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Reelection Incentives and Political Corruption:  
Evidence from Brazilian Audit Reports

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January 2005

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# Reelection Incentives and Political Corruption: Evidence from Brazilian Audit Reports\*

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## Abstract

As part of a recent anti-corruption campaign, the Brazilian government began to audit the municipal expenditure of federally-transferred funds. Using these audit reports, we construct a unique data set of political corruption to test whether reelection incentives affect the level of corruption in a municipality. Consistent with a political economy agency model, we find that mayors who are in their second and final term are significantly more corrupt than first-term mayors. In particular, second-term mayors on average divert, R\$188,431.4 more than first-term mayors, which is approximately 4 percent of the total amount transferred to municipalities. We also find much more pronounced effects among municipalities where the costs of rent-extraction are lower, and the density of pivotal voters is higher. Our results also illustrate an important trade-off: second-term mayors, while more corrupt, provide a higher level of public goods. As Brazil and other countries continue their decentralization process, our findings promote the need for a better understanding of how local institutions can help reduce the incentives for corruption.

Key words: Corruption, Reelection Incentives, Term Limits, Brazil

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# 1 Introduction

An important role of elections is to hold incumbent politicians accountable for poor performance. The possibility of reelection provides politicians with incentives to exert more effort and refrain from rent-seeking behavior. While there exists an entire class of political economy models that illustrate this idea, the extent to which reelection incentives actually affect rent-seeking behavior remains an unexplored empirical question.<sup>1</sup> The scarcity of empirical tests of these political-agency models stems, in large part, to the difficulties in measuring corruption. This paper overcomes this limitation by constructing a unique database of political corruption based on audit reports. We then exploit the existence of term limits to empirically test whether reelection incentives affect corruption among mayors of Brazilian municipalities.

In many respects, Brazil provides the ideal setting to test whether political incentives affect corruption. After the constitution of 1988, municipal governments became responsible for a substantial share of public services' provision, particularly in the areas of education and health. With the devolution of public service delivery to local governments, the federal government transferred large amounts of federal resources to municipalities.<sup>2</sup> With the influx of federal funds increasing the potential for local capture, it is not too surprising that corruption at the municipal level is now an overarching concern for Brazil. A recent article in *VEJA*, a leading Brazilian news magazine, reports that at least R\$7 billion, out of the resources transferred from the federal government to municipalities, disappear every year. In response to its systemic corruption, the Brazilian government began in April of 2003 an ambitious anti-corruption policy to audit the receipts of federal funds of randomly chosen municipalities. Using these audit reports we construct two objective measures of corruption at the municipal level: the share of resources misappropriated and the number of corrupt irregularities. Moreover, because the federal program has audited more than 376 randomly selected municipalities across Brazil, there is sufficient variation to try to understand what explains political corruption at a local setting.

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<sup>1</sup>See for example Ferejohn (1986), Barro (1970), Banks and Sundaram (1993), Persson and Tabellini (2000), and Alesina and Tabellini (2004)

<sup>2</sup>Currently, the 5,560 Brazilian municipalities receive on average \$35 billion per year from the federal government, which represents approximately 15 percent of federal government's revenue. For comparison, fiscal decentralization in the world is on average 6 percent, while in other similar developing countries such as Mexico, for example, it is only 3 percent.

Even with data on corruption, a test of how reelection incentives affect political corruption was only possible in Brazil after 1998 when a constitutional amendment allowed mayors to run for a second consecutive term. This amendment allow us to test the effects of reelection incentives by comparing corruption levels between mayors who are in their first term to mayors who are in their second and final term.<sup>3</sup>

To provide a theoretical framework for our results, we build a simple political agency model that links rent appropriation to reelection incentives and provides comparative statics with respect to political competition, media availability, and judicial enforcement. Our findings are consistent with this theory. In particular, we find that the share of resources misappropriated is 4 percentage points higher for second-term mayors than for first-term mayors. This indicates that of the amount of federal funds transferred to municipalities, second-term mayors on average misappropriates R\$188,431.4 (approximately US\$70,000) more than first-term mayors. We also show a positive association for the number of corrupt irregularities. Compared to first-term mayors, second-term mayors commit 31 percent more irregularities related to corruption. Although we cannot reject the possibility of omitted-variable bias, our results are remarkably robust to various specifications and estimation procedures.

Because there are private costs associated with corruption that directly affect an incumbent's reelection incentives, we exploit differences in the institutional features of the municipality that affect either the probability of being discovered or prosecuted to further test our model. We find significant variation comparing municipalities with and without a media source and municipalities with and without a judiciary district. Among municipalities with either a radio or newspaper there is no differential effect between first and second-term mayors. Though we find a similar result for municipalities with a judiciary district, for the municipalities *without* a judiciary district the effect of reelection incentives on political corruption is 7 percentage points, which is almost double the estimate in aggregate.

We also find, consistent with the model, that the effect of reelection incentives is much more pronounced in municipalities where mayor elections were close. The intuition for this result is as follows. In municipalities with a higher share of pivotal voters, a first-term mayor has an incentive

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<sup>3</sup>As we will discuss later in the paper, it is important to understand that we are measuring the reelection incentives induced by term limits, and not the effects of term limits *per se*. Our counterfactual is a one term-limit regime and not the absence of term limits, as in (Besley and Case 1995).

to further reduce rent-extraction in order to guarantee reelection for his second term. Conversely, mayors who dictate a municipality will extract maximal rent in the first term since reelection is almost assured.

Although lame duck mayors may have less incentives to refrain from corruption, the reelection of a mayor also has its benefits. In addition to being more corrupt, second-term mayors on average commit 17 percent fewer violations associated with maladministration. This result highlights an important trade-off that has received little attention in the corruption literature. Because of a potential complementarity between corruption and the provision of certain public goods, voters may have to choose between reelecting a mayor into a position of low accountability and receiving a higher level of public goods.

The contribution of our paper to the literature is three-fold. This paper represents (to our knowledge) the first empirical test of a class of political-agency models that link reelection incentives to political corruption. In so doing, we complement two studies that examine how reelection incentives affect economic policies. Besley and Case (1995) use data from U.S. governors from 1950 to 1986 and find that governors who face a binding term limit are more likely to raise taxes and expenditures, and reduce real state minimum wages. In a related study, List and Sturm (2004) use data on environmental policy across U.S. states to test a theoretical model where politicians use secondary policies to attract voters. They find that environmental policy differs substantially between years in which the governor can and cannot be reelected. Our study, while examining political corruption, differs in another important respect. Whereas these studies identify the effects of term limits, we measure the effects of reelection incentives created by allowing mayors to run for a second consecutive term. This is an important distinction because our counterfactual assumption is not the absence of term limits, but rather allowing only a single term.

This paper also contributes more broadly to a burgeoning empirical literature on what determines corruption, and more specifically, the role that political institutions play (see for example: Traisman (2000); Mocan (2004); Adsera, Boix, and Payne (2003); Kunicova and Rose-Ackerman (2003); Lederman, Loayza, and Soares (2001); Persson, Tabellini, and Trebbi (2003)). Our focus on understanding corruption at a local level is distinct in this strand of the literature. Unlike the various these studies that rely on cross-country comparisons, we try to understand how local institutions and political incentives influence the extent of municipal corruption.

Our third main contribution is the use of audit data to objectively measure and quantify corruption.<sup>4</sup> In this respect our contribution is similar to Henderson and Kuncoro (2004), Svensson (2003) and Reinikka and Svensson (2004) in using corruption indicators derived from microdata for a single country. Differently from Henderson and Kuncoro (2004) and Svensson (2003) who look at bribe payments by firms, we analyze government corruption at the municipality level. In that sense, our paper is more related to Reinikka and Svensson (2004), who analyze rent capture in a large educational transfer program in Uganda. They collect data on grants received by schools using an expenditure tracking survey to study how socioeconomic characteristics matter for the capture of rents by local officials and politicians. Our focus is instead on political incentives and rent-extraction, and our data differs in the important fact that it measures political corruption of independent municipal governments.

Finally, this paper adds to the discussion of the costs and benefits of decentralization in developing countries. Although we cannot determine whether decentralization has increased overall corruption in Brazil, the fact that it has undoubtedly increased corruption at the local level places an important emphasis on trying to understand how local institutions affect corruption. Our findings provide suggestive evidence that the local institution that promote accountability and oversight may not only reduce political corruption but will minimize the adverse incentives that term limits seem to create.

The remainder of the paper is organized as follows. Section 2 presents a theoretical framework that links corruption to reelection incentives. It is within this context that we interpret our empirical results. Section 3 then provides some basic background information on corruption in Brazil and describes the data. Our empirical strategy is discussed in section 4, and the results follow in section 5. Section 6 concludes the paper.

