is correct, we should see evidence that in municipalities with weak institutions, oil windfalls are associated with mayors increasing municipal employment[33] and spending on administrative expenses – staff salaries and running costs.[34] Column 1 of Table 3, and the first interaction plot in Figure 2, confirm that this is the case in places with poor institutions. For municipalities with the lowest tax capacity, a 10% increase in royalties causes a 0.53% increase in administrative expenditures. Column 2 and the second interaction plot further suggests that part of this increase in administrative costs is due to an increase in the number of municipal employees per capita, again in municipalities with weak institutions. In this instance, the magnitude of the effect is statistically significant but small: in municipalities with the poorest institutions, a 10%

[33] We measure municipal employment as the log of total employees per capita in the election year, including civil-service and non-civil-service contracts.

[34] We calculate administrative spending as the average of salaries and running costs over the entire electoral cycle, since in election years, legislation constrains mayors' ability to incur debt or expand the payroll.

Table 2: Effects of royalties and term-limited incumbents on municipal outcomes

Model	Ln adm. exp./cap (1)	Ln gov. employ./cap (2)	Ln incum party. electoral exp. (3)	Incum party (g-index) (4)	Turnout % (5)
Variables					
Ln royalties	0.05511***	0.00078***	0.0731*	0.54587**	0.342***
	(0.02131)	(0.00024)	(0.04143)	(0.23016)	(0.07930)
Ln royalties ×					
Ln Taxes/GDP$_{2000}$	-0.02404**	-0.00025*	-0.01912	-0.24417	-0.206***
	(0.01096)	(0.00015)	(0.01588)	(0.19788)	(0.04063)
Term-limited incumbent	-0.01808	-0.00084**	-0.06401	-2.85589***	-0.014
	(0.02787)	(0.00040)	(0.11233)	(0.83542)	(0.15024)
Fixed-effects					
Municipality	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	3,706	2,772	1,654	1,533	3,659
Adjusted R^2	0.44	0.81	0.23	0.51	0.60
Mean of dependent variable	7.25	0.04	12.26	13.36	86.03
1st stage F for royalties	2,538	1,369	637	518	2,515

Notes: This table reports 2SLS estimates from Equation 2. Dependent variables are municipal administrative expenditures per capita, government employment per capita, party incumbent electoral expenditures, incumbent party vote concentration (g-index), and voter turnout. All models include year and municipality fixed effects, with standard errors clustered (in parentheses) at the municipality level. The sample size varies across columns depending on data availability. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

increase in royalties boosts municipal employment per capita by 0.25%.[35]

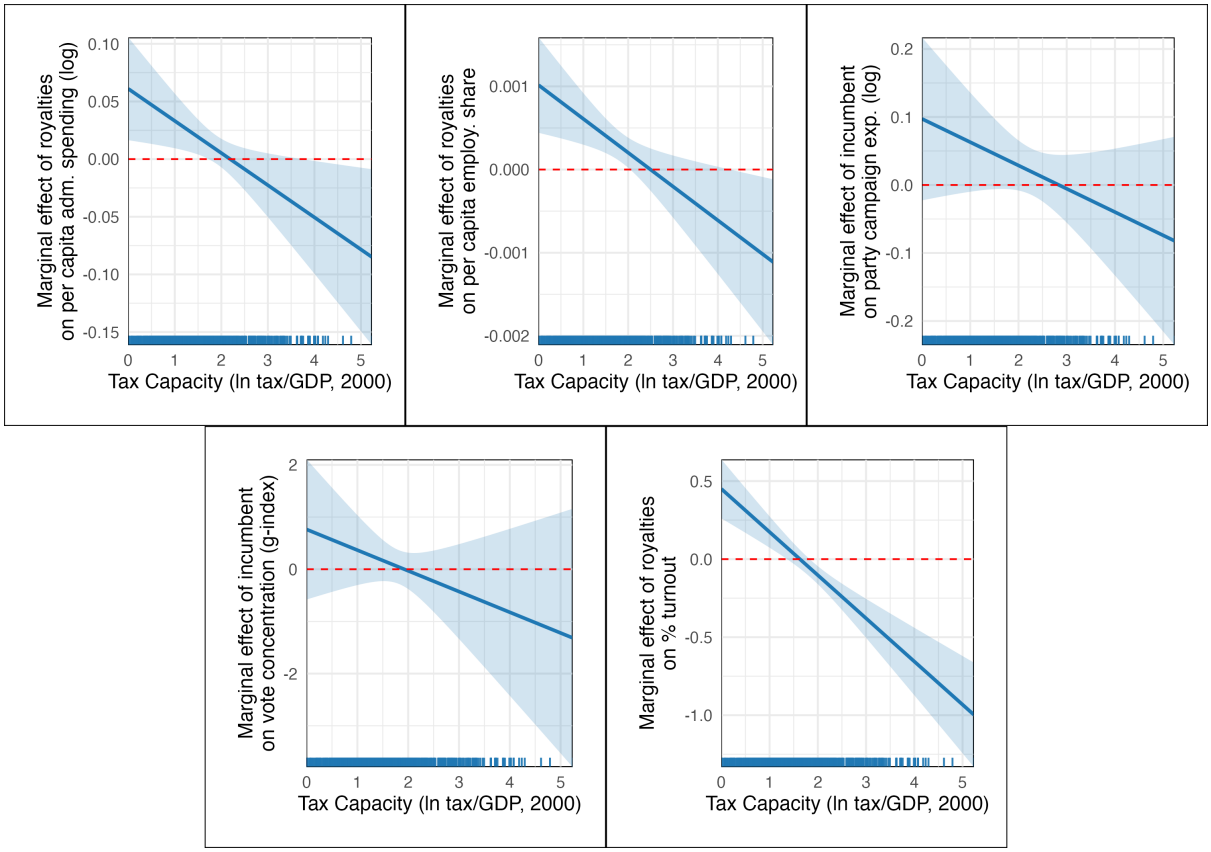
At the same time that weak institutions allow mayors who receive windfalls to hire political brokers into the municipality, they also allow them to use those resources for campaign purposes. Column 3 and its accompanying interaction plot suggest that the campaign expenditures of incumbent parties increase in municipalities with low taxes and in response to royalties.[36] A 10% increase in royalties causes a 0.7% increase in the electoral expenditures of incumbent parties; however, this effect is not statistically significant at conventional levels.

Our theory also suggests that we should observe more clientelism when municipalities with weak institutions receive resource windfalls. Of course, clientelism is difficult to

[35] One concern with using aggregate municipal employment as a proxy for patronage is that civil servants cannot be arbitrarily hired or dismissed. However, hiring timing is at the mayor's discretion, allowing strategic expansions of the permanent bureaucracy. Indeed, evidence from Brazil shows that government hiring rises during election years for both civil servants and temporary workers (see, e.g., Toral 2022), suggesting that aggregate increases can reasonably be viewed as patronage.

[36] Because Brazil's Electoral Tribunal only began systematically reporting campaign spending in 2004, our analysis is restricted to the post-2004 period.

Figure 2: Mechanisms to explain the conditional effects of oil royalties on incumbent reelection



Notes: The figure illustrates the mechanisms explaining the conditional effects of oil royalties on incumbent reelection. Coefficients are drawn from Table 3. The unit of analysis is the municipality, and the specification includes municipality and period fixed effects. Shaded areas represent 95% confidence intervals. The rug plot at the bottom plots the distribution of municipalities by their tax capacity.

observe (Boix and Stokes 2007; Nichter 2014). As a reasonable proxy for clientelism, we measure the concentration of the incumbent's vote, following Gingerich (2013). The intuition behind this proxy is that clientelism in the Brazilian context relies on local brokers embedded in their communities (Gingerich 2020; Gingerich et al. 2014). These brokers distribute goods and favors to their neighbors in exchange for votes, campaign locally for their candidate, and transport voters to the polling places on Election Day (e.g., Hidalgo and Nichter 2016; Stokes et al. 2013). If they receive the resources they need to be effective, their candidate should attract votes disproportionately from the communities in which they operate. Thus, a candidate's vote should be more geographically concentrated the more she relies on clientelism (e.g., Rueda 2017). To measure vote concentration, we rely on the G-index introduced by Avelino et al. (2011). Column 4 and its interaction

plot confirm that vote concentration increases due to royalties in municipalities with weak institutions, although this result is not statistically significant.

Some of this patronage and clientelistic brokering could be buying votes, but some might also buy turnout (e.g., Nichter 2008).[37] Even in a context with compulsory voting and high turnout, mayors in municipalities with weak institutions may use some resource windfalls to bolster turnout in their favor.[38] Indeed, column 5 and its accompanying interaction plot suggest that in the lowest capacity municipalities, a standard deviation increase in royalties increases turnout by 1.5 percentage points or 1.7%.[39]

Taken together, these findings are consistent with clientelism being the key mechanism by which royalties increase incumbent reelection rates. In municipalities with weak institutions, royalties incentivize incumbents to increase public employment and, therefore, administrative expenses. These effects are consistent with rentierism implied by theories of a political resource curse (Ross 2001). In addition, incumbents' electoral expenditures in municipalities with weak institutions increase, possibly as public resources are diverted to finance elections, or as royalties make office more attractive. These expenditures, in turn, boost turnout, either through mobilization efforts by patronage employees or as political brokers buy turnout. When resource windfalls boost reelection rates in Brazilian municipalities that have weak institutions, it seems to be because their mayors engage in more clientelism.

[37] As usual, we measure turnout as the share of registered voters who cast a ballot, including valid, blank, and null votes.

[38] This is likely the case in Brazil where, despite compulsory voting, the penalties for not voting are relatively low, especially for low-income voters (Cepaluni and Hidalgo 2016), the main targets of turnout buying (Amat and Beramendi 2020).

[39] A back-of-the-envelope calculation highlights the "practical" relevance of the turnout mechanism. In low-capacity municipalities in our sample, the median population is around 13,000 voters. Since Brazilian elections are often decided by margins under 5%, a standard deviation increase in royalties raises turnout by about 1 percentage point—from 85.1% to 87%— adding roughly 250 voters. This increase could be decisive in close contests, illustrating how our proposed mechanism can meaningfully shape municipal electoral dynamics.

Evaluating Mechanisms at the Individual-Level

Our previous results show that oil windfalls are diverted toward clientelistic practices in municipalities with weak institutions. Because these findings rely on aggregate measures of clientelism, they rest on the premise that such measures provide meaningful information about voter behavior in contexts like Brazil. Existing literature supports this assumption, with survey evidence showing that institutional weakness increases citizens' propensity to engage in clientelistic relationships (e.g., Fergusson et al. 2022). While reassuring, it remains an open question whether the same dynamic travels to our context. To explore this directly, we turn to individual-level analysis.

We rely on the LAPOP's Americas Barometer 2010 Brazilian wave.[40] This wave provides two advantages for testing the clientelism mechanism at the individual level. First, it asks respondents whether they were offered goods or services in exchange for their vote or political support in past elections,[41] and it records whether they voted in the last presidential election.[42] The first question directly captures vote buying (Stokes 2005), while the second serves as a useful proxy for turnout buying (Nichter 2008), especially because turnout levels often reflect political parties' efforts to mobilize voters (e.g., Amat and Beramendi 2020).[43] The second advantage of the 2010 wave is that it allows us to study the theorized mechanism during the same period as our primary analysis, providing a more precise test of whether the increase in mayors' reelection rates in municipalities

[40] LAPOP conducts nationally representative face-to-face surveys using probability samples across Latin America. For additional information on the sampling methodology and questionnaire for the LAPOP's Americas Barometer 2010, see: https://www.vanderbilt.edu/lapop/core-surveys.php.

[41] Specifically, the question asked: "In recent years, thinking about electoral campaigns, has any candidate or someone from a political party offered you something, such as a favor, food, or any other benefit or item in exchange for your vote or support? Did this happen frequently, sometimes, or never?" We rescaled the response options as follows: 0 = never, 1 = sometimes, and 3 = frequently.

[42] The question asked: "Did you vote in the last presidential election in 2006?". We rescaled the responses so that 1 indicates "yes" and 0 indicates "no".

[43] One might argue that turnout in presidential elections reflects different mobilization dynamics than turnout in mayoral elections. To our knowledge, however, no national survey in Brazil directly measures turnout in local elections. Still, there are strong reasons to treat presidential turnout as a valid proxy for local electoral mobilization. In Brazil's decentralized political system, mayors play a central role as vote brokers for their parties in federal elections (Brollo and Nannicini 2012; Novaes 2018), given their strong incentives to climb the party ladder and secure discretionary transfers from higher levels of government. Thus, presidential elections are arguably one suitable way to assess local mobilization.

with weak institutions after resource windfalls reflects clientelistic practices.

To evaluate the mechanism at the individual level, we merged the geocoded LAPOP survey with our municipal-level data on offshore oil royalties.[44] We applied the same identification strategy as in the primary analyses (Equation 2), but now – due to the small number of observations in each municipality – use state-fixed effects instead of municipality-fixed effects to capture unobserved, time-invariant characteristics of each state. We also include standard individual-level controls for age, sex, and education, which are plausibly unaffected by the oil windfalls and can therefore be considered pre-treatment.

Table 3 reports the main results of the individual-level analysis. Consistent with our theoretical expectations, respondents in municipalities with weak institutions are more likely to report receiving vote-buying offers. In these municipalities, a standard deviation increase in oil royalties raises vote-buying by 0.24–0.49 points, corresponding to 15–29%.[45] The effects also extend to turnout: in municipalities that collect less than 2% of GDP in taxes (the bottom 25% in tax collection), a half standard deviation increase in oil royalties raises self-reported turnout by 0.36-points, or about 60%. This suggests that resource windfalls increase turnout in presidential elections where institutions are weak.

[44] Merging survey data with municipal-level information is challenging because the AmericasBarometer is nationally rather than regionally representative. As a result, our merged sample does not cover the full universe of 939 municipalities from our primary dataset. Therefore, the findings should be interpreted with caution when generalizing beyond this sample. Appendix Table F.9 presents the summary statistics from the final merged sample.

[45] If anything, these effects likely underestimate the true prevalence of vote-buying due to known social desirability bias in self-reports (e.g., Gonzalez-Ocantos et al. 2012).

Table 3: Effects of oil royalties on vote buying and turnout

	Vote Buying (1)	Turnout (2)
Variables		
Ln royalties	0.148*	0.254***
	(0.069)	(0.032)
Ln royalties × Ln Taxes/GDP, 2000	-0.049**	-0.041***
	(0.020)	(0.009)
State FE	Yes	Yes
Individual-Level Controls	Yes	Yes
Fit statistics		
Observations	885	885
Adjusted R^2	0.80	0.89
Mean of dependent variable	0.15	0.59

Notes: This table reports 2SLS estimates from Equation 2. Dependent variables are self-reported vote buying and turnout. All models include state fixed effects and individual-level controls (age, education, gender), with standard errors clustered (in parentheses) at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Ruling Out Alternative Explanations

The pattern that incumbents have higher reelection rates in weak-institution municipalities following oil windfalls, although consistent with our clientelism argument, could also have alternative explanations. In this section, we evaluate three of them.

First, one might argue that the higher reelection rates in municipalities with weak institutions reflect a better provision of public goods and services rather than clientelistic mobilization. In this account, even whether voters cannot observe oil windfalls directly, they may still infer incumbents' competence from how politicians manage these resources (e.g., Ashworth and De Mesquita 2014). From this perspective, incumbents may expand public goods provision to signal their competence and avoid electoral punishment. This explanation is particularly relevant to Brazil, where voters are highly responsive to the performance of local politicians (e.g., Novaes and Schiumerini 2022; Toral 2024).

To assess this alternative explanation, we examine whether incumbents in municipalities with weak institutions use windfall resources to expand spending on health and education, public goods that scholarship identifies as the most salient to voters (e.g., Boas et al. 2019; Grossman and Slough 2022). If higher reelection rates in these municipalities

reflected learning from improved service provision, we would expect to see spending increases after resource shocks. Yet, as shown in Appendix Table G.12, spending patterns in health and education are not different between municipalities with weaker and stronger institutions.[46] In other words, the incumbency advantage in weak-institution settings does not appear to stem from voters rewarding investments in public goods.[47]

Second, one might argue that resource windfalls in municipalities with weaker institutions increase incumbents' reelection rates by reducing electoral competition (e.g., Carreri and Dube 2017). The logic is straightforward: when institutions fail to constrain incumbents' "power of the purse," potential challengers may be discouraged from entering the race, which reduces competition and ultimately strengthens incumbents' chances of reelection. Yet, Appendix Table G.13 shows that this is not the case. In municipalities with weaker institutions that receive oil windfalls, neither the number of candidates nor the number of effective political parties declines.

While windfalls do not appear to reduce these aspects of political competition, they might still influence who chooses to run for office. Research on political resource courses often suggests that windfalls raise incumbents' reelection chances through adverse candidate selection. Because rents are particularly attractive to lower-quality candidates, larger budgets may discourage higher-quality individuals, who have better outside options, from entering the race (e.g., Brollo et al. 2013), particularly in municipalities with weak institutions. To assess this alternative explanation, we examine the educational background of the most competitive challenger (the runner-up), focusing in particular on whether they hold a college degree—a widely used proxy for candidate quality in studies of adverse political selection (e.g., Besley et al. 2011; Brollo et al. 2013). Since recent work has questioned the validity of education as a proxy for candidate quality (e.g.,

[46] We measure health and education spending as the logarithm of per capita expenditures, calculated as the average spending in the years preceding each election divided by the municipality's population. The results are substantially similar whether we use the logarithm of per capita spending or the share of total expenditure (results are available upon request). Due to a higher number of missing data before 2000, our analysis focuses on the 2004, 2008, and 2012 electoral cycles.

[47] This conclusion is also consistent with prior research on natural resources and incumbent spending on public goods. For example, Novaes and Schiumerini (2022: pp.14–15) find no evidence that commodity shocks (e.g., soybeans, maize) affect mayors' public goods spending in Brazil.

Carnes and Lupu 2016), we also examine the occupational background of the runner-up challenger, particularly whether they come from a high-skill profession. As shown in Appendix G.14, we find no evidence that oil windfalls affect the composition of challengers in mayoral elections, even in municipalities with weak institutions.[48] This indicates that the higher reelection rates of incumbents in these municipalities are not driven by facing lower-quality challengers.

A Conditional Political Resource Curse

Despite decades of scholarship on the political resource curse, the jury is still out. Particularly among democracies, the empirical record has been far from conclusive (Ross 2015). One reason is theoretical. As we have argued in this paper, the political resource curse in democracies depends crucially on the strength of preexisting political institutions. Although resource revenues increase the incentives for incumbents to engage in rent-seeking and undermine democratic competition, they are less likely to do so when strong institutions of accountability make it likely that they will be caught. In contexts with weak institutions, incumbents are frequently able to commandeer resources to ensure their reelection. Where institutions are strong, resources have no such effect. The argument that the resource curse is conditional on institutional strength has been made explicitly with regard to the effects of resources on economic outcomes (Mehlum et al. 2006b) and conflict (Morrison 2010), but has not been made explicitly with regard to the political resource curse. This account has the potential to help reconcile the divergent empirical findings on the political resource curse.

Another reason the empirical record has been mixed is empirical. Incumbents may endogenously determine how many resources to extract, or preexisting factors may drive both resource extraction and political outcomes. Observational studies have trouble ruling out these potential sources of endogeneity. To overcome these challenges, we test our argument using a subnational research design in Brazil, both since the institutional

[48] While we restrict our analysis to the runner-up, the results are also consistent when considering the entire pool of candidates (results are available upon request).

strength of its municipalities varies hugely, and also since its municipalities are assigned oil royalties in a plausibly exogenous way. This strategy allows us to recover estimates of the causal effects of resources in contexts with varying institutional strength.

Consistent with our theory, we find that institutional strength conditions the effects of oil royalties on incumbent reelection. In municipalities with weak institutions, incumbents divert resources to boost municipal employment, administrative expenditures, campaign expenditures, and turnout, all of which ensure their reelection. In municipalities with strong institutions, reelection rates do not increase.

Our argument that institutions condition the political resource curse offers a theory that could reconcile the divergent empirical record to date. Whether it does, in fact, reconcile the cross-national findings is a matter for future work. Our argument also adds nuance to the robust finding that resources have a positive effect in Latin America (Dunning 2008b; Ross 2012) by showing that the effects of resources can be negative—in regions with weak institutions—even within this context. Moreover, our argument that resources spur clientelism in municipalities with weak institutions points to the specific practices—like hiring more municipal staff and turnout-buying – that ought to be studied further in these contexts.

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Online Appendix for "Oil Windfalls and a Conditional Political Resource Curse: Evidence from a Natural Experiment in Brazil"

Contents

A Oil Data Description

Royalties from offshore oil wells are allocated to municipalities based on geodesic orthogonal and parallel lines drawn from each municipality's coastline. The figure B.2 depicts examples of these lines. The royalties from the offshore well in the figure are divided between the two municipalities using the formulas detailed below.

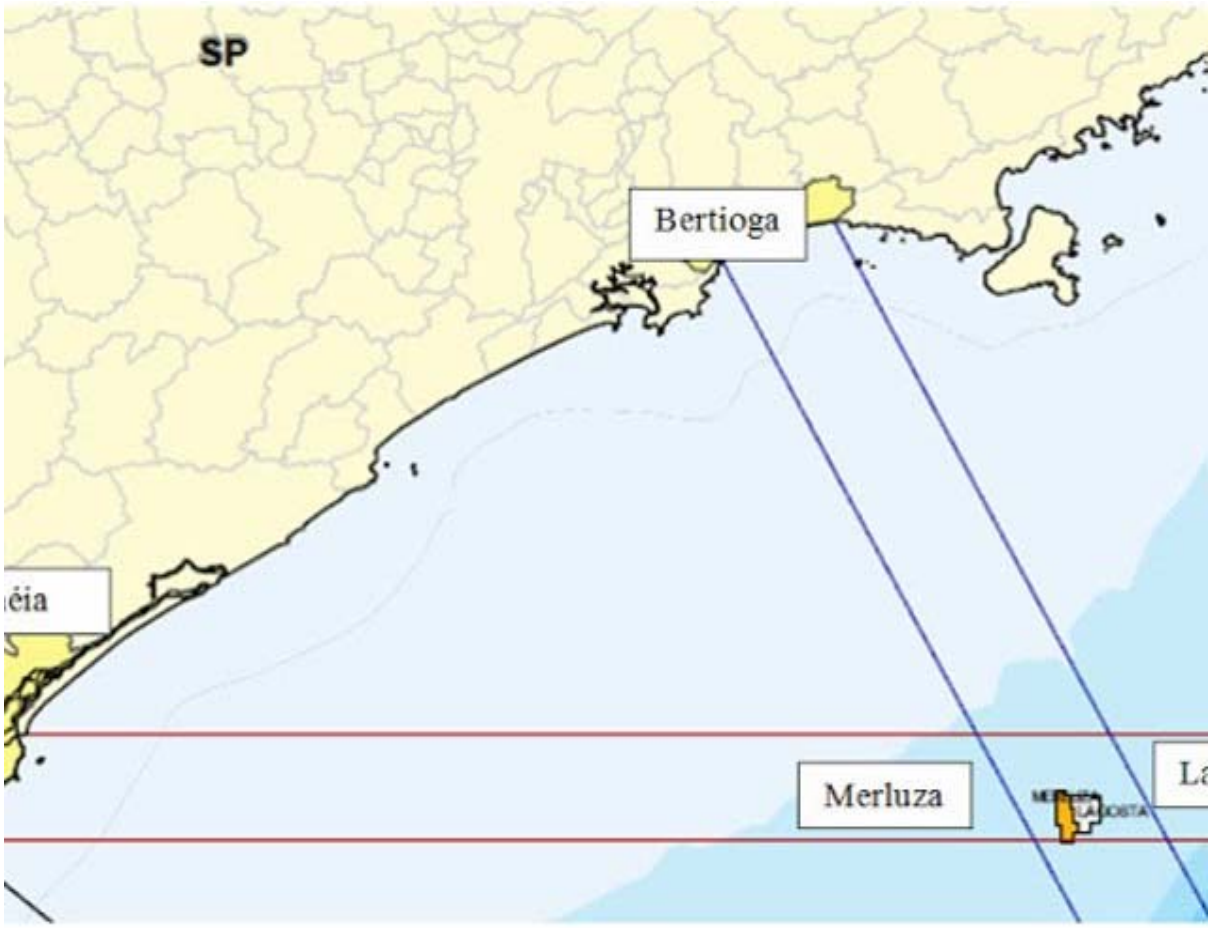


Figure A.1: A depiction of how offshore oil wells are matched to municipalities

A.1 Total Yearly Royalties

Data on total royalties (from both offshore and onshore fields) received by each municipality by year from 1999 to 2012 was gathered from the website of the Agencia Nacional do Petroleo, Gas Natural e Biocombustıveis (National Agency on Oil, Natural Gas, and Biofuels; ANP) at royalty transfers. Each of the files for monthly royalties includes data on royalties accumulated for the year up until that month. Therefore, we used the accumulated royalties data on the December files, which include all royalties accumulated for the year up to the third week in December (the third week of each month is when royalty transfers to municipalities are made, so this data captures the yearly amount).

A.2 Offshore Royalties - First 5 Percent

We first calculated the total 5 percent royalties accrued for each offshore oil field using the oil and gas prices and oil and gas outputs by month. Oil and gas prices were obtained from the ANP website at oil reference prices and gas reference prices. Because royalty transfers experience a two-month lag time, royalties data for a given month is calculated using the prices set two months prior (i.e. royalties for January 2008 uses price data from November 2007; royalties for October 2011 uses price data from August 2011, etc.). Data on monthly offshore oil field output (both oil and natural gas) can be found on the ANP website at field-level production. The first 5 percent royalties for each oil field were calculated using the following formula:

$$\begin{aligned}\text{Total 5\% Royalties} = \Big[&(\text{Oil Reference Price } (\tfrac{R\$}{m^3}) \times \text{Oil Output } (m^3)) \\ &+ (\text{Gas Reference Price } (\tfrac{R\$}{m^3}) \times \text{Gas Output } (m^3))\Big] \times 0.05\end{aligned}$$

For a tiny number of data points, the calculated royalties did not match up with the actual data obtained from the ANP website. The actual published data is only available from July 2007 to December 2012. Next, we calculated the total offshore royalties to each municipality by month. This was done by first calculating the total royalties by mesoregion (which essentially means state in this case). The formula to calculate the first 5 percent royalties to each municipality is given by:

$$\begin{aligned}\text{Royalties to Municipality (first 5\%)} = \text{Mesoregion Total} &\times \text{Population Ratio} \\ &\times 0.3\end{aligned}$$

The population ratio for each municipality is found on the ANP website at royalty transfers. The population ratios were occasionally adjusted slightly during the period for which data was available, so these figures were changed accordingly. It is multiplied by 0.3 because, per the ANP, 30 percent of the 5 percent royalties are to go to municipalities in relevant geoeconomic zones. Population ratios vary according to the geoeconomic zone designation of each municipality. There are three types of zones:

- **Main zones**: municipalities deemed "producing zones" based on their proximity to the offshore field. Municipalities in this zone share 60 percent (of the 30 percent of the 5 percent) royalties for their respective mesoregion.

- **Secondary zones**: municipalities traversed by pipelines for transporting offshore oil. These municipalities share in 10 percent (of the 30 percent of the 5 percent) royalties for their respective mesoregion.
- **Bordering zones**: municipalities bordering main zones or which serve as the location of three or more oil processing or transportation sites. These municipalities share in 30 percent (of the 30 percent of the 5 percent) royalties for their respective mesoregion. If the mesoregion does not have any secondary zones, which is the case for some, they share in 40 percent (of the 30 percent of the 5 percent) royalties for their respective mesoregion

The description of these zones can be found at ANP (Asked Questions), under "other", item 9. Each municipality can only belong to one zone. A very small number of municipalities experienced a change in their geoeconomic zone designation over the period covered by the data.

A.3 Offshore Royalties - Variable Quotas

To determine the variable quota (amount over 5 percent) royalties to each municipality, we first calculated how monthly royalties from each offshore field were allocated. This was done by using the variable quota figures found on the ANP website at royalty transfers. Variable quota royalties are only allocated to municipalities found in the "main geoeconomic zone," a designation discussed above. The distribution of variable quota royalties for each offshore field is determined by a municipality's "facing percentage," which is calculated by the ANP using the geographical relationship between the wells being exploited and the municipality. Using the facing percentage document in the zip files on the above page, we determined which municipalities received variable quota royalties from a given field and the percentage they received. The formula is given by:

$$\begin{aligned}\text{Variable Quota Royalties (Municipality, field)} = {} & \text{Total Variable Quota Royalties (Offshore field)} \\ & \times \text{Facing Percentage} \times 0.225\end{aligned}$$

The factor of 0.225 in the above formula is given by the ANP, which allocates 22.5 percent of the variable quota royalties to municipalities facing offshore fields (again, see ANP website at royalty transfers. On occasion, the facing percentages for offshore oil fields are adjusted based on the location of exploitation, and very rarely, new municipalities received variable quota royalties because of changes in their geoeconomic zone designation. Our calculations account for these changes.

B Map: Offshore Royalties Across Brazilian Municipalities

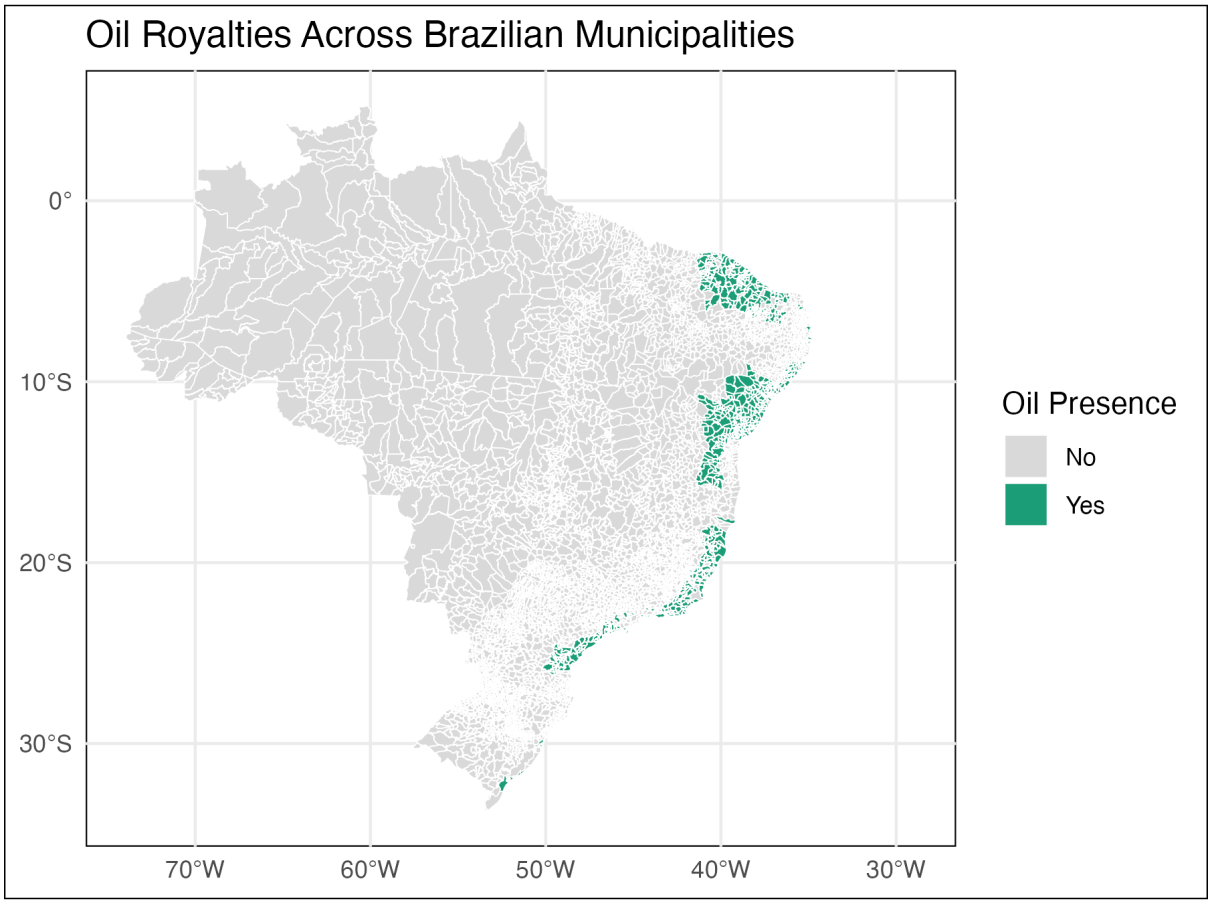


Figure B.2: Geographic distribution of offshore oil royalties across Brazilian municipalities. Municipalities that received positive royalties in at least one election cycle (2000–2012) are highlighted in green, while municipalities with no recorded royalties are shown in gray.

C Summary Statistics

Table C.1 presents summary statistics for the variables included in the primary analyses, mechanism tests, and alternative explanations.

Table C.1: Summary Statistics

Variable	N	Mean	Sd	Min	Max
Fiscal Revenues					
Ln Taxes/GDP, 2000	3706	1.38	0.82	0.00	5.24
Ln royalties	3756	8.81	4.36	0.00	19.27
Ln offshore royalties	3756	8.18	4.27	0.00	18.88
Ln GDP per capita, 1999	3706	7.84	0.79	6.54	11.88
Municipal Characteristics					
Ln royalties × Ln Taxes/GDP, 2000	3706	12.24	11.15	0.00	80.32
Ln administrative expenditures per capita	3737	7.25	1.06	0.00	9.83
Ln municipal employees per capita	2796	0.05	0.02	0.00	0.24
Ln education expenditures per capita	2513	5.78	0.55	3.91	7.78
Ln health expenditures per capita	2513	5.35	0.64	0.00	7.61
Ln transportation expenditures per capita	2513	2.06	1.53	0.00	6.11
Local Councils	1878	1.08	0.73	0.00	3.00
Political Characteristics					
Incumbent reelection	3756	0.30	0.46	0.00	1.00
Term-limited incumbent	3756	0.24	0.42	0.00	1.00
Turnout (%)	3708	86.02	6.05	58.16	98.69
Effective number of parties	3756	2.21	0.58	1.00	5.77
Ln number of candidates	3756	1.36	0.28	0.69	2.77
Incumbent party vote concentration (g-index)	1556	13.29	18.79	0.00	298.20
Ln incumbent campaign expenditure	981	11.92	1.81	0.00	17.03
Ln incumbent party campaign expenditure	1676	12.27	2.01	0.00	18.40
Challenger Characteristics					
College degree	3447	0.47	0.50	0.00	1.00
High-skill occupation	3463	0.27	0.45	0.00	1.00

D Balance Tests

Table D.2 presents balance tests, comparing treated and control units on pre-treatment covariates. We regress theoretically relevant covariates for the outcomes of interest on offshore royalties measured in 2012. Consistent with the as-if-random nature of the research design, the sample is well balanced across these pre-treatment characteristics.

Table D.2: Balance Tests: Baseline Covariates

Panel A: Socioeconomic Indicators				
	Estimate	Std. Error	P-value	N
Population 1996	0.064	0.030	0.035*	901
Tax/GDP 2000	0.022	0.024	0.364	925
% Literacy 1991	-0.224	0.352	0.523	930
Human Development Index 1991	0.000	0.002	0.999	930
Panel B: Electoral and Geographic Indicators				
	Estimate	Std. Error	P-value	N
Turnout 1998	0.000	0.001	0.999	921
Ln Area (km^2)	0.006	0.021	0.775	939
Ln Distance to Capital	-4.286	4.187	0.309	935

Notes: This table presents OLS regression-based balance tests of baseline covariates on offshore royalties in 2012. Each row reports the coefficient from a separate regression of the pre-treatment covariate on royalties, with state fixed effects and standard errors clustered at the state level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

E Robustness Checks

E.1 Fiscal State Capacity and Horizontal Accountability

E.1.1 Correlations

Our main argument relies on the idea that fiscal capacity capture institutional constraints on incumbents' political power. A substantial body of literature has shown that fiscal state capacity is positively associated with political development (e.g., Besley and Persson 2014; Dincecco and Wang 2022; Hanson and Sigman 2021). While this general pattern is reassuring, we examine whether similar relationships hold in our sample of municipalities, using two proxies for horizontal accountability, namely: local councils and transparency law.

We first examine whether fiscal state capacity is correlated with local councils, a reasonable proxy for horizontal accountability in Brazil. These councils are mixed participatory bodies that bring together government officials, the judiciary, and civil society actors to monitor key policy areas. We rely on data from the Survey of Basic Municipal Information (MUNIC), conducted by the Brazilian Institute of Geography and Statistics (IBGE), which provides annual, nationally representative information on municipal local councils in Brazil.[49] Specifically, we assess whether municipalities in our oil windfall sample have local councils in policy areas associated with the provision of core public goods: education, public security, and urban planning. Because council data are not available for the year of our fiscal capacity measure (2000) and only became systematically available from 2004, we rely on the earliest available information to capture when councils were created. This timing varies between 2005 and 2008, reflecting differences in the questions collected by MUNIC across years. The results, reported below in Table E.4, show that our measure of fiscal state capacity, as measured in 2000, is strongly associated with the presence of councils in education (Column 1), public security (Column 2), and urban policy (Column 3).

We also examine whether fiscal state capacity correlated with municipal compliance with Brazil's 2011 Transparency Law (Lei de Acesso à Informação, LAI).[50] This legislation requires municipalities to publicly disclose budgetary and administrative information and maintain accessible online transparency portals. Its objective is to equip both citizens and oversight institutions with the information necessary to monitor local governments and reduce opportunities for mismanagement. To measure compliance, the federal government—through its independent oversight agency, the Controladoria-Geral da União (CGU)—developed the Escala Brasil Transparente (EBT), which evaluates municipalities on a standardized 0–10 scale.[51]

We focus on the first wave of the survey assessment, conducted between January and June 2015. This wave examined 12 criteria related to municipal responsiveness to formal information requests submitted by citizens or institutions. It evaluated 492 mu-

[49] MUNIC data, its description, and temporal coverage are available at: https://www.ibge.gov.br/en/statistics/social/health/19143-survey-of-basic-municipal-information-editions.html?=&t=o-que-e.

[50] Law No. 12,527 (2011), Brazil's Access to Information Law. Available at: https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2011/lei/l12527.htm.

[51] A detailed description of the EBT and its evaluation criteria is available at: https://mbt.cgu.gov.br/publico/avaliacao/escala_brasil_transparente/200000001.

nicipalities with populations below 50,000, including all 27 state capitals, the 26 states, and the Federal District, using a random sample drawn from the 2014 IBGE database. We merge this EBT wave with our oil windfalls dataset, yielding a sample of 304 municipalities. Overall, as shown in Table E.4 (column 4), there is a positive association between fiscal state capacity and greater compliance with the transparency law.

Table E.3: Fiscal State Capacity, Local Councils, and Transparency Law

Model	(1)	(2)	(3)	(4)
Dependent Variable	Education (2006)	Public Security (2006)	Urban Planning (2008)	Transparency Law (2015)
Variables				
Ln Taxes/GDP, 2000	0.081***	0.081***	0.121***	0.346***
	(0.015)	(0.014)	(0.018)	(0.042)
Fit statistics				
Observations	3,706	3,706	3,706	304
Adjusted R^2	0.024	0.051	0.055	0.132

Notes: This table reports separate OLS regressions estimating the association between municipal fiscal capacity in 2000 (log taxes over GDP) and proxies for horizontal accountability. Columns 1–3 correspond to binary indicators for the presence of a municipal council in the specified policy area, while Column 4 indicates a higher grade of compliance with the transparency law. Standard errors (in parentheses) are clustered at the municipal level. These estimates are descriptive and not interpreted causally. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Taken together, this section provides suggestive evidence that fiscal state capacity is associated with horizontal accountability. We reach this conclusion using multiple measures across different years, each addressing potential limitations of the others, which increases confidence in the consistency of results. Overall, these findings align with the broader literature that employs fiscal capacity as a proxy for institutional strength.

E.1.2 Local Councils: A Measure of Horizontal Accountability

Table E.4: Reelection

Model	(1) 2SLS	(2) 2SLS
Variables		
Ln royalties	0.0267*	0.0089*
	(0.0141)	(0.0046)
Ln royalties × Local Councils	-0.0165*	-0.0028*
	(0.0098)	(0.0014)
Term-limited incumbent	-0.7662***	-0.4032***
	(0.0193)	(0.0142)
Municipality FE	Yes	No
State FE	No	Yes
Year FE	Yes	Yes
Fit statistics		
Observations	1,878	1,878
R^2	0.717	0.179
1st-stage F-statistic	572.8	6,104

Notes: This table reports 2SLS estimates from Equation 2 with incumbent reelection as the dependent variable. Model (1) includes municipality and year fixed effects; Model (2) includes state and year fixed effects. Due to data limitations, the analysis covers only the 2008 and 2012 electoral cycles. Standard errors (in parentheses) are clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

E.2 Persistence of Royalties' Effects on Incumbent Reelection

Table E.5: Conditional effects of oil royalties on incumbent reelection over time

Model	(1) 2SLS	(2) 2SLS
Variables		
Ln royalties	0.0128***	0.0265***
	(0.0043)	(0.0049)
Ln royalties × Period	-0.0043**	-0.0056
	(0.0021)	(0.0041)
Ln royalties × Ln Taxes/GDP, 2000		-0.0097**
		(0.0049)
Ln royalties × Ln Taxes/GDP, 2000 × Period		0.0009
		(0.0024)
Ln Taxes/GDP, 2000 × Period		-0.0099
		(0.0267)
Term-limited incumbent	-0.6094***	-0.6131***
	(0.0131)	(0.0267)
Fixed-effects		
Municipality	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	3,756	3,706
Adjusted R^2	0.19	0.20
1st stage F-statistic	2796	2056

Notes: This table reports 2SLS estimates from Equation 2, with incumbent reelection as the dependent variable. Model (1) estimates the effect of oil royalties—instrumented by offshore oil royalties—on reelection, interacting with a time trend, while Model (2) examines whether preexisting institutional strength conditions the effect of royalties on reelection over time. All models include municipality and year fixed effects, with standard errors (in parentheses) clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

E.3 General Robustness

Table E.6: Robustness: Effects of Oil Royalties on Incumbent Reelection

Model	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS
Variables				
Ln royalties per capita	0.059**			
	(0.026)			
Ln royalties per capita × Ln Taxes/GDP$_{2000}$	-0.022			
	(0.015)			
Ln royalties		0.049	0.015**	0.025***
		(0.033)	(0.006)	(0.008)
Ln royalties × Ln GDP per capita$_{1999}$		-0.005		
		(0.004)		
Ln royalties × Ln Taxes/GDP$_{2000}$			-0.008**	-0.012**
			(0.004)	(0.005)
Term-limited incumbent	-0.613***	-0.612***	-0.632***	
	(0.013)	(0.013)	(0.006)	
Fixed-effects				
Municipality	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Fit statistics				
Observations	3,706	3,706	14,376	2,827
Adjusted R^2	0.20	0.20	0.20	0.08

Notes: This table reports 2SLS estimates from Equation 2, with incumbent reelection as the dependent variable. All models include year and municipality fixed effects, with standard errors (in parentheses) clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table E.7: Robustness: Effects of offshore royalties on reelection

Model	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) OLS	(5) 2SLS
Variables					
Ln royalties	0.017***	0.026***	0.017*		
	(0.006)	(0.010)	(0.008)		
Lagged Ln Taxes/GDP ×					
Ln royalties	-0.006**				
	(0.003)				
Lagged Ln Taxes/GDP	0.066*				
	(0.003)				
Ln royalties ×					
Ln Taxes/GDP, 2000			-0.008*		
			(0.004)		
Ln offshore royalties				0.016***	
				(0.006)	
Ln Taxes/GDP, 2000 ×					
Ln offshore royalties				-0.007**	
				(0.003)	
Ln royalties ×					
Ln Taxes/GDP$_{2000}$ (Winsorized)		-0.014**			
		(0.0068)			
Ln royalties in $t+1$					0.006
					(0.010)
Ln Taxes/GDP, 2000 ×					
Ln royalties in $t+1$					-0.002
					(0.006)
Term-limited incumbent	-0.612***	-0.611***	-0.611***	-0.612***	-0.701***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.011)
Fixed-effects					
Municipality	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes		Yes	Yes
State × Year			Yes		
Fit statistics					
Observations	3,722	3,706	3,706	3,706	2,781
Adjusted R^2	0.20	0.20	0.20	0.20	0.20

Notes: This table reports 2SLS estimates from Equation 2, with incumbent reelection as the dependent variable. All models include year and municipality fixed effects, with standard errors (in parentheses) clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

E.4 Validity of the Interaction Effect: Covariates and Linearity Checks

This section addresses potential concerns related to the interaction effect between the oil windfalls and fiscal state capacity, our proxy for institutional strength. A key concern is that institutional strength is not randomly distributed across municipalities and may be correlated with other factors that also influence political outcomes, raising the possibility of omitted-variable bias in our interaction estimates. To assess the robustness of our results, we examine whether the estimated interaction effects are sensitive to the inclusion of time-varying baseline observable characteristics that may be correlated with institutional strength. We include a set of covariates commonly associated with institutional strength in the literature: rural population share, literacy rate, total population, gross domestic product, poverty rate, socioeconomic inequality (as measured by the Gini index), and radio and television coverage. All of these variables are measured prior to the beginning of the windfall period, in the same year as our institutional strength measure, ensuring that they are pre-treatment. Table E.8 reports a series of stepwise specifications based on Equation 2, in which we add these variables individually and then jointly in a fully saturated model. Across all specifications, the magnitude and significance of the interaction effect remain stable, indicating that our main results are not driven by observable time-varying differences across municipalities. Moreover, while these checks do not directly test the exclusion restriction, they provide indirect support for its plausibility.

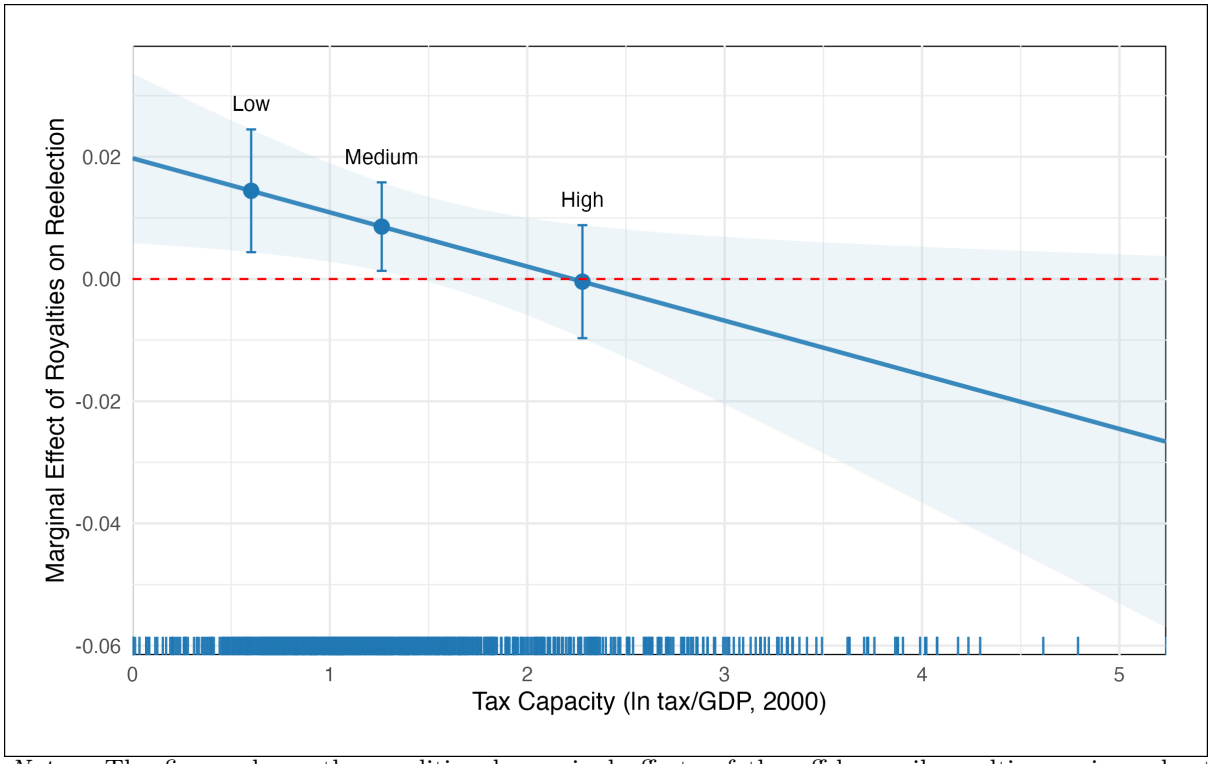
Table E.8: Robustness: Interaction Effects of Oil Royalties with Pre-Treatment Municipal Characteristics on Incumbent Reelection

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables										
Ln royalties	0.0198***	0.0200***	0.0205***	0.0187***	0.0186***	0.0205***	0.0188***	0.0203***	0.0210***	0.0171**
	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0072)	(0.0071)	(0.0071)
Ln royalties × Ln Taxes/GDP$_{2000}$	-0.0089**	-0.0091**	-0.0097**	-0.0082**	-0.0081**	-0.0097**	-0.0084**	-0.0092**	-0.0097**	-0.0086**
	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0041)
Term-limited incumbent	-0.6127***	-0.6126***	-0.6124***	-0.6132***	-0.6131***	-0.6125***	-0.6134***	-0.6127***	-0.6130***	-0.6142***
	(0.0134)	(0.0134)	(0.0134)	(0.0133)	(0.0133)	(0.0134)	(0.0134)	(0.0134)	(0.0134)	(0.0132)
Rural Pop Share (2000) × Year		-0.0034								0.0050
		(0.0081)								(0.0118)
Literacy Rate (2000) × Year			-0.0002							-0.0005
			(0.0001)							(0.0004)
Ln Population (2000) × Year				-0.0019						0.0068*
				(0.0016)						(0.0037)
Ln GDP (2000) × Year					-0.0014					-0.0101***
					(0.0011)					(0.0034)
Poverty Share (2000) × Year						-0.0001				-0.0002
						(8.55×10^{-5})				(0.0003)
Gini Coefficient (2000) × Year							-0.0476			-0.0295
							(0.0319)			(0.0337)
Radio Coverage (2000) × Year								0.0145		-0.0391
								(0.0209)		(0.0326)
TV Coverage (2000) × Year									0.0002	0.0002
									(0.0001)	(0.0002)
Fixed-effects										
Municipality	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics										
Observations	3,706	3,706	3,706	3,706	3,706	3,706	3,706	3,706	3,706	3,706
R^2	0.3987	0.3988	0.3995	0.3992	0.3992	0.3993	0.3994	0.3989	0.3993	0.4042

Notes: This table presents 2SLS estimates from Equation 2, with reelection as the dependent variable. The models are estimated sequentially, progressively adding baseline covariates interacted with a linear time trend, up to Model 10, which includes all covariates simultaneously. All models include municipality–year fixed effects. Standard errors (in parentheses) are clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Another potential concern is that our interaction effect assumes a linear relationship. As Hainmueller et al. (2019) note, violations of linearity can make estimates highly model-dependent. To evaluate this assumption, we use the binning estimator they propose, which calculates effects at low, medium, and high levels of the moderator. Figure E.3 shows that these binned estimates closely align with the linear marginal effects based on the continuous tax capacity variable (Figure 1), indicating that the linearity assumption is reasonable for this moderator.

Figure E.3: Conditional effect of oil royalties on incumbent reelection



Notes: The figure shows the conditional marginal effects of the offshore oil royalties on incumbent reelection. The coefficients for the plot are from Model 5 of Table 1. The unit of analysis is the municipality, and the specification includes municipality and period fixed effects. The shaded region represents the 95% confidence interval. The rug plot at the bottom plots the distribution of municipalities by their tax capacity.

F Individual Level Analysis: Survey Data

This section expands on the main individual-level findings from Section Evaluating Mechanisms at the Individual-Level, presenting the complete regression tables across various model specifications (Tables F.10 and F.11). We also provide summary statistics for the key variables used in our analysis, including demographic characteristics, institutional strength, oil royalties, and proxies for clientelism (Table F.9). All data are drawn from the LAPOP Wave 2010 survey.

F.1 Summary Statistics

Table F.9: Summary Statistics

Variable	N	Mean	Sd	Min	Max
Ln Taxes/GDP, 2000	905	2.482	0.7058	0.669	3.379
Ln royalties	905	11.18	4.301	0	17.59
Ln offshore royalties	905	9.561	5.392	0	17.26
Ln royalties × Ln Taxes/GDP, 2000	905	28.89	15.47	0	59.45
Clientelism	905	0.168	0.5243	0	2
Turnout	905	0.5989	0.4904	0	1
Age	903	39.32	15.78	18	89
Education (Years)	887	7.768	3.958	0	17
Gender (1=Male)	905	1.518	0.4999	1	2

F.2 Vote-Buying

Table F.10: Vote-Buying

Model	(1) 2SLS	(2) 2SLS	(3) 2SLS
Variables			
Constant	-0.431	-0.606	
	(0.281)	(0.355)	
Ln royalties	0.155**	0.155**	0.148*
	(0.069)	(0.071)	(0.020)
Ln royalties × Ln Taxes/GDP_{2000}	-0.039**	-0.039**	-0.049**
	(0.017)	(0.018)	(0.020)
State FE	No	No	Yes
Individual-Level Controls	No	Yes	Yes
Fit statistics			
Observations	905	885	885
R^2	0.18926	0.17618	0.79926

Notes: This table reports 2SLS estimates from Equation 2, with self-reported vote-buying as the dependent variable. Model (1) includes no controls; Model (2) includes individual-level controls; Model (3) includes both individual-level controls and state fixed effects. Standard errors (in parentheses) are clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

F.3 Turnout

Table F.11: Turnout

Model	(1) 2SLS	(2) 2SLS	(3) 2SLS
Variables			
Constant	-0.184	-0.236	
	(0.589)	(0.638)	
Ln royalties	0.143*	0.146*	0.254***
	(0.076)	(0.078)	(0.032)
Ln royalties × Ln Taxes/GDP_{2000}	-0.028	-0.029	-0.041***
	(0.021)	(0.021)	(0.009)
State FE	No	No	Yes
Individual-Level Controls	No	Yes	Yes
Fit statistics			
Observations	905	885	885
R^2	-0.31513	-0.36338	0.89394

Notes: This table reports 2SLS estimates from Equation 2, with self-reported presidential turnout as the dependent variable. Model (1) includes no controls; Model (2) includes individual-level controls; Model (3) includes both individual-level controls and state fixed effects. Standard errors (in parentheses) are clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

G Alternative Explanations

This section presents the full results for the three alternative explanations to our main proposed mechanism, as discussed in Section Ruling Out Alternative Explanations. In a nutshell, Table G.12 shows no evidence that royalties affected government expenditure on public goods provision, while Table G.13 demonstrates that levels of political competition were also not affected.

G.1 Public Goods Provision

Table G.12: Effects of oil royalties on government expenditures per capita

	Ln educ. exp./cap		Ln health exp./cap		Ln transport exp./cap	
Model	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Ln royalties	0.0048	0.0044	0.0033	0.0054	-0.0009	0.00031
	(0.0046)	(0.0040)	(0.0048)	(0.0054)	(0.0277)	(0.0300)
Ln royalties × Ln Taxes/GDP$_{2000}$	0.0012	-0.0002	-0.0001	0.0016	-0.0011	-0.0043
	(0.0030)	(0.0025)	(0.0027)	(0.0028)	(0.0149)	(0.0150)
Term-limited incumbent	0.0106	0.0080	0.0078	0.0060	0.0456	0.0486
	(0.0067)	(0.0061)	(0.0092)	(0.0093)	(0.0421)	(0.0427)
Fixed-effects						
Municipality	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes		Yes		Yes	
State X Year	No	Yes	No	Yes	No	Yes
Fit statistics						
Observations	2,493	2,493	2,493	2,493	2,493	2,493
Adjusted R^2	0.93	0.94	0.87	0.87	0.65	0.65
1st stage F-statistic	1027	1027	1027	1027	1027	1275

Notes: This table reports OLS and 2SLS estimates from Equation 2, with dependent variables: (1) log per capita education spending, (2) log per capita health spending, and (3) log per capita transportation spending. Models 1, 3, and 5 include municipality and year fixed effects, while models 2, 4, and 6 include municipality and state-by-year fixed effects. Standard errors (in parentheses) clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

G.2 Effects of royalties on political competition

Table G.13: Effects of royalties on political competition

	Ln number of candidates	Effective number of parties
Model	(1)	(2)
Variables		
Ln royalties	-0.0050	-0.0103
	(0.0038)	(0.0091)
Ln royalties × Ln Taxes/GDP$_{2000}$	0.0035	0.0068
	(0.0021)	(0.0056)
Term-limited incumbent	0.0212**	0.0762***
	(0.0098)	(0.0215)
Fixed-effects		
Municipality	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	3,706	3,706
Adjusted R^2	0.44	0.25
1st stage F-statistic	2538	2538

Notes: This table reports 2SLS estimates from Equation 2, with dependent variables: (1) log number of candidates, (2) effective number of parties. All models include year and municipality fixed effects, with standard errors (in parentheses) clustered at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

G.3 Impact of Royalties on Challenger Education and Occupation

Table G.14: Effects of royalties on challenger characteristics

	College Degree (Challenger)	High-Skill Occupation (Challenger)
Model	(1)	(2)
Variables		
Ln royalties	-0.0030	0.0101
	(0.007)	(0.0081)
Ln royalties × Ln Taxes/GDP$_{2000}$	0.0016	-0.0057
	(0.004)	(0.0047)
Term-limited incumbent	0.0003	0.0228
	(0.0206)	(0.0207)
Fixed-effects		
Municipality	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	3,400	3,416
Adjusted R^2	0.22	0.07
1st stage F-statistic	2246	2263

Notes: This table reports 2SLS estimates from Equation 2 with the dependent variable indicating whether the challenger has a college degree or works in a high-skill occupation. All models include year and municipality fixed effects, with standard errors clustered (in parentheses) at the municipality level. **Significance:** *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.