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Reputation Shocks and Strategic Responses in Electoral Campaigns

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Abstract

Information affecting a candidate's reputation might have significant electoral consequences. Do candidates respond to the release of information? Using Brazilian elections and audits as an exogenous source of information, I show that both incumbent and challenger increase their campaign spending when *detrimental* information affects the incumbent's reputation. Conversely, *beneficial* information decreases candidates' spending. The main channel is that information affects the expected competitiveness of elections and, therefore, candidates' spending. Only information disclosed prior to electoral campaigns impacts campaign spending. Furthermore, incumbents also adapt a conditional cash transfers program by increasing (decreasing) the beneficiaries when detrimental (beneficial) reputation shocks occur.

Keywords: Information, Politicians' reaction, Campaign spending, Elections, Corruption.

JEL codes: D72, D73, D83, P16.

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1 Introduction

As public figures, politicians are typically exposed to the release of information affecting their reputation. These events often have important consequences on who gets elected and which policies are implemented.[1] Despite this, little is known about how implicated politicians and competitors respond to this information. Most of the literature analyzes how information impacts voters' behavior (Pande, 2011), without acknowledging that politicians can strategically react to it. This not only goes against the fact that politicians actively search for support from voters, but also implies that not accounting for this underestimates the true impact of information on electoral accountability and governance.[2]

Candidates spend substantial amounts of money and time on image-building and voter persuasion.[3] As electoral campaigns are costly yet effective in attracting electoral support (Da Silveira and De Mello, 2011; Kendall et al., 2015; Spenkuch and Toniatti, 2018; Larreguy et al., 2018; Bekkouche et al., 2020), candidates might adjust their campaign spending depending on the information released. For instance, politicians might spend more on campaigning to attenuate the effects of detrimental information or to reduce their spending when beneficial information is disclosed.

This paper provides causal evidence that information affecting a candidate's reputation impacts the amount spent on campaigning for both the implicated politician and the competitor. Particularly, I analyze information affecting the incumbent's reputation and show how the incumbent's and the challenger's responses differ when the information is *beneficial* or *detrimental* for the incumbent. This highlights the role of money in politics and its relationship with information.

Analyzing politicians' response to the release of information is challenging as it is rare to observe exogenous variation in the amount and type of information available about the incumbent, as well as the timing when the information is released. Indeed, information might be endogenous (Dziuda and Howell, 2021) as well as the timing of its release (Gratton et al., 2018).

To estimate the causal impact of reputation shocks on campaign spending, I focus on Brazilian mayoral elections and leverage random municipal audits as a source to define detrimental and beneficial reputation shocks impacting the incumbent. Between 2003 and 2015, the federal government in Brazil selected municipalities at random to audit the use of federal resources. Auditors produced detailed reports disclosing irregularities in the

[1] Media investigations, politicians' own disclosure, audits, governmental investigations, social media, among others, could release information affecting a politician's reputation. Examples abound across countries and elections. Even fake news can affect candidates' reputation and potentially sway elections. This was particularly salient in the 2016 US election (Allcott and Gentzkow, 2017).

[2] Dunning et al. (2019) conclude that there is 'no evidence of impact of the common informational intervention across all studies in the aggregate, and little evidence of substantial impact in any of the individual studies.' Similar findings are shown by Incerti (2020), who highlights the discrepancies between field and survey experiments.

[3] In the United States, the costs of the 2020 election amounted to nearly $14 billion. This is the most expensive election in history, nearly the annual GDP of Malta and more than double of Guyana's in 2020.

management of the funds which were publicly released. These audits have been widely recognized as transparent and accurate, and therefore provide a credible and publicly available source of information affecting the incumbent's reputation.[4] I exploit the random timing of the audits with respect to the election dates. Hence, I compare candidates' campaign expenditure in municipalities receiving reputation shocks *before* the election versus municipalities receiving reputation shocks *after* the elections, accounting for detrimental and beneficial shocks.[5] Further, I analyze how incumbents spend their campaign resources and whether their funding sources are affected by the release of information.

The results show that both incumbent and challenger spend more on campaigning when detrimental information impacts the incumbent's reputation.[6] Detrimental information for the incumbent implies an increase in expenditure between 17 to 21 percent for incumbents and between 31 to 37 percent for challengers. In contrast, both incumbent and challenger decrease their campaign spending when the incumbent faced a beneficial reputation shock before the election. This implies a decrease in campaign expenditure between 27 to 36 percent for incumbents and between 17 to 22 percent for challengers.

Regarding the timing of the information release, only information disclosed prior to the electoral campaign impacts the campaign spending. This is consistent with politicians seeking financial and political support prior to the elections. Hence, information released during the campaign does not give politicians enough time to adjust their campaign funds.