## 2 Theoretical Framework

In this section, we present a simple theoretical model that provides a basic framework to interpret our empirical findings. Our model, which is similar to those presented in Persson and Tabellini (2000) and Alesina and Tabellini (2004), is an adaptation of the career concern model pioneered by

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<sup>4</sup>Golden and Picci (2004) provides a survey of the potential criticisms associated with the commonly-used subjective measures of corruption.

Holmstrom (1999) and later extended by Dewatripont, Jewitt, and Tirole (1999). In this political context in which elections reward competent or able politicians, incumbents with reelection possibilities have the incentive to extract less rent and thus appear more competent in their provision of public goods. In effect, incumbents will refrain from maximum rent extraction in the first period in order to increase their reelection chances and the possibility of full (unconstrained) rent extraction in the second period.

The basic intuition for this result is simple. The objective of voters is to elect the candidate with the highest competency level since this assures them of the highest utility. The incumbent's ability is unknown to the voters, and only revealed to the incumbent after he chooses his level of rent-seeking for the first period.<sup>5</sup> With voters left to infer his level of ability, the incumbent has an incentive to refrain from rent-seeking to appear more competent than average and thus assure himself of reelection. This leads to an equilibrium where politicians in their last term of office will on average extract more rent compared with their first term in office. The details of this intuition are what follow.

Consider a two-period model, where voters have preferences over private income  $y$  and a publicly provided good  $g_t$ . The utility of a representative voter  $U_t$  in period  $t = 1, 2$  is expressed as,

$$U_t = y(1 - \bar{\tau}) + \alpha g_t. \quad (1)$$

The exogenous parameter  $\alpha$  is assumed to be greater than 1, and taxes are fixed at  $\bar{\tau}$ .

Though public goods are the sole policy instrument, politicians can engage in rent-seeking behavior. We require that the government balances its budget in both periods, so the appropriation of nonnegative rents  $r_t$  by the politician effectively reduces the amount of public goods and consequently lowers voter welfare. The government budget constraint determines the level of public goods as,

$$g_t = \theta + \bar{\tau}y - r_t. \quad (2)$$

The random variable  $\theta$  captures the politician's competence in providing public goods and is distributed from a normal distribution with mean  $\bar{\theta}$  and variance  $\sigma$ .<sup>6</sup> All else held constant, a more

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<sup>5</sup>The fact that the incumbent does not know his own competency level is admittedly a strong assumption. Banks and Sundaram (1993) and Rogoff (1990) cast this agency problem as an adverse selection problem to relax this assumption, and find the same general result.

<sup>6</sup>One could easily relax the assumption that a politician's competency affects the provision of public goods in an additive manner and maintain similar results.



competent politicians effectively increases the government budget constraint to provide more public goods.

Politicians value rents according to a well-behaved, concave function,  $R(r_t)$ , but also experience some disutility,  $C(r_t)$ , stemming from the transaction costs associated with rent appropriation. The disutility of rent extraction increases with the amount of rent appropriated and in a convex manner, i.e.  $C' > 0, C'' > 0$ . To insure that voters have the incentive to reelect competent incumbents, we also assume that the maximum level of rents that a politician can extract is strictly below the total available tax revenue. We can now state the objective of the incumbent politician in period 1 as,

$$V_I = R(r_1) - C(r_1) + Pr_I \beta (R(r_2) - C(r_2)), \quad (3)$$

where  $\beta \in (0, 1)$  is a discount factor and  $Pr_I$  is the probability of reelection.

The timing of this game is as follows:

- In period 1, the incumbent politician chooses the level of rent appropriation,  $r_1$  before knowing his competency level  $\theta$ .
- Nature then reveals the value of  $\theta$ , which determines the level of public goods,  $g_1$ . Observing only their own utility, voters are forced to make inference on the incumbent's competence level.
- Elections are held.
- If the incumbent wins, his competence  $\theta$  is maintained. Otherwise, the challenger enters office with a competency level randomly drawn from the same normal distribution.
- In period 2, rents  $r_2$  are set, thus determining the level of public goods,  $g_2$ .

Because the game ends in period 2 and there are no incentives to behave altruistically, the elected politician will set rents  $r_2$  to equate marginal benefits to marginal costs, i.e.  $R'(r_2) = C'(r_2)$ .<sup>7</sup> Unable to induce politicians away from optimal rent extraction in period 2, voters will seek to elect the most competent candidate since doing so provides them with the highest utility.

With this objective and having observed the current level of public goods  $g_1$ , voters will properly recognize that politicians maximize equation 3 and form expectations about the level of current

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<sup>7</sup>Alesina and Spears (1988) show that lame-duck politicians may not fully extract rent if they consider the reelection probabilities of their own party.

rents,  $r_1^e$ . Also realizing that the alternative to reelecting the incumbent is to elect a politician with an expected competency level of  $\bar{\theta}$ , voters will hold the incumbent accountable to a threshold level of public good provision in the first period that is equal to  $y\bar{\tau} + \bar{\theta} - r_1^e$ . If the level of public goods  $g_1$  is higher than this threshold, implying a higher expected competence level than  $\bar{\theta}$ , the incumbent is reelected. This voting behavior can be summarized with the following voting rule,  $r$ :

$$r = \begin{cases} 1 & \text{if } g_1 \geq y\bar{\tau} + \bar{\theta} - r_1^e, \\ 0 & \text{otherwise} \end{cases}$$

From the incumbent's perspective, his period 1 decision is to optimally choose rents  $r_1$ , while considering the fact that increasing rents in period 1 will lower his probability of reelection and thus his expected future benefits. Formally, this maximization problem can be expressed as:

$$\begin{aligned} \text{Max}_{r_1} R(r_1) - C(r_1) + Pr(g_1 \geq y\bar{\tau} + \bar{\theta} - r_1^e)\beta(R(r_2^*) - C(r_2^*)) \\ \text{s.t. } g_t = y\bar{\tau} + \theta - r_t \text{ for } t = 1, 2 \end{aligned}$$

where  $r_2^*$  is the optimal level of rent extraction in period 2. After substituting in the constraints and rearranging slightly, we can reformulate the statement to:

$$\text{Max}_{r_1} R(r_1) - C(r_1) + (1 - Pr(\theta \leq \bar{\theta} + r_1 - r_1^e))\beta(R(r_2^*) - C(r_2^*)).$$

Given our distributional assumption for  $\theta$ , the equilibrium rent extraction  $r_1^*$  is implicitly defined by the first-order condition:

$$R'(r_1) - C'(r_1) + \frac{1}{\sigma\sqrt{2\pi}} \exp\left(\frac{r_1 - r_1^e}{2\sigma^2}\right) \beta(R(r_2^*) - C(r_2^*)) = 0 \quad (4)$$

In equilibrium, voters' expectation of rents must equal the incumbent's optimal choice of rents, i.e.  $r_1^e = r_1$ . Equation 4 thus simplifies to:

$$R'(r_1) - C'(r_1) = \eta\beta(R(r_2^*) - C(r_2^*)), \quad (5)$$

where  $\eta = \frac{1}{\sigma\sqrt{2\pi}}$  is the density of the normal distribution of  $\theta$  evaluated at its mean.

Comparing the equilibrium choice of rents of the two periods provides the main result of this model and the motivation for our empirical test. Politicians in their last term of office will on average extract more rent compared with their first term in office. To see this, first define the function  $\Psi(r_t) = R'(r_t) - C'(r_t)$ , which given our assumptions about  $R(\cdot)$  and  $C(\cdot)$ , is a concave

function. From equation 5, and with  $\eta\beta(R(r_2^*) - C(r_2^*)) > 0$ , it holds that  $\Psi(r_1^*) > \Psi(r_2^*) = 0$ . The concavity of  $\Psi(\cdot)$  thus implies that  $r_2^* > r_1^*$ .

Note that equation 5 suggests other implications of this model that we explore in the data. The higher the uncertainty in the election, as measured in  $\eta$ , the lower the equilibrium rents  $r_1^*$ , and the relatively higher rent extraction in period 2. Similarly, the higher the "rent-profit", either because of higher revenues or lower transaction costs, implies a higher relative rent extraction in the second period.

### 3 Background and Data Construction

To understand how reelection incentives affect the level of political corruption, we assemble a unique database of municipal corruption spanning the years 2000 to 2003. We use reports from randomized audits done by the Brazilian government to construct objective measures of a municipality's corruption level during this period. In this section we first provide some background on political corruption at the municipal level and then describe how we used the audits reports to construct measures of corruption.

#### 3.1 Descriptive Evidence on Political Corruption Schemes

With a series of well-publicized federal corruption scandals, including the impeachment of ex-President Collor de Mello, much of our understanding of corruption and its institutional sources in Brazil, has been limited at the national scale (see for (Fleischer 1997); (Fleischer 2002); (Geddes and Neto 1999); (Barry Ames 1987)). Corruption at the municipal level, which has increased substantially as result of the Brazil's decentralization, has received much less attention.

Local corruption in Brazil assumes a variety of familiar forms. Illegal procurement practices, diversion of funds, and over-invoicing for goods and services are among the most common ways local politicians find to appropriate resources (?).

While Brazilian law requires a competitive bidding process with at least three participants for any project in excess of R\$80,000 per year, the municipality of *Itapetinga* in the state of Bahia, for example, highlights one of the many ways local mayors have manipulated the public procurement process. In 2002 and 2003, the federal government transferred to *Itapetinga* R\$ 389,000 (US\$110,000) for the purchase of school lunches. In 12 out of the 16 calls for bids, only

one bid was ever supplied. It was later discovered that each call for bids was posted only one hour prior to its deadline, and surprisingly only a firm owned by the mayor's brother posted within the time limit. This same scheme was uncovered for other social programs in the areas of education and health.

In other procurement bids, irregularities appear because friendly or family firms have either benefitted from insider information on the value of the project, or certain restrictions have been imposed to limit the number of potential bidders. An example from *Cacule*, Bahia, illustrates this. The call for bids on the construction of a sports complex specified as a minimum requirement for participation that all firms needed to have at least R\$100,000 in capital and a specific quality control certification. Only one firm called Geo-Technik Ltda., which was to discovered to have provided kickbacks to the mayor, met these qualifications.

While some procurement practices manipulate the process in favor of firms that offer potential kickbacks, other strategies are more blatant forms of fund diversions. For example in the municipality of *São Francisco do Conde*, again in Bahia, a health contract of R\$308,000 was awarded to a phantom firm: a firm that only exists on paper. And in other contracts, although existing firms did win the bid, none of them were even aware that they had participated in the bidding process. The local administration used these firm's names in false receipts for public goods that were never provided.

Another common form of corruption is for mayors to divert funds intended for education and health projects towards the purchase of cars, fuel, apartments, or payment of their friends' salaries. In some cases, the mayor himself is a direct beneficiary. For example, in *Paranhos*, Mato Grosso do Sul, R\$189,000 was paid to implement a rural electrification project. As it turns out, one of the farms benefitted by the project was in fact owned by the mayor.

### **3.2 The Construction of Corruption Indicators**

In April of 2003, the Controladoria Geral da União (CGU) - an agency responsible for auditing the use of federal resources - started an unprecedented anti-corruption program designed to audit the application and execution of federal funds transferred to municipalities. Every month the CGU sends approximately 10 auditors to 50 randomly-selected municipalities across the 26 states to examine the allocation of federally-transferred funds, to inspect the quality and completeness of

public works, and to conduct interviews with key members of civil society.<sup>8</sup> These federal transfers, typically earmarked for specific projects or public works, are examined for such irregularities as diversion of funds, noncompetitive bidding in the procurement contracts, cost-padding, and incomplete or non-utilization. Each visit lasts seven days on average, and results in a detailed report documenting any irregularity associated with either the federal transfers or federally-funded social programs. Reports are subsequently sent to the federal judiciary system for potential prosecution. It is with these reports that we construct our objective indicators of political corruption and study how reelection incentives affect these measures.

Reports are available for the 376 municipalities that were randomly selected across the first 8 lotteries.<sup>9</sup> Contained in each report are the total amount of federal funds that was transferred to the current administration and thus audited, as well as, an itemized list describing each irregularity, in what sector it occurred (e.g. health, education, etc.), and in most cases the amount of funds involved.

Based on our readings (and that of an independent person), we then codified these reports into several categories; some indicating corruption while others simply exposing poor administration. A couple examples will provide insight into our coding procedures.

Consider for example how the municipality of *Malhada de Pedras* in the interior of Bahia allocated funds from the Federal program FUNDEF - a program designed to pay for the costs of primary education in a municipality:

**1) Fraud, diversion of funds, and falsified receipts associated with the resources of FUNDEF:** the auditors identified R\$100,000 in falsified receipts, emitted over the last 3 years, to justify expenditure associated with FUNDEF. All of the 12 firms that were indicated on the receipts as providers of the products, confirmed that they had never conducted business with the administration. The auditors also confirmed that R\$610,000 was paid to individuals without any direct ties to the educational system.

We coded this irregularity as a diversion of funds in the area of education, with an amount to-

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<sup>8</sup>It is important to mention that these auditors are hired based on a public examination, and prior to visiting the municipality receive extensive training on the specificities of the sampled municipality. Also, there is a supervisor for each team of auditors.

<sup>9</sup>Only 26 municipalities were selected in the first lottery. In May of 2004, starting with the tenth lottery, the CGU increased the number of municipalities sampled to 60.

talling R\$710,000. The municipality of *Varzea*, in the state of Paraíba, provides an example of maladministration.

**1) Maladministration in the use of resources from the Family Health Program (Programa de Saude da Familia):** The municipality used R\$92,500 to pay medical doctors from the Association of Protective Motherhood and Childhood Assistance, a productivity premium. Although used for health-related expenses, these resources were intended to be used in the area of preventive medicine, and in particular to defray costs associated with the programs: Family Health, Oral health, and the Community Health Agents Program.

We classified this violation as poor administration in the area of health, with a value of R\$92,500.

In all, we coded the irregularities into 11 categories: diversion of funds, illegal procurement contracts, over-invoicing, incomplete public works, non-existent or non-functioning social council, mismanagement of a social program, abandoned project (white elephant), clientelism, failure to spend allocated budget, poor administration, and other. For each irregularity we distinguish the sector in which it was found, and its amount when available.

Among these various categories of irregularities, we combine the incidences of funds diversion, illegal procurement practices, and over-invoicing to construct an aggregate indicator of municipal corruption. These practices have not only been shown to be the most common forms of corruption in Brazil, but in many instances they are not necessarily mutually exclusive. In effect, over-invoicing and illegal procurement practices often serve as vehicles for funds diversion. The combination of these three categories is what we consider best captures the municipality's corruption level.

With our aggregated corruption indicator, we define two measures of political corruption at the municipal level. The first measure computes the total amount of resources related to our corrupt activities, expressed as a share of the total amount of resources audited. Our second measure simply counts the number of irregularities related to corruption. There are at least two reasons why we calculate alternative measures of corruption. First, although correlated with our first measure of corruption (the correlation coefficient is 0.51), the number of corrupt irregularities helps to distinguish whether second-term mayors also engage in more corrupt transactions. Second, in coding the amount of resource deviated or involved in an illegal procurement, a dollar amount was

not always available in some of the audit reports.<sup>10</sup> While coding these cases as zero underestimates the amount of corruption, this could create a bias for testing reelection incentives if the cases occurred disproportionately for first-term mayors. By using this count measure we include these irregularities and thus avoid this potential bias.<sup>11</sup>

Summary statistics for each of our categories, including the corruption indicator, are displayed in Table 1.<sup>12</sup> As seen in column 1, 54 percent of the municipalities have performed an illegal procurement practice, and at least 48 percent of the municipalities have diverted some type of funds. Over-invoicing, another source of corruption, is found much less frequently, occurring in only 6 percent of our sample. After combining these indicators, we see that 73 percent of the municipalities have had at least one incidence of corruption. Moreover, those administrations that do commit an act of corruption average around 2.35 corrupt violations, which represents 35 percent of the irregularities found. At an average of R\$135,000 per violation, these corrupt practices represent 9.1 percent of the total amount amount audited.

Among the other types of irregularities, the misuse or mismanagement of a social program appears to be an important problem for the federal government and the efficacy of its social policies. Approximately 39 percent of the municipalities have mismanaged at least one of its federally-funded social program. Surprisingly, explicit acts of clientelism were found in only 7 percent of the sample, whereas incidences of poor administration are commonly found in over 67 percent of the municipality.

Columns 5-8 in Table 1 display the primary sectors over which these irregularities are distributed. Both in aggregate and for the corruption indicator, we see that over 50 percent of these irregularities occur in the areas of education and health: sectors that were decentralized during of the 1990s. Though this table cannot distinguish whether corruption occurs relatively more in health and education because the federal funds are concentrated in these areas or because the activities within these sectors are easier to corrupt, there does appear to be a lack of oversight. Of the 30 percent of the municipalities that do not have a functioning or existent council, roughly 50 percent of these dysfunctional councils are related to health or education. We also find that

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<sup>10</sup>Only 11 percent of the incidences of illegal procurement practices and funds diversion did not have a value.

<sup>11</sup>If anything we are underestimating the effect of reelection incentives on the share of total resources associated with corruption, because the proportion of these irregularities is 6 percentage points higher for second-term mayors.

<sup>12</sup>Summary statistics are computed for the 367 municipalities that constitute our estimation sample. The 13 municipalities were excluded for not having a full set of explanatory variables.

abandoned projects (or white elephants), which are found in 10 percent of the municipalities, are mostly associated with agriculture.

To now get a sense for how reelection incentive may affect these various irregularities, Table 2 compares these indicators between municipalities with mayors in their first-term to municipalities with mayors in their second-term. Compared to municipalities with first-term mayors, the number of irregularities found in each of our 3 categories of corruption (diversion of funds, illegal procurement practices, and over-invoicing) is higher in municipalities governed by second-term mayors. On average, second-term mayors commit .23 more irregularities in both diversion of funds and illegal procurement practices, although only procurement practices are measured with much precision. A comparison of our aggregated indicator of corruption provides some preliminary evidence in support of our theoretical predictions. Mayors in their final term of office commit 0.48 more irregularities related to corruption than first-term mayors, a difference that is significant at 90 percent confidence. When we measure corruption, using the share of the transfers audited, the last set of rows of Table 2 tell a similar story. Second-term mayors are on average 3.7 percent more corrupt than first-term mayors; a difference which is significant at a 95 percent level of confidence. Notice also that illegal procurement practices drives much of the difference between first and second-term mayors that we observed in our corruption indicators. Just in terms of procurement practices, the share of resources audited that were found to be irregular is 3.1 percent higher for second-term mayors than for first-term mayors.

The table also shows that while more corrupt, second term mayors are on average better administrators than first-term mayors. This difference could be attributed to both the experience gained in office and the fact that second-term mayors could represent a select-group of more administratively able individuals. Regardless of the explanation, as seen in column 3, municipalities with a second-term mayors commit fewer irregularities in tending to administrative matters, and to a lesser extent have less dysfunctional councils and better-managed social programs.

### **3.3 Data on Municipal Characteristics**

Three other data sources, obtained from the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística (IBGE)), complement our political corruption variables. The richness of these data allows us to control for several municipal characteristics, whose absence



might otherwise confound our estimates.

Our measures of per capita income were obtained from the 2000 population census. Per capita income is simply measured as total household income divided by household size. Using sampling weights, we then constructed for each municipality average per capita income and a Gini coefficient.

Our second complementary data source from IBGE is a municipality survey, *Perfil dos Municípios Brasileiros: Gestão Pública*, conducted in 1999. These data characterize various aspects of the public administration, including the existence of laws which govern its budgetary and planning procedures. The survey also provides structural features of the municipality such as whether it has a newspaper or municipal police, etc.

Finally, results from 2000 mayor elections are available from the Tribunal Superior Eleitoral (TSE). These data contain vote totals for each candidate by municipality, along with various individual characteristics, such as the candidate's gender, education, occupation, and party affiliation. We use this information to construct the mayor's winning margin and various other measures of electoral performance.

Table 3 compares differences in mean characteristics of municipalities with a first-term mayor and municipalities with a second-term mayor. Despite our lack of experimental design and need to assume selection on observable characteristics, it is useful to understand what determinants of corruption if any, are significantly different across the municipalities with first-term and second-term mayors. Along several observable characteristics, there appear to be few differences between municipalities with second and first-term mayors. Out of 46 observable characteristics of the municipality only 6 are significantly different at a 95 percent level of confidence.<sup>13</sup> There is a significant difference in their margin of victory in the 2000 municipal elections between first and second-term mayor. This is not too surprising given that incumbents tend to have an advantage in elections. The other important differences between municipalities with first and second-term mayor are the proportion of the population that is literate and per capita income, which are presumably correlated. Municipalities with second term mayors have a lower per capita income of roughly R\$27, which is about 10 percent of the monthly minimum wage.

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<sup>13</sup>For the sake of space, we only report the 22 main variables, and 3 of those are significantly different. See the table's footnote for a list of the other variables.

## 4 Empirical Strategy

Our main objective is to test whether the reelection incentives created from allowing mayors to be reelected for a second term affect the level of political corruption in a municipality. Exploiting the fact that mayors are limited to two consecutive terms in office, we compare the corruption level between first-term mayors and second-term mayors. Our theoretical model predicts that first-term mayors who still face reelection incentives should on average be less corrupt than second-term mayors. Here, we present the empirical specification used to test this hypothesis, and discuss the assumptions needed for a causal interpretation of our results.

We estimate the effects of reelection incentives using the following econometric specification,

$$r_{ij} = \beta I_{ij} + X_{ij}\delta + \eta_j + \varepsilon_{ij}, \quad (6)$$

where  $r_{ij}$  is the level of corruption for municipality  $i$  in state  $j$ , and  $I_{ij}$  indicates whether the mayor is in his second and final term. The vector  $X_{ij}$  is a set of municipal and mayor characteristics that determine the municipality's level of corruption,  $\eta_j$  represents state intercepts, and  $\varepsilon_{ij}$  denotes unobserved (to the econometrician) municipal and mayor characteristics thought to determine corruption. Under this specification, with the standard yet substantive assumption that  $E[I_{ij}\varepsilon_{ij}] = 0$ , the coefficient  $\beta$  measures the true effect of reelection incentives on corruption levels.

The intuition underlying this identification assumption and our estimate of  $\beta$  can be had by considering the ideal research design. Consider a controlled experiment that randomly assigns the possibility of reelection to a second term across politicians before the start of their first administration and then record corruption levels after the first term. To be concrete suppose that without the possibility of reelection lame duck mayors commit a level of corruption equal to  $\bar{r}$ , and in municipalities that allow reelection for to a second term, corruption in the first term is equal  $r_1$ .<sup>14</sup> In this randomized experiment, the simple difference  $\bar{r} - r_1$  captures the average effect of being able to be reelected to a second and final term on the level of corruption.

What this experiment illustrates is that the coefficient  $\beta$  measures exactly this difference under the following two counterfactual assumptions. First, second-term mayors behave similarly to mayors who face a single-term limit. And secondly, conditional on observed characteristics, first-term mayors behaved similar to second-term mayors when in their first term.

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<sup>14</sup>Note that if reelected to the second term the mayor by assumption commits a level of corruption equal to  $\bar{r}$ .

Note that because our counterfactual is not the absence of term limits, we are not capturing the effects of term limits, as in the case of Besley and Case (1995). We could however interpret  $\beta$  as a term-limit effect under the strong assumption that corruption among mayors in their first term is equal to the corruption level of mayors in the absence of term limits. But this assumption is violated in most political agency models precisely because reelection incentives for first-term mayors are higher in municipalities with a term limit than those without. Hence, because reelection incentives are higher among these municipalities, first-term mayors have the incentive to lower their corruption level relative to mayors in municipalities without term limits.

## 5 Empirical Results

This section provides evidence consistent with our theoretical model. Our results show that mayors who face a binding term limit are associated with higher levels of corruption, measured in both the share of resources appropriated and the number of corrupt irregularities. These findings are robust to various specifications and estimation techniques. We also explore variation in the effects of reelection incentives and find that it is larger among municipalities where the cost of rent extraction is lower, and where the density of pivotal voters is higher; again all consistent with our theoretical predictions. We conclude this section with a discussion of potential threats to our identification assumptions.

### Basic Results on Corruption

Table 4 presents OLS estimates of the effects of reelection incentives on the share of resources that were corrupted.<sup>15</sup> Column 1 reports the unadjusted relationship between whether the mayor is in his second-term and the share of funds appropriated, and the remaining columns correspond to specifications that include additional sets of controls. Our base specification presented in column 2 controls for mayor characteristics, demographic characteristics of the municipality, and a measure of political competition. Whereas column 3 simply extends this specification to include municipal characteristics that are thought to constrain the practice of corruption in a municipality. Our

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<sup>15</sup>Without any evidence of corruption in 31 percent of the sample, we also estimate a Tobit model to account for the left censoring at zero. Estimate of the marginal effects are reported in Table 11 of the annex. Conditional on the censoring, the marginal effects for the Tobit are similar to the OLS estimates.

full specification reported in column 4, which also corresponds to equation 6, simply adds state intercepts to the specification reported in column 3. Sample sizes and  $R^2$  are reported below. The sample has been restricted to the non-missing observations of the various control variables, so as to keep its size constant across specifications; this adjustment does not affect the general results.

From the bivariate relationship in column 1, we see that second-term mayors are associated with a 3.4 percentage point increase in corruption. At a baseline of 0.062, this estimate represents an effect of 54.8 percent. Alternatively if we consider that on average R\$5,542,210 were transferred to these municipalities, lame-duck mayors appropriate R\$188,431.4 more than first-term mayors. As seen in the other columns, the inclusion of additional controls has virtually no effect on the point estimate. For example in column 4, which controls for state intercepts and various mayor and municipal characteristics, the estimated effect while slightly larger is statistically indistinguishable from the estimate of the unadjusted regression.

Several characteristics that *a priori* we would expect to be correlated with corruption are unfortunately not robust to the inclusion of state fixed-effects. In columns 2 and 3, we see that both the education of the mayor and the proportion of the population that is literate are both negatively correlated with corruption. While the proportion of the population that lives in the urban sector is positively related to corruption. Surprisingly, political corruption is not associated with either per capita income, income inequality, or the number of effective candidates in the 2000 mayor election. The inclusion of variables that limit the practice of corruption, such as having a local radio station or being a judiciary district appear to have a negative effect on corruption but are unfortunately not measured with much precision. When we use within state variation to identify the other determinants of corruption, we find that many of these estimates loose precision and become insignificant. The effect of reelection incentives is the exception, as the point estimate increases to 0.040 and remains statistically significant at a 5 percent level.

For our second measure of corruption, Table 5 reports the OLS estimates of the effect of reelection incentives on the number of irregularities found to be corrupt.<sup>16</sup> Column 1 in Table 5 presents

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<sup>16</sup>Given that our dependent variable is constructed from count data, we also estimate a poisson model. Estimates of the marginal effects call be found in Table 12 of the annex. The marginal effects for the bivariate regression, column 1, are in fact similar to the OLS estimates. However as we add more explanatory variables, the marginal effects from the Poisson, which unlike OLS are functions of the other control variables, differ slightly from the OLS estimates. As reported in columns 3-5, the marginal effects are stable across specifications.

the bivariate relationship between reelection incentives and the number of corrupt irregularities. Although we find that second-term mayors are more corrupt than first-term mayors, an underlying concern would be that municipalities with second-term mayors may have had more items audited. Without knowing this information, we proxy for this scale-effect in column 2 by controlling for the total number of irregularities (i.e. poor administration, poor functioning councils, etc) found in the municipalities.<sup>17</sup> Compared to column 1, the estimated effect remains statistically indistinguishable and significant at a 95 percent level of confidence. The estimate in column 2 implies that second-term mayors are associated with a 0.534 increase in the number of corrupt irregularities. At a baseline of 1.73 corrupt violations, this represents a 31.4 percent increase. This estimate is robust to the inclusion of other controls, specifically mayor characteristics, demographics, political competition, proxies for cost of corruption, and state fixed-effects.

As a test of the robustness of our estimates, Table 6 presents the estimated effect of reelection incentives using a bias-adjusted matching estimator (Abadie and Imbens 2004). The flexibility of the matching estimator allows us to compare first-term mayors to second-term mayors with similar observable characteristics. Although compared to the regression analysis the identification assumptions are similar, the matching estimator does not assume a functional form and does not extrapolate over areas of uncommon support in the observable characteristics.

The first three columns of table 6 correspond to effects of reelection incentives on the share of resources related to corruption. Whereas, the second set of columns, columns 4-6, report the estimated effect for the incidence of corruption-related irregularities. For each measure of corruption, Table 6 presents three different specifications which differ in the variables that are matched. For both measures of corruption, the point estimates are consistent with those presented in the regression analysis and measured much more precisely. For example with the full set of control, the effect of term-limits on corruption-related expenditure is 0.035 percentage points, compared to 0.040 percentage points in our regression analysis.

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<sup>17</sup>The fundamental assumption is that total number of irregularities is a weakly monotonic function of total number of items audited.

## Local Context and Reelection Incentives

In table 7, we explore the extent to which this second-term effect varies according to local context. According to the model presented in section 2, we expect second-term mayors to be relatively more corrupt in municipalities where the cost of rent extraction is lower, and where the density of pivotal voters is higher. Table 7 reports the second-term effects on the share of total resources related to corruption for 3 types of variables chosen to capture this variation. Two channels affect the expected cost of corruption. One is the probability of getting caught, and the second is the probability of getting punished. We use whether or not a municipality has a radio and newspaper to proxy for the probability of getting caught in a corruption scheme. Whereas we distinguish the existence of a judiciary district in a municipality as a potential measure of the probability of getting punished. To proxy for the density of pivotal voters we borrow a commonly used measure from the political science literature: the mayor's margin of victory in the previous election (see for example Ansolabehere and Snyder (2003)).

Column 1 presents the second-term effect interacted with the indicator for whether a judiciary district exists in the municipality. The presence of a judiciary reduces the corruption differential between first-term and second-term mayors. This suggests that in municipality with a judiciary district, the costs of corruption are sufficiently high that there is no incentive to reduce first-period corruption in order to improve reelection possibilities. Column 2 and 3 present the second-term effect interacted with the existence of local media. We find that in municipalities without a newspaper, mayors that do not have reelection incentives are 11.2 percentage point more corrupt than those that do. This estimate, which is 7.3 percentage points higher than the aggregate effect, suggests that in municipalities with no newspapers second-term mayors divert on average R\$616,000 more than first-term mayors. Using the existence of a radio station as our measure of media availability provides similar yet attenuated results.

In column 4, we test how the second-term effect varies with the degree of political competition in the municipality. Among municipalities where 2000 elections were highly competitive, which corresponds to a win margin value of 0.021 (10 percent of the sample), the second-term effect is .064, which is 1.6 times the average estimate. And if we consider the other 10 percent of the municipalities where the elections were less competitive, given by a win margin of 0.35, the second term is 0.001. This result shows that municipalities characterized by low competition exhibit no

differential effect in rent-extraction between first and second-term mayors. First-term mayors with an extreme electoral advantage can afford to be as corrupt as a lame-duck mayor since his reelection is practically guaranteed.

## **A Trade-off between Public Good Provision and Corruption**

We have provided suggestive evidence that second-term mayors, who no longer face reelection incentives, tend to be more corrupt than first-term mayors. And yet, more corruption does not necessarily imply less provision of certain public goods. The descriptive statistics presented in Table 2 do seem to indicate that second-term mayors, while more corrupt, are also better public administrators. This complementarity presents an interesting trade-off. Voters must consider reelecting a mayor into a position of low accountability in exchange for more or better quality public goods. Here we examine this association between second-term mayors and better public administration more closely.

Table 8 presents the OLS estimates for the effect of being a second-term mayor on the number of violations associated with mismanagement. We define mismanagement as the number of violations associated with poor administration, mismanagement of a social program, failure to spend allocated budget, and unfinished public works. The specifications and sample in columns 1-5 replicate those presented in Table 5.

For each specification there is a strong negative association between being a second-term mayor and the number of violations associated with mismanagement. For example, in our most general specification (column 5) second-term mayors are associated with 0.414 less violations than first-term mayors.<sup>18</sup> At a baseline of 2.37 violations, this effect represents a 17.5 percent difference between first and second-term mayors.

Hence, even though second-term mayors are associated with a 31.4 percent increase in corrupt violations, with second-term mayors providing, on average, better social programs, more complete public works, and better overall administration, a tradeoff clearly exists. Voters must decide between reelecting a mayor that as a lame duck has the incentive to extract maximum rent but on the other hand is a more capable provider of public goods. Interestingly enough in Brazil's fascinating political history, this tradeoff has even been communicated in a political campaign. The

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<sup>18</sup>The marginal effects estimated from a Poisson model, once again provide very similar results.

ex-mayor of São Paulo during the 1950's campaigned on the slogan "Rouba, mas faz [Steals but does things] (Laranjeira 1999). And recently this slogan has been applied to another ex-mayor of São Paulo, Paulo Maluf, who despite being accused of corruption in the 1990's reran for mayor in the 2004 elections.

Although second-term mayors appear to be better providers of public goods, in the absence of repeated observations across time it is not clear what accounts for this correlation. Are second-term mayors able to provide better public goods because of the job experience, or are we simply capturing a selection bias associated with the fact that second-term mayors are reelected politicians. Table 9 attempts to get at this distinction. Here we re-estimate each specification with a sample that excludes first-term mayors that do not get reelected in the 2004 elections. If conditional on observable characteristics, second-term mayors have on average similar innate administrative abilities as the group of first-term mayors that were also reelected in 2004, then we can attribute any differences in the number of violations associated with mismanagement to mostly work experience.

What Table 9 demonstrates is that even using this restricted sample second-term mayors are still associated with less violations in the provision of public goods. Compared to first-term mayors, lame duck mayors commit .454 fewer violations (see column 5). Considering the previous estimate of -.414 in Table 8, this provides some suggestive evidence that voters do face a tradeoff between more potential corruption and reelecting a mayor with four years of on-the-job experience.

## Estimation Concerns

Even though our general results are consistent with an important class of political agency models, mayors are unfortunately not randomly assigned to one or two term limits. As such, omitted-variable bias remains a central concern, and any unobserved characteristic of the municipality or its mayor that both determines corruption and is correlated with reelection will bias our results. Here, we describe some alternative explanations for our results.

One potential source of bias is the unobserved competency or ability of a mayor. If in an alternative theoretical framework a mayor's competency increases his reelection probability and enables him to be more corrupt, then our estimate, in capturing the mayor's competency, would be biased upwards. There are however, at least two reasons why unobserved competency may not be driving our results. First, as seen in tables 4 and 5 the second-term effect is robust to the



inclusion of several mayor characteristics, such as: age, education, party affiliation, civil status, and gender. The second reason is provided in Table 10. To try to control for a mayor's competency or administrative abilities, we include in our regressions the number of irregularities associated with poor administration, misuse of a social program, nonexistent/dysfunctional councils, and unfinished public works. Columns 1-4 of Table 10 present the effect of reelection incentives on the share of resources found to be corrupted. The regressions shown here use similar specifications as those presented in table 4, with the exception that we now try to proxy for the mayor's competency level. As the table shows all four types of administrative irregularities are negatively associated with corruption, but only the misuse or mismanagement of social programs is significant at a 90 percent level of confidence. And while these estimates do lend some support to idea that a mayor's ability may affect the level of corruption, our estimates of the second-term effect are in general unaffected. Only in the bivariate regression, column 1, do we lose some precision.

A related source of potential bias is if politicians learn or establish networks over time that allow them to become more corrupt. If this were the case, our estimates would not necessarily reflect the lack of reelection incentives for second-term mayors but rather the corruption knowhow that second-term mayors have accumulated. Without more data it is difficult to test our model against a learning model.

Our inability to control for informal institutions maybe another source of bias. If for example differences in the degree of clientelism or patronage within municipality are not captured in the differences of the various municipal characteristics that we control for, then our estimated second-term effect maybe upwardly biased. This notwithstanding, we would like to note that our estimates are robust to the inclusion of state fixed-effects, and in the context of Brazil, there is undoubtedly much more variation in informal institution across states, than within states.

Finally, there is at least two reasons to believe that our estimates represent lower bounds. First, lame duck mayors may have aspirations for other political offices. And second, as in Alesina and Spears (1988) lame-duck mayor may also consider the reelection probabilities of their own party or a candidate that they have indicated. In both cases, lame duck mayors would have an incentive to refrain from complete rent extraction and consequently our results would be biased downward.

## 6 Conclusions

In April 2003, Brazil launched an ambitious anti-corruption campaign designed to audit the application and execution of federal funds transferred to municipalities. We exploit the reports of these randomly audited municipalities to examine the link between reelection incentives and the extent of political corruption. Our results are broadly consistent with a class of political agency models that suggest that the possibility of reelection provides incentives for incumbents to reduce rent extraction in their first term in order to increase their likelihood of reelection to a second term.

In particular, we find that second-term mayors are associated with significantly more political corruption than first-term mayors, both in terms of the share of resources misappropriated and a simple count of the number of corrupt irregularities found in the municipality. There are also significant differential effects in several of the institutional features that affect the extent of corruption, such as in municipalities with a media source, a judiciary district, or are highly politically competitive. Among municipalities with either a radio or a newspaper for instance, first-term mayors have similar corruptions levels as second-term mayors; a finding that supports a growing literature on the importance of media on political accountability ((Stromberg 2003) and (Besley and Burgess 2002)).

While these empirical results provide valuable evidence in support of a fairly general political agency model, our findings also highlight a critical complementarity that is absent in many of these theoretical models. Second-term mayors, while more corrupt, are also better providers of public goods. Consequently, it maybe the case that voters are willing to accept some amount of corruption in exchange for a more experienced mayor that is able to provide a higher level of public goods.

Finally, this paper contributes to the discussion of the costs and benefits of decentralization in developing countries. Although we cannot determine whether decentralization has increased overall corruption in Brazil, the fact that it has undoubtedly increased corruption at the local level places an important emphasis on trying to understand how local institutions affect corruption. Our findings provide some preliminary evidence that local institution that promote accountability and oversight may not only reduce political corruption but will minimize the adverse incentives that term limits seem to create.

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## 7 Tables

Table 1: Summary Statistics of the Irregularities

Irregularity	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Proportion of municipalities with at least one irregularity	Number of irregularities among municipalities with at least one	Amount per irregularity (R\$)	Share of Total Resources	Health	Education	Water and Sanitation	Agriculture
All types	0.992 (0.090)	4.636 (1.928)	N/A	N/A	0.281	0.223	0.067	0.062
Diversion of funds	0.485 (0.500)	1.561 (4.636)	119,106.40 (311,037.20)	0.046 (0.090)	0.306	0.249	0.043	0.050
Illegal procurement practices	0.539 (0.499)	1.690 (1.561)	170,607.10 (253,024.10)	0.083 (0.104)	0.198	0.299	0.104	0.044
Over-invoicing	0.057 (0.231)	1.048 (1.690)	88,674.59 (195,723.50)	0.030 (0.049)	0.409	0.136	0.045	0.045
Poor administration	0.679 (0.467)	1.714 (2.357)	N/A	N/A	0.477	0.146	0.023	0.039
Failure to spend allocated budget	0.054 (0.226)	1.050 (1.714)	439,194.50 (1,489,151.00)	0.072 (0.105)	0.143	0.000	0.095	0.048
Unfinished public work	0.253 (0.436)	1.287 (1.050)	235,187.70 (464,722.40)	0.059 (0.111)	0.132	0.008	0.388	0.041
Nonexistent council	0.307 (0.462)	1.167 (1.287)	N/A	N/A	0.165	0.316	0.000	0.008
Clientelism	0.070 (0.256)	1.000 (1.167)	N/A	N/A	0.154	0.385	0.000	0.038
Misuse of social program	0.388 (0.488)	1.201 (1.000)	N/A	N/A	0.150	0.520	0.000	0.012
Abandoned project	0.108 (0.311)	1.125 (1.201)	N/A	N/A	0.222	0.000	0.178	0.311
Corruption indicator	0.733 (0.443)	2.357 (1.515)	134,983.80 (192,647.30)	0.091 (0.123)	0.253	0.271	0.075	0.047

- Standard deviations are reported in parentheses.
- Summary statistics reported in columns 1-4 are computed from a sample 367 municipalities, and the summary statistics reported in columns 5-8 are computed from a sample 1720 irregularities.

Table 2: Comparison of the irregularities found between municipalities with a first-term mayor and a second-term mayor

	Municipalities with a		
	First-term mayor	Second-term mayor	Difference
Proportion of municipalities	0.547	0.453	0.094
<i>Number of Irregularities</i>			
Diversion of funds	0.593 (0.074)	0.800 (0.131)	-0.207 (0.151)
Illegal Procurement	0.871 (0.097)	1.133 (0.119)	-0.262 (0.153)*
Over-invoicing	0.036 (0.013)	0.052 (0.020)	-0.016 (0.024)
Poor administration	1.338 (0.107)	1.051 (0.131)	0.287 (0.169)*
Failure to spend allocated budget	0.084 (0.033)	0.050 (0.021)	0.034 (0.039)
Incomplete public work	0.232 (0.039)	0.232 (0.042)	0.000 (0.057)
Non-existent council	0.485 (0.069)	0.391 (0.059)	0.095 (0.091)
Clientelism	0.043 (0.013)	0.043 (0.014)	0.000 (0.019)
Mismanagement of social program	0.449 (0.050)	0.405 (0.053)	0.045 (0.073)
Abandoned project	0.064 (0.018)	0.060 (0.018)	0.004 (0.026)
Corruption Indicator	1.500 (0.140)	1.985 (0.219)	-0.485 (0.260)*
<i>Share of Total Resources Audited</i>			
Diversion of funds	0.018 (0.004)	0.022 (0.006)	-0.004 (0.007)
Illegal Procurement	0.035 (0.005)	0.066 (0.015)	-0.031 (0.016)*
Over-invoicing	0.000 (0.000)	0.002 (0.001)	-0.002 (0.001)
Failure to spend allocated budget	0.002 (0.001)	0.005 (0.005)	-0.004 (0.005)
Incomplete public work	0.012 (0.004)	0.012 (0.004)	0.000 (0.005)
Corruption Indicator	0.053 (0.007)	0.090 (0.017)	-0.037 (0.018)**

- Robust standard errors are reported in parentheses.
- \* significant at 10%; \*\* significant at 5%



Table 3: Comparison of the main municipal characteristics between municipalities with a first-term mayor and a second-term mayor

	Municipalities with a		
	First-term mayor	Second-term mayor	Difference
Mayor Characteristics			
Male (1/0)	0.963 (0.012)	0.957 (0.017)	0.007 (0.021)
Education level	5.954 (0.177)	6.088 (0.198)	-0.134 (0.266)
Age	48.005 (0.788)	46.349 (0.904)	1.656 (1.199)
Married (1/0)	3.011 (0.116)	3.155 (0.115)	-0.144 (0.163)
Win margin	0.126 (0.011)	0.196 (0.017)	-0.070 (0.020)**
Municipal Characteristics			
Population in logarithms	9.545 (0.088)	9.554 (0.117)	-0.009 (0.146)
Area (km)	100045.7 (18430.5)	123090.9 (22225.8)	-23045.1 (28873.4)
Urban population (%)	0.646 (0.020)	0.591 (0.026)	0.055 (0.032)
Literate population (%)	8263.345 (81.339)	7917.189 (113.415)	346.155 (139.567)*
Per Capita Income	220.461 (8.666)	193.443 (9.423)	27.019 (12.801)*
Gini	0.535 (0.005)	0.529 (0.005)	0.006 (0.007)
Judiciary district (1/0)	0.523 (0.045)	0.477 (0.050)	0.047 (0.067)
Radio (1/0)	0.551 (0.044)	0.505 (0.050)	0.046 (0.067)
Newspaper (1/0)	0.861 (0.030)	0.861 (0.034)	-0.001 (0.045)
Total resources audited (R\$)	4,138,580.0 (523287.5)	4,787,749.0 (619310.8)	-649,169.0 (810787.1)

- Robust standard errors are reported in parentheses.
- \*\* significant at 5%; \*\*\* significant at 1%
- All together we compared the means of 46 characteristics of the municipality. The characteristics that are not shown in the table include: indicators for whether there exists a shanty-town, a civil defense, municipal guards, small-claims court, computerized treasury, computerized budget, computerized payroll, computerized health data, computerized education data; 15 different types of organic laws concerning such items as the budget, zoning, and tax exemptions; the number of councils, the proportion of regulated councils, share of budget devoted to public employment, and the size of the budget in 1999,2000, and 2001. Of these other characteristics only the existence of a law specifying construction in public spaces and computerized health data were significantly different at a 5 percent level of confidence.

Table 4: Reelection incentives and the share of total resources associated with corruption

Dependent variable:	Share of resource associated with corruption			
	(1)	(2)	(3)	(4)
Second-term	0.034 [0.018]*	0.039 [0.019]**	0.038 [0.018]**	0.04 [0.020]**
Male mayor		-0.032 [0.042]	-0.031 [0.041]	-0.054 [0.041]
Education of mayor		-0.007 [0.004]*	-0.007 [0.004]*	-0.008 [0.005]
Married mayor		-0.003 [0.004]	-0.003 [0.004]	-0.002 [0.005]
Age of mayor		-0.001 [0.001]	-0.001 [0.001]	0 [0.001]
Urban population (%)		0.096 [0.053]*	0.102 [0.051]**	0.088 [0.058]
Literate population (%)		-0.234 [0.121]*	-0.238 [0.123]*	-0.171 [0.141]
Log population		-0.009 [0.012]	0.004 [0.012]	-0.002 [0.012]
Number of effective candidates in 2000 mayor elections		-0.001 [0.013]	-0.001 [0.013]	0.001 [0.013]
Log per capita income		0.012 [0.036]	0.028 [0.036]	0.045 [0.038]
Gini		-0.126 [0.101]	-0.08 [0.100]	0.025 [0.119]
Judiciary district			-0.014 [0.016]	-0.021 [0.019]
Small claims court			-0.026 [0.022]	-0.008 [0.026]
Radio			-0.021 [0.015]	-0.032 [0.020]
Newspaper			-0.003 [0.022]	0 [0.025]
Treasury computerized			-0.037 [0.038]	-0.039 [0.045]
Party affiliation intercepts	N	Y	Y	Y
State intercepts	N	N	N	Y
Observations	367	367	367	367
R-squared	0.02	0.15	0.17	0.22

Notes:

- Robust standard errors are reported in the brackets.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 5: Reelection incentives and the incidences of corruption

Dependent variable:	Number of Irregularities associated with corruption				
	(1)	(2)	(3)	(4)	(5)
Second-term	0.484 [0.267]*	0.534 [0.213]**	0.516 [0.204]**	0.563 [0.205]***	0.555 [0.228]**
Male mayor			-0.182 [0.366]	-0.219 [0.341]	-0.253 [0.332]
Education of mayor			-0.085 [0.051]*	-0.082 [0.051]	-0.08 [0.058]
Married mayor			0.005 [0.069]	0.021 [0.068]	0.003 [0.066]
Age of mayor			-0.005 [0.010]	-0.006 [0.010]	-0.001 [0.011]
Urban population (%)			0.182 [0.499]	0.071 [0.513]	-0.091 [0.581]
Literate population (%)			-2.264 [1.499]	-2.222 [1.561]	-1.951 [1.916]
Log population			0.215 [0.112]*	0.235 [0.119]**	0.124 [0.127]
Number of effective candidates in 2000 mayor elections			0.054 [0.167]	0.124 [0.169]	0.144 [0.163]
Log per capita income			0.015 [0.361]	0.106 [0.364]	0.528 [0.435]
Gini			-0.073 [1.326]	-0.019 [1.254]	1.2 [1.388]
Judiciary district				0.201 [0.216]	0.138 [0.234]
Small claims court				-0.448 [0.244]*	-0.219 [0.286]
Radio				-0.058 [0.195]	0.025 [0.215]
Newspaper				0.138 [0.261]	0.334 [0.274]
Treasury computerized				0.382 [0.291]	0.348 [0.264]
Number of Irregularities		0.555 [0.086]***	0.473 [0.094]***	0.482 [0.097]***	0.452 [0.098]***
Party affiliation intercepts	N	N	Y	Y	Y
State intercepts	N	N	N	N	Y
Observations	367	367	367	367	367
R-squared	0.02	0.39	0.5	0.51	0.56

Notes:

- Robust standard errors are in brackets.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 6: Reelection incentives and corruption: Matching Estimator

Dependent variable:	(1)	Share of resources		Number of corrupt irregularities		
	(2)	(3)	(4)	(5)	(6)	
Second-term	0.037 [0.0146]**	0.032 [0.009]***	0.035 [0.0142]**	0.534 [0.172]***	0.397 [0.097]***	0.652 [0.153]***
Matching variables:						
Male mayor	N	Y	Y	N	Y	Y
Education of mayor	N	Y	Y	N	Y	Y
Married mayor	N	Y	Y	N	Y	Y
Age of mayor	N	Y	Y	N	Y	Y
Urban population (%)	N	Y	Y	N	Y	Y
Literate population (%)	N	Y	Y	N	Y	Y
Log population	N	Y	Y	N	Y	Y
Number of effective candidates in 2000 mayor elections	N	Y	Y	N	Y	Y
Log per capita income	N	Y	Y	N	Y	Y
Gini	N	Y	Y	N	Y	Y
Judiciary district	N	N	Y	N	N	Y
Small claims court	N	N	Y	N	N	Y
Radio	N	N	Y	N	N	Y
Newspaper	N	N	Y	N	N	Y
Treasury Computerized	N	N	Y	N	N	Y
Number of Irregularities	Y	N	Y	Y	N	Y
State Intercepts	N	N	Y	N	N	Y
Observations	367	367	367	367	367	367

Notes:

- Robust standard errors.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 7: Heterogeneity of the effects of reelection incentives on political corruption

Dependent variable:	Share of resources associated with corruption			
	(1)	(2)	(3)	(4)
Second-term	0.072 [0.030]**	0.112 [0.048]**	0.073 [0.029]**	0.068 [0.026]**
Judiciary district	0.007 [0.018]			
Judiciary district*Second-term	-0.066 [0.034]*			
Newspaper		0.032 [0.014]**		
Newspaper*Second-term		-0.086 [0.049]*		
Radio			0.006 [0.016]	
Radio*Second-term			-0.066 [0.035]*	
Win margin				0.04 [0.075]
Win margin*Second-term				-0.18 [0.101]*
Observations	367	367	367	367
R-squared	0.17	0.16	0.17	0.17

Notes:

- Robust standard errors.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%
- Each regression controls for population size, area, urban, literacy rate, and electoral competition, Gini, and per capita income.

Table 8: Reelection incentives and the incidences of poor administration

Dependent variable:	Number of Irregularities associated poor administration				
	(1)	(2)	(3)	(4)	(5)
Second-term	-0.536 [0.226]**	-0.504 [0.202]**	-0.476 [0.191]**	-0.488 [0.193]**	-0.414 [0.208]**
Male mayor			0.696 [0.363]*	0.738 [0.346]**	0.678 [0.331]**
Education of mayor			0.063 [0.047]	0.058 [0.047]	0.06 [0.055]
Married mayor			0.012 [0.068]	0.001 [0.067]	0.027 [0.064]
Age of mayor			0.01 [0.010]	0.01 [0.010]	0.008 [0.011]
Urban population (%)			-0.14 [0.489]	-0.051 [0.504]	-0.176 [0.554]
Literate population (%)			2.454 [1.397]*	2.64 [1.441]*	3.017 [1.780]*
Log population			-0.225 [0.109]**	-0.247 [0.118]**	-0.115 [0.129]
Number of effective candidates in 2000 mayor elections			-0.227 [0.180]	-0.265 [0.182]	-0.288 [0.181]
Log per capita income			-0.065 [0.341]	-0.095 [0.350]	-0.27 [0.426]
Gini			0.822 [1.289]	0.559 [1.251]	-0.485 [1.351]
Judiciary district				-0.013 [0.217]	-0.033 [0.230]
Small claims court				0.179 [0.232]	0.071 [0.279]
Radio				0.102 [0.185]	-0.112 [0.202]
Newspaper				-0.196 [0.251]	-0.349 [0.284]
Treasury computerized				-0.458 [0.287]	-0.439 [0.263]*
Number of Irregularities		0.356 [0.075]***	0.441 [0.080]***	0.441 [0.082]***	0.472 [0.084]***
Party affiliation intercepts	N	N	Y	Y	Y
State intercepts	N	N	N	N	Y
Observations	367	367	367	367	367
R-squared	0.03	0.23	0.37	0.38	0.45

Notes:

- Robust standard errors are in brackets.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 9: Reelection incentives and the incidences of poor administration: Robust

Dependent variable:	Number of Irregularities associated poor administration				
	(1)	(2)	(3)	(4)	(5)
Second-term	-0.609 [0.266]**	-0.666 [0.234]***	-0.507 [0.220]**	-0.497 [0.223]**	-0.454 [0.214]**
Male mayor			0.917 [0.378]**	0.926 [0.357]**	1.027 [0.313]***
Education of mayor			0.124 [0.056]**	0.116 [0.059]*	0.134 [0.068]*
Married mayor			0.063 [0.068]	0.069 [0.069]	0.073 [0.068]
Age of mayor			0.011 [0.012]	0.009 [0.012]	0.01 [0.013]
Urban population (%)			0.067 [0.586]	0.114 [0.638]	0.172 [0.707]
Literate population (%)			0.117 [1.709]	-0.057 [1.705]	-0.358 [1.973]
Log population			-0.384 [0.130]***	-0.308 [0.140]**	-0.193 [0.176]
Number of effective candidates in 2000 mayor elections			-0.354 [0.189]*	-0.371 [0.195]*	-0.467 [0.206]**
Log per capita income			0.41 [0.386]	0.651 [0.408]	0.336 [0.545]
Gini			1.023 [1.588]	0.856 [1.548]	-0.142 [1.730]
Judiciary district				-0.076 [0.247]	-0.097 [0.272]
Small claims court				-0.33 [0.278]	-0.439 [0.377]
Radio				0.17 [0.238]	0.135 [0.272]
Newspaper				-0.089 [0.278]	-0.24 [0.344]
Treasury computerized				-0.498 [0.325]	-0.457 [0.291]
Number of Irregularities		0.372 [0.104]***	0.468 [0.106]***	0.464 [0.105]***	0.46 [0.108]***
Party affiliation intercepts	N	N	Y	Y	Y
State intercepts	N	N	N	N	Y
Observations	246	246	246	246	246
R-squared	0.03	0.24	0.45	0.46	0.52

Notes:

- Robust standard errors are in brackets.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 10: Reelection incentives and the share of total resources associated with corruption: Robustness

Dependent variable:	Share of resources associated with corruption			
	(1)	(2)	(3)	(4)
Second-term	0.029 [0.020]	0.035 [0.020]*	0.034 [0.019]*	0.037 [0.021]*
<i>Number of irregularities</i>				
Poor administration	-0.007 [0.007]	-0.004 [0.008]	-0.004 [0.008]	-0.003 [0.008]
Misuse of social program	-0.021 [0.011]*	-0.019 [0.011]*	-0.021 [0.012]*	-0.02 [0.013]
Nonexistent council	-0.015 [0.016]	-0.011 [0.015]	-0.012 [0.014]	-0.013 [0.015]
Unfinished Public Works	-0.007 [0.012]	-0.005 [0.013]	-0.005 [0.014]	-0.003 [0.015]
Observations	367	367	367	367
R-squared	0.04	0.16	0.19	0.23

Notes:

- Robust standard errors.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%
- In addition to the controls presented in this table, the regressions presented columns 1 through 4 control for the same respective variables presented in columns 1 through 4 of tables 4 and 5.



## 8 Annex

Table 11: Reelection incentives and the share of total resources associated with corruption: TOBIT model

Dependent variable:	Share of resource associated with corruption			
	(1)	(2)	(3)	(4)
Second-term	0.032 [0.015]**	0.033 [0.015]**	0.032 [0.014]**	0.033 [0.015]**
Male mayor		-0.035 [0.032]	-0.035 [0.032]	-0.052 [0.033]
Education of mayor		-0.006 [0.003]*	-0.006 [0.003]*	-0.006 [0.004]*
Married mayor		-0.003 [0.004]	-0.003 [0.004]	-0.002 [0.004]
Age of mayor		0 [0.001]	0 [0.001]	0 [0.001]
Urban population (%)		0.059 [0.042]	0.064 [0.040]	0.051 [0.042]
Literate population (%)		-0.2 [0.091]**	-0.217 [0.091]**	-0.162 [0.102]
Log population		0.002 [0.009]	0.015 [0.009]	0.01 [0.009]
Number of effective candidates in 2000 mayor elections		0.003 [0.012]	0.003 [0.012]	0.004 [0.012]
Log per capita income		0.004 [0.026]	0.017 [0.026]	0.037 [0.027]
Gini		-0.117 [0.090]	-0.062 [0.089]	-0.004 [0.101]
Judiciary district			-0.017 [0.013]	-0.024 [0.015]
Small claims court			-0.019 [0.016]	-0.002 [0.020]
Radio			-0.022 [0.012]*	-0.03 [0.015]**
Newspaper			0.001 [0.016]	0.005 [0.016]
Treasury computerized			-0.018 [0.027]	-0.021 [0.030]
Party affiliation intercepts	N	Y	Y	Y
State intercepts	N	N	N	Y
Observations	367	367	367	367
Pseudo Log-likelihood	4840	12255	13811	16760

Notes:

- Robust standard errors are reported in the brackets.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%
- The marginal effects reported for the Tobit model are conditional on censoring, i.e.  $\frac{\partial E(y|x, y>0)}{\partial x}$ .

Table 12: Reelection Incentives and the Incidence of Corruption: Poisson Model

Dependent variable:	The number of irregularities associated with corruption				
	(1)	(2)	(3)	(4)	(5)
Second-term	0.484 [0.266]*	0.464 [0.169]***	0.367 [0.154]**	0.418 [0.150]***	0.402 [0.148]***
Male mayor			-0.141 [0.259]	-0.142 [0.231]	-0.318 [0.231]
Education of mayor			-0.048 [0.037]	-0.052 [0.035]	-0.057 [0.036]
Married mayor			0.041 [0.048]	0.052 [0.047]	0.025 [0.041]
Age of mayor			-0.002 [0.007]	-0.004 [0.007]	0.001 [0.007]
Urban population (%)			0.164 [0.397]	0.069 [0.393]	-0.041 [0.420]
Literate population (%)			-1.511 [1.045]	-1.387 [1.117]	-1.548 [1.244]
Log population			0.189 [0.082]**	0.216 [0.090]**	0.145 [0.094]
Number of effective candidates in 2000 mayor elections			-0.004 [0.158]	0.043 [0.154]	0.075 [0.138]
Log per capita income			-0.173 [0.297]	-0.041 [0.317]	0.327 [0.349]
Gini			-0.221 [1.110]	-0.234 [1.058]	0.415 [1.011]
Judiciary district				0.212 [0.162]	0.117 [0.166]
Small claims court				-0.441 [0.164]***	-0.248 [0.175]
Radio				-0.105 [0.148]	-0.032 [0.157]
Newspaper				0.142 [0.207]	0.24 [0.192]
Treasury computerized				0.145 [0.179]	0.038 [0.182]
Number of Irregularities		0.339 [0.028]***	0.269 [0.037]***	0.28 [0.038]***	0.255 [0.035]***
Party affiliation intercepts	N	N	Y	Y	Y
State intercepts	N	N	N	N	Y
Observations	367	367	367	367	367
Pseudo likelihood	-188130	-159718	-150186	-148806	-144272

Notes:

- Robust standard errors are in brackets.
- \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%