To rationalize that both incumbent and challenger increase (decrease) their campaigning effort when information damages (improves) the incumbent's reputation, I describe a campaign spending model based on Erikson and Palfrey (2000). Information impacting the incumbent's reputation affects the expected closeness of the election and consequently candidates' optimal campaigning effort. When the incumbent is the favorite, information that benefits her makes the election less competitive and thus the challenger needs to overcome a larger deficit to win. This decrease in the competitiveness of the election reduces the impact of campaigning on the electoral outcome motivating the challenger and the incumbent to simultaneously reduce their spending. The opposite occurs for detrimental reputation shocks.

To further explore this channel, I compare whether differential responses exist depending on how large the incumbent's head start is. To do so, I use the incumbent's previous margin of victory as a proxy to the anticipating the margin of victory. On average, incumbents who won the previous election by a small margin ('weak incumbent') are more likely to have a smaller head start (if any) compared with incumbents that won by a large margin ('strong incumbent'). Therefore, in municipalities with strong incumbents, a detrimental reputation shock should increase candidates' spending as the election becomes

[4] Among studies using these audits are Ferraz and Finan (2008, 2011); Brollo (2011); Brollo et al. (2013).

[5] This empirical strategy was previously used by Ferraz and Finan (2008).

[6] I do not find evidence suggesting that just releasing information affects candidates' campaign spending. Likewise, the information disclosure does not affect the incumbent's candidacy, regardless of whether the information is detrimental or beneficial.

more competitive. In turn, in municipalities with weak incumbents, a detrimental reputation shock should have a smaller (or even negative) impact on candidates' spending. For weak incumbents, a detrimental shock could reduce the head start to zero (maximizing campaigning effort) but it could also increase the head start in favor of the challenger (potentially decreasing campaigning effort).[7] The evidence supports this. Incumbents with a high previous win margin are more responsive to detrimental reputation shocks (increase spending by 44 per cent) compared to incumbents with a small previous win margin (increase spending by 2 per cent).

In terms of the disbursement categories, I do not observe that incumbents adapt specific spending categories to information shocks (regardless of the type). In terms of campaigning funds, I find that incumbents facing detrimental reputation shocks before the elections use more of their own money to fund their electoral campaigns.

Apart from campaign spending, incumbents might use other strategies to respond to reputation shocks. I study if there is manipulation in the provision of a conditional cash transfer program (Manacorda et al., 2011, De La O, 2013, Labonne, 2013; Brollo et al., 2015; Frey, 2016) or in the use of patronage through the manipulation of public sector employment (Enikolopov, 2014; Robinson and Verdier, 2013). I find that beneficial (detrimental) reputations shocks induce incumbents to reduce (increase) the share of beneficiaries of conditional cash transfer programs within the municipality. Reputation shocks do not seem to impact public employment (either permanent or transitory).

A large literature has analyzed the impact of information on distributive politics highlighting that incumbents put more effort and resources in places where more information is available (Besley and Burgess, 2002; Strömberg, 2004; Snyder and Strömberg, 2010; Cole et al., 2012). My paper shows that the content of the information is also relevant on the allocation of resources. Politicians decrease their effort in the presence of beneficial reputation shocks and the opposite occurs for detrimental shocks.

This paper contributes to the vast literature studying electoral campaigns, which has been mainly focused on the impact of spending on electoral results (e.g. Levitt, 1994; Gerber, 1998; Grossman and Helpman, 2001; Stratmann, 2017) and specifically for Brazil (Samuels, 2001; Da Silveira and De Mello, 2011). This paper highlights the important relationship between money and information in politics. It provides causal evidence how politicians adapt their campaign spending depending on the information available to the electorate. A few papers have analyzed the role of information on how candidates distribute their campaigning resources (Casey, 2015; Bidwell et al., 2020). My paper studies politicians' strategic responses to beneficial or detrimental information shocks accounting for citizens priors, showing a substitution between reputation and campaign spending for the incumbent. Furthermore, not only the content of the information matters for how candidates react, but also whether the candidate affected by it is the front-runner or not as this impacts how contested is the election.

[7] For instance, if the incumbent and the challenger are equally likely to win the elections, a detrimental reputation to the incumbent puts the challenger as the front runner.

One relevant contribution of this paper is to the literature analyzing the impact of information on electoral accountability, which have provided mixed evidence (e.g. Peters and Welch (1980) for the United States; Banerjee et al. (2011), and Banerjee et al. (2014) for India; Chang et al. (2010) for Italy; Chong et al. (2015), Larreguy et al. (2015), Arias et al. (2018) for Mexico; Ferraz and Finan (2008); De Figueiredo et al. (2012); Boas et al. (2019) for Brazil; Humphreys and Weinstein (2012) for Uganda). This paper suggests that one reason for this might be due to politicians' behavior. Most of the focus has been on how voters react to information, without accounting that politicians can react to the information before voters go to the polls. There are a few exceptions, however. Grossman and Michelitch (2018) find that only politicians from competitive constituencies in Uganda improve their performance whenever there is more information. Cavalcanti et al. (2018) shows that Brazilian political parties use the information from audits for selecting their candidates. Cruz et al. (2018) find that increasing awareness regarding the scope of public programs induces incumbents to buy votes in the Philippines. Furthermore, politicians' reaction counterbalance the effect of information on the chances of being reelected. My paper extends this literature by highlighting the role of campaigning on electoral accountability. Not only incumbents but also challengers adapt their spending depending on how the incumbent's reputation is affected by the information which consequentially also affect voters' behavior. Hence, the impact of detrimental information on electoral accountability should be larger than previously found in the literature (Ferraz and Finan, 2008).

Finally, this paper contributes to the literature studying contests.[8] While a large theoretical literature analyzes asymmetric contest and effort provision (e.g. Baik, 1994; Stein, 2002; Konrad, 2009), empirical studies analyzing this in a real life contexts are rare.[9] This paper provides empirical evidence supporting that contestants' effort depends on how (un)even the contest is.

This paper is organized as follows. In section 2, I describe the institutional settings and the data. After describing the empirical strategy in section 3, I present the main findings in section 4. Section 5 discusses a campaign spending model to rationalize candidates' behavior. Section 6 analyzes the sources used to finance campaign expenditures and how incumbent spend their campaign resources. Section 7 shows whether public programs are manipulated to react to reputation shocks. Final remarks are in section 8.

2 Institutional setting and data

There are 5,565 municipalities in Brazil, each lead by a mayor (*Prefeito*). Every 4 years, on the first Sunday of October, all municipalities elect their mayors. Elected candidates are decided by simple plurality rule and they cannot hold office for more than two consecutive terms. Municipalities with over 200,000 inhabitants have a run-off if no candidate obtains

[8] For articles analyzing campaign elections as contests see Snyder (1989), Che and Gale (1998), Erikson and Palfrey (2000), Meirowitz (2008), Pastine and Pastine (2012), Denter and Sisak (2015).

[9] For exceptions see Brown (2011), Genakos and Pagliero (2012), Boudreau et al. (2016), Gross (2020).

a majority in the first round.

Three months before the elections, candidates officially start their electoral campaigns. Candidates finance their campaigns with private resources (own resources and donations from firms and private individuals) and public funds from the party's fund. Candidates and parties are responsible for the campaign expenses and for reporting their financial accounts. In case a candidate does not declare them, the registration is canceled.

Electoral information about politicians, campaign expenditures and finances is obtained from the *Tribunal Superior Eleitoral* (TSE). This data contains information on candidates' party affiliation, gender, education, age, marital status, and the total votes obtained. To identify candidates across elections, I use probabilistic linkage matching on candidates' names conditional on the candidate's gender, age and municipality. I use electoral information for previous elections to identify if the mayor is eligible for reelection and whether she reran or not. Information about campaign expenditure is available from election 2004 onward.[10] Campaign expenditures are in Brazilian currency units (Real) at 2000 prices (IPCA - FGV deflator).

While information affecting incumbents' reputation can take various forms, in this study, I focus on information related to the misuse of public resources coming from publicly available audit reports. Municipalities have considerable power and autonomy in the allocation of public resources. They receive transfers from the federal and state government which are spent on education, health, social assistance, infrastructure, among others. The mayor has a crucial role in defining how the municipal budget will be spent. Hence, I use the information disclosed by the audit reports as information directly affecting the mayor's reputation.

2.1 Reputation shocks: Municipal audit program.

In April 2003, the Brazilian government started a fiscalization program in charge of *Controladoria Geral da União* (CGU) aimed at auditing the use of federal funds transferred to municipalities. Municipalities with less than 450,000 inhabitants were part of the audit program, where each time 60 municipalities were randomly selected through a lottery process.[11] If selected, a group of external auditors visited the municipality and reviewed the municipal accounts, physically contrasting the existence of public goods against reported municipal expenditure. Following the visit, a report compiling the findings is produced and released to the media and the general public nearly 3 months later. This process has been recognized as transparent and accurate, and receives substantial attention at the municipal level (Ferraz and Finan, 2008; Brollo, 2011).

[10] Nearly 9 per cent of the incumbents rerunning for 2004 and 2008 elections have no campaign expenditure data on the website. There are no systematic differences between incumbents with and without information in terms of municipal or mayor's characteristics.

[11] The first draw of the lottery was a pilot. In the second lottery, 26 municipalities were selected, one per state excluding Brazilia. From lottery 3 until 9, 50 municipalities were selected. Since lottery 10, 60 municipalities were selected.

To see how a mayor's reputation is affected by the audits, I use the corruption measure constructed by Brollo (2011) and Brollo et al. (2013). This measure includes illegal procurement practices, fraud, over-invoicing, among others (see appendix D.1). This data covers lotteries 2 to 29 and corresponds to mayoral terms January 2001- December 2004 and January 2005- December 2008.

Among all the audited municipalities, there are 1365 in which the mayor was eligible for reelection (see table 1). The variable 'Corruption' is equal to one when the audit found evidence of irregularities in the use of fiscal funds, otherwise is zero. In turn, 'Share corruption' denotes the share of funds involved in irregularities over the total of funds audited. For the 2001-2004 term, 70 per cent of the mayors were involved in at least one irregularity. Despite the high share of the mayors involved in the misuse of public funds, the share of money involved in irregularities is in most cases relatively low. On average, 4.43 percent of the audited resources were found to be involved in violations. For the 2005-2008 term, the proportion of mayors involved in irregularities increased by 18 percentage points, and the average amount of resources involved in irregular transactions increased to almost 6 percent.

[Table 1 here]

Detrimental/beneficial reputation shocks. Classifying information as beneficial or detrimental for the incumbent is difficult since this depends on citizens' priors about the incumbent. A beneficial (detrimental) information shock can be easily defined for extreme outcomes (i.e. no evidence of corruption or high level of corruption) since there are no outcomes that can be better (or worst). However, for intermediate outcomes this is difficult. For instance, if the audit uncovered irregularities but less than what people expected, this could improve the incumbent's reputation.

To account for the complex relationship between information and citizens priors, in addition to the previous two variables, I use two additional measures to define beneficial or detrimental reputation shocks by using mayors' position in the distribution of 'Share corruption'. The third measure is a dummy variable equal to one of the shares of resources in irregular transactions is above the median of the distribution, otherwise, it is zero. A fourth measure is similar to the previous one but separate incumbents' reputation shock into quartiles.

2.2 Sample and summary statistics

As this paper concerns the release of information involving the incumbent in view of her possible reelection, I focus on elections in municipalities where the incumbent was a candidate and information affecting incumbent's reputation is available. Out of the 1,365 audited municipalities where the incumbent was eligible for reelection, in 971 of these, the mayors reran. Campaign expenditures data is available for 91 per cent of these incumbents. Therefore, the final sample contains 883 municipalities-incumbents. For

these 883 municipalities, there is data on campaign spending for 839 main challengers (defined postelection). Figure 1 shows the number of municipalities by lottery dates in which the incumbent received the information before the elections and after elections for each mayoral term. As can be seen in the figure some lotteries (e.g. lottery 29 in August 2009) provide information about the mayors' behavior for mayors in the 2001-2004 and 2005-2008 term. Additionally, as can be seen, some lotteries occur before the elections, but the information was release after the elections.

[Figure 1 here]

Table 2 and 3 shows the summary statistics for incumbents and challengers, respectively. The sample is split depending on whether the reputation shock occurred before or after the election. Municipal characteristics are obtained from the *Instituto Brasileiro de Geografia e Estatística* (IBGE), the 2000 Brazilian Census and a municipal-level survey *Perfil dos Municipios Brasileiros* 2005. I include the GDP per capita (in ln), Gini coefficient for income, the share of the urban population, illiteracy rates and a variable accounting for media presence - the presence of a radio station (am) in the municipality in 2005. Overall, mayor and municipal characteristics seem to be well balanced across treated (disclosure of information before the election) and control groups (disclosure of information after the election).[12]

[Table 2 here]

[Table 3 here]

For identification purposes, it is crucial to stress that there is no evidence that reputation shocks affect the incumbent's decision to re-contest the following election (see table D.2 in appendix). This is true regardless of whether the information improved or damaged incumbents' reputation.[13]

3 Empirical strategy

First, I analyze whether information affecting incumbents' reputation induce a change in politicians' behavior and second if this strategic reaction differs on whether the information is beneficial or detrimental for the incumbent.

The causal impact of reputation shocks on campaign expenditures is obtained by exploiting the random timing of the audits with respect to the date of the elections. I compare politicians' campaign expenditure in municipalities where the information was released before the elections versus those where information was released after the elections. I estimate the following model:

$$Y_{ist} = \alpha + \beta r_{ist} + \mathbf{Z}'_{ist}\phi + \omega_s + \lambda_t + \epsilon_{ist}\,, \tag{1}$$

[12] Table D.1 in Appendix shows how balanced is the sample for the 1,365 observations.

[13] Equally, the incumbent's reputation shocks do not seem to affect challengers' candidacy in terms of the number of candidates and educational level (see tables D.3 and D.4).

where Y_{ist} is the campaign expenditure for an incumbent (challenger) from municipality i, state s at term t and r_{ist} denotes whether the reputation shock occurred before the election or not. The parameter of interest is β which captures the (average) causal effect of reputation shocks on candidates' campaign expenditure. I control for municipal and candidates' characteristics ($\mathbf{Z}'_{ist}$), and add *state* (ω_s) and *term* (λ_t) fixed effects. ϵ_{ist} is the error term which is clustered at municipal level.

To capture the fact that detrimental and beneficial reputation shocks could trigger differential responses, I estimate the following model:

$$Y_{ist} = \alpha + \beta_0 r_{ist} + \beta_1 c_{ist} + \beta_2\, r_{ist} \cdot c_{ist} + \mathbf{Z}'_{ist}\phi + \omega_s + \lambda_t + \epsilon_{ist}\,, \tag{2}$$

where c_{ist} denotes one of the measure described in section 2 to represent whether the reputation shock is detrimental ($c_{ist} = 1$) or beneficial ($c_{ist} = 0$). $\beta_0 + \beta_2 c_{ist}$ indicates the average causal impact of the reputation shock conditional on its type c_{ist}. If this term is negative (positive) for beneficial (detrimental) reputation shocks, then politicians decrease (increase) their campaign expenditures whenever their reputation is improved (damaged).

4 Reputation shocks on campaign expenditures

Incumbent's behavior. Table 4 presents the results from OLS estimation of equation 1 and 2 for the incumbent's per capita campaign expenditure as the dependent variable. Columns differ in the set of controls used and also in the case of model 2 (columns 3 to 10), the columns correspond to specifications using one of the four measures capturing whether reputation shocks are detrimental or beneficial for the incumbent (Corruption, Share corruption, Median and Quartile, see section 2). The variable 'Before' denotes whether the reputation shock affected the incumbent before the elections.

[Table 4 here]

Columns (1) and (2) show no indication that being exposed to a reputation shock before the election had any effect on the amount spent in campaigning. However, when accounting for the different contents of the information, the estimations of model 2 (columns 3 to 10) show that incumbents react differently to detrimental or beneficial information on their reputation.

Particularly, table 4 shows a substitution between reputation and campaigning effort. Incumbents improving their reputation before elections spend less in campaigning compared to those of the same type but that benefit from the reputation shock after the election. In turn, incumbents exposed to detrimental reputation shocks before the elections increase their campaign expenditures compared to those affected by detrimental shocks post-elections.

The crowding-out effect of beneficial shocks on campaign expenditure is statistically significant across specifications. A beneficial reputation shock induces incumbents to decrease their campaign expenditure by an amount between 0.427 to 1.125 Brazilian Reals

per citizen. These effects are large. Based on the estimates of column (8), incumbents improving their reputation spend 26 percent less compared to the average per capita campaign expenditure of candidates in the control group. In contrast, detrimental reputation shocks induce the opposite response. Based on column (8), incumbents increase their per capita campaign expenditure by 0.545 Brazilian Reals due to detrimental information before the elections. This represents a 19 percent increase in campaign expenditure.

It is possible to estimate the monetary value that incumbent place on beneficial and detrimental reputation shocks in an electoral campaign. Using the estimates from the preferred specifications (columns 8 and 10) and the average population for the municipalities in the sample (27,200 inhabitants), a beneficial reputation shock is worth between 21,243 ($= 0.781 \cdot 27{,}200$) to 28,641 ($= 1.053 \cdot 27{,}200$) Brazilian Reals (at prices of 2000), whereas a detrimental reputation shocks costs a candidate about 14,824 ($= 0.545 \cdot 27{,}200$) to 11,778 ($= 0.433 \cdot 27{,}200$) Brazilian Reals.

Finally, it is interesting to note that incumbents involved in irregularities spend fewer resources in campaigning if this information is not disclosed before elections. This is true regardless of the level of corruption identified in the audits. This might suggest that these 'corrupt' incumbents are not reallocating these funds to finance their campaigns.

Main challenger's behavior. Table 5 reports the impact of the incumbent's reputation shocks on the main challenger's campaign spending. As in the case of the incumbent, disclosing information does not affect the challenger's behavior as shown by the first two columns. However, once accounting for the type of information, similar patterns as in the case of incumbent emerge.

[Table 5 here]

According to the first row and for different specifications, the main challenger decreases the amount spent in campaigning when the contesting incumbent received a beneficial reputation shock before the election. As in the case of the incumbent, the point estimates increase (in absolute value) as the measure used to define a negative reputation shock is more fine-grained (in the sense it allows better separating detrimental and beneficial shocks). According to column (8), a beneficial reputation shock to the incumbent decreases the per capita campaign spending by 0.555 Brazilian Reals. This represents a 17 percent decrease.

In turn, a detrimental shock to the incumbent's reputation induces the main challenger to increase her campaign spending. According to column (8), a detrimental shock induces the challenger to spend 1.217 Brazilian Reals more per person (37 per cent increase).

Taking into account the results from table 4 and 5 there is seems to be a higher reaction (in absolute terms) to shocks that favor a candidates position (i.e. incumbents' beneficial shocks favor the incumbent, while incumbents' detrimental shocks favor the challenger) compared to shocks that disfavor the candidate.

4.1 Timing of the information

Does the timing of the information matter? To study differential impacts of the timing of the disclosure on campaign spending, I separate reputation shocks according to when the information was released with respect to the elections. I use relevant dates related to the candidate selection period (see Cavalcanti et al., 2018). Candidates have to be affiliated with a party one year before the election to be able to run. This period is relevant since it is when individuals decide to run for office and seek financial and political support. The final list of candidates for mayor is set 3 months before the elections, right after which the electoral campaign starts.

Table 6 shows the results for the incumbent. As before, just disclosing information does not impact campaign spending, regardless of when the information is released. Column (3) and (4) show the results using the preferred specification, which uses the median of corruption to define beneficial and detrimental shocks. It seems that information released during the electoral campaign does not impact a candidate's spending, regardless of whether it is beneficial or detrimental for the incumbent (while the standard errors are large, the point estimates are small). In turn, information that is released over three months before the election does affect the amount spend on campaigning. This suggests that information released during the campaign does not give politicians enough time to adjust their campaign strategies, at least in terms of the amount spent in campaigning.

[Table 6 here]

5 Information disclosure and expected competitiveness of the election

To rationalize candidates' responses to information shocks, I present a campaign spending model based on Erikson and Palfrey (2000) in which candidates' spending decisions depend on the expected competitiveness of the election and the other candidate's spending. Information affecting the incumbent's reputation affects the expected closeness of the election and candidates adjust their campaign expenditures simultaneously. Later I present evidence supporting this mechanism.

5.1 Campaign spending model and reputation shocks

Two candidates, the incumbent and the challenger, compete in an election by investing resources in campaigning. Let $P(I, C, m)$ represents the probability that the incumbent wins the election, which increases in the incumbent's campaign spending (I), decreases in the challenger's spending (C) and increases in m, an exogenous pre-spending anticipated margin of victory of the incumbent ($m > 0$). This m could be due to incumbency, popularity, reputation from previous elected office, among others.

The expected payoff of incumbent and challenger are described by:

$$U_I(I, C; m) = P(I, C, m) - K_I(I)$$

$$U_C(I, C; m) = 1 - P(I, C, m) - K_C(C)$$

where $K_I(I)$ and $K_C(C)$ represent incumbent's and challenger's technology for raising campaign resource.[14] Commonly, incumbents have advantages compared with challengers in terms of their effectiveness in raising campaign resources and in how they spend them.[15] This will create another asymmetry between contestants that will make the competition more favorable for the incumbent.

Suppose that $P(I, C, m)$ is concave, K_i convex and $K_i'(0) = 0 \forall i \in \{I, C\}$. These conditions guarantee the existence and uniqueness of a Nash Equilibrium.[16] Let (I^*, C^*) describe the interior solution when using Nash equilibrium as the solution concept.

We are interested in analyzing how candidates' behavior in equilibrium (I^*, C^*) is affected by reputation shocks impacting the incumbent before elections, which is captured by changes in the parameter m. The following proposition states that in equilibrium, under standard conditions, both candidates will react in the same direction to an exogenous shock to m: Beneficial (detrimental) reputation shocks decrease (increase) the incumbent's and challenger's campaign spending.

Proposition 5.1 *If* $\frac{\partial^2 P}{\partial I \partial m} < 0$, $\frac{\partial^2 P}{\partial C \partial m} > 0$ *and* $\frac{\partial^2 P}{\partial I \partial C} > 0$, *then* $\frac{dI^*}{dm} < 0$ *and* $\frac{dC^*}{dm} < 0$.

Proof See appendix C.

Each condition is quite intuitive and satisfied in a wide range of models of P used in the literature.[17] The less competitive the election is (larger m), the lower the marginal impact of spending on the incumbent's probability of winning is for the incumbent ($\frac{\partial^2 P}{\partial I \partial m} < 0$) and challenger ($\frac{\partial^2 P}{\partial C \partial m} > 0$). Finally, $\frac{\partial^2 P}{\partial I \partial C} > 0$, accounts for the strategic competitive nature of the election. That is, holding everything else constant, the greater spending by the challenger makes the contest more competitive, which increases the marginal impact of incumbent spending on the probability of winning.

The intuition is the following. A beneficial reputation shock (being publicly recognized as not corrupt before the election) for the incumbent (strong candidate) discourages the

[14] I assume that candidates have the same valuation for winning the election (V) and for losing it (v). Hence, candidate's expected payoff functions are $U_i(I, C; m) = V \cdot P(I, C, m) + (1-v) \cdot (1 - P(I, C, m)) - \hat{K}_i(i)$ for $i \in \{I, C\}$ where $\hat{K}_i(i)$ is the cost function. To reduce notation, assume that $v = 0$ and normalize candidate's payoff functions by V, where $K_i(i) = \hat{K}_i(i)/V$.

[15] If the fundraising efficiency is higher for incumbent than challenger, $K_I'(x) < K_C'(x) \forall x$. If the effectiveness of incumbent's campaign spending is higher than challenger's, $\frac{\partial P(x,y,m)}{\partial I} > \left|\frac{\partial P(y,x,m)}{\partial C}\right| \forall x$, given any m and other contestant's campaign spending y.

[16] First order conditions are $\frac{\partial P(I^*, C, m)}{\partial I} - K_I'(I^*) = 0$ and $-\frac{\partial P(I, C^*, m)}{\partial C} - K_C'(C^*) = 0$. Second order conditions are given by $\frac{\partial^2 P(I,C,m)}{\partial I^2} - K_I''(I) < 0$ and $-\frac{\partial^2 P(I,C,m)}{\partial C^2} - K_C''(C) < 0$.

[17] See Erikson and Palfrey (2000) for when the probability of winning depends on a normally distributed error. Schotter and Weigelt (1992) develop a similar model with uniform errors.

challenger by making the election even less competitive than before (increase m). This decreases the marginal value of spending for both candidates. The challenger reduces her campaign expenditure as it is relatively unprofitable to spend large amounts of resources to beat the incumbent. This consequently allows the incumbent to reduce the campaign expenditure. The opposite occurs for detrimental reputation shocks for the incumbent.

Note that a detrimental reputation shock for the incumbent could be seen as a beneficial shock to the challenger since what matters is the relative performance. However, while a beneficial shock to the incumbent decreases her effort, a beneficial shock to the challenger increases her effort. The asymmetry in the incumbent's and challenger's responses is given by the fact that, in the former case, the contest becomes more uneven, whereas in the latter the contest becomes more even.

5.2 Incumbent's previous electoral support

To explore whether the evidence is consistent with this theory, I compare incumbents' responses depending on their expected margin of victory. The idea is the following. In elections where the incumbent is the clear front runner, detrimental shocks should increase candidates' campaign spending. However, in elections where the incumbent is not the front runner, detrimental reputation shocks should decrease candidates' spending. For instance, if candidates are equally likely to win the elections, detrimental information against the incumbent could tip the election in favor of the challenger, decreasing candidates' campaigning effort.

I use incumbents' previous margin of victory to proxy the anticipated margin of victory for the incumbent. On average, incumbents that won the previous election by a small margin ('weak incumbent') are more likely to have a smaller head start (if any) compared with incumbents that won by a large margin ('strong incumbent').[18] [19]

In elections with strong incumbents, a detrimental reputation shock should increase candidates' spending as the election becomes more competitive. In turn, in municipalities with weak incumbents, a detrimental reputation shock should have a smaller (or even negative) impact on candidates' spending. This depends on the composition of candidates in this group as some of them could have a positive head start while others might have a negative head start.

Table 7 shows the impact of reputation shocks on per capita campaign expenditures by

[18] Incumbents with a larger previous win margin have significantly larger win margin in the following election. Particularly, incumbents with a previous win margin above the median have nearly 7 percentage points more than incumbents with a previous win margin below the median, which on average their winning margin in the next election is 3 percentage points).

[19] Polls confirm that incumbents rerunning are more likely to have a positive win margin. 68 percent of the incumbents rerunning are the front-runner according to polls at the beginning of the electoral campaign. Second, incumbents with larger previous win margin are expected to have a larger win margin in the next elections (see figure D.1 in appendix). There is a difference of 4,5 percentage points in win margin for those above the median of the previous win margin versus those below the median for incumbents for which there is polls data and who were not audited.

incumbents' previous electoral support. Columns (1) to (4) show the estimates for incumbents with below-the-median previous electoral support (i.e. 'weak incumbents'), whereas columns (5) to (8) is for incumbents with an above-the-median previous margin of victory (i.e. 'strong incumbents'). Evidence supports the theory, suggesting that information is affecting the expected competitiveness of the election.

Weak incumbents do not seem to respond to detrimental reputation shocks. Based on the estimates in column (2), weak incumbents spend 0.05 Brazilian Reals more when facing detrimental reputation shocks (an increase of 2 percent). However, this is not significant. When separating reputation shocks using the quartiles (columns 3 and 4), the effects are small and positive for the 2nd and 3rd quartile, while it is negative for the 4th quartile. None of them is significant at conventional levels of significance.

In contrast, strong incumbents are responsive to detrimental reputation shocks. According to column (6), strong incumbents spend 1.222 Brazilian Reals more when facing detrimental reputation shocks before the election. This represents an increase in campaign spending of 44 percent. For the fourth quartile, the increase is 0.913 non-significant, for the 3rd quartile, this is 1,415 Brazilian Reals (significant), consistent with an inverted U-shape.

In terms of beneficial reputation shocks, the estimates are significant only for strong incumbents, however, they are similar in magnitude across strong and weak incumbents.

[Table 7 here]

6 Disbursement categories and Funding sources

6.1 Disbursement categories

Not all campaign activities are equally useful to influence citizen's behavior (Schuster, 2020). Expenses in advertising are useful for attracting electoral support meanwhile donations to other candidates are not. How does campaign disbursement change with the release of information?

Nearly a third of the campaign funds are spent on advertising. This accounts for expenses in prints, publicity and propaganda, promotional events including artists and presenters. Figure 2 shows how much incumbents spend on different categories. On average, incumbents rerunning spend almost 1 Brazilian Reals per capita on advertising. Other operational costs such as staff, utilities (mainly expenses in gasoline) and leased assets account for nearly a quarter of the budget.[20]

[Figure 2 here]

[20]Disbursement categories are separated as follows: Advertising contains artists and presenters, promotional events, prints, propaganda and publicity. Staff. Bills contain gas, water, electricity and food. Goods contain Real Estate and Furniture Leasing. Expenses on services by third parties. Expenses not specified. Cash are write-off of resources (Baixa de Recursos). Others include Postal Expenses, Gifts, Social charges, Taxes and fees, Expedient Materials and Tickets and Driving / Travel and Tolls.

To study whether incumbents adapt specific spending categories depending on the reputation shock I estimate equation 2 for different spending categories as the dependent variable. Table 8 shows the results. Overall, there is no particular category that is adapted depending on the information. There is complementarity in the type of disbursements. For instance, for increasing the level of advertising, candidates might need to hire more staff, spend more on utilities, among others. Despite this, apart from the leased assets and utilities, the point estimates for all categories are negative for beneficial information released before the election. While not significant, incumbents with beneficial reputation shocks reduce the amount of advertising. The opposite occurs for incumbents with detrimental reputation shocks before the election.[21]

[Table 8 here]

6.2 Funding sources

To study whether incumbents' funding sources are affected by reputation shocks, I separate funding sources into personal resources, donations from private individuals, donations from firms, and others sources (e.g. party fund). Figure 3 shows that candidates' own resources are the most important source of funding for local elections followed by individuals' donations. These two sources fund over two-thirds of the campaigning cost.

[Figure 3 here]

Apart from perhaps the incumbent's own resources, it is not obvious how detrimental information might affect each funding source. On the one hand, people or firms might not want to be linked with tainted politicians and therefore they might reduce their financial support. On the other hand, detrimental information (such as those related to corruption) might attract funding coming from people and firms searching for future returns if the politician is elected. In turn, beneficial reputation shocks might attract new funding sources, but might also allow politicians to avoid receiving funding from sources that could ask for favors in the future in case of being reelected. Additionally, beneficial information might lead candidates to exert less effort in gathering funds as their electoral prospects are better.

[Table 9 here]

Table 9 estimates the effect of reputation shocks on funding sources in per capita terms. Despite that beneficial reputation shock decrease campaign spending (see section 4), there is not a significantly large reduction coming from a specific funding source. Incumbents with beneficial reputation shocks before the election use less of their own resources compared to those with beneficial shocks after the election. They also receive

[21] Note that if corrupt politicians are using certain ways to buy off the electorate, these could be hard to be capture as they might be concealed through different spending categories.

fewer donations from individuals and firms. While not significant, the largest decrease comes from 'Other sources' (nearly 50 percent less) such as the Party fund. However, this source of funding is not as relevant compared with people's donation which is reduced between 34 percent, although standard errors are large.

In turn, detrimental reputation shocks before the election induce incumbents to use more of their own resources to finance their campaigns. The use of own resources increases by nearly 30 percent. This is significant at 11 percent of significance.

Although estimated with less precision, firms donations seem to increase in a substantial amount (by nearly 40 percent) compared to incumbents receiving detrimental shocks after the election.[22]

7 Reputation shocks on conditional cash transfer program and public employment.

Apart from campaign expenditure, incumbents have a wider number of tactics to react to reputation shocks. These can range from clientelistic tactics in the form of patronage (e.g. offering of public-sector employment), direct vote-buying (e.g. distribution of money, tangible goods or gifts); or through the use of pork-barrel spending while holding office. In Brazil, these tactics are ubiquitous (Ames et al., 2008).

This section analyzes whether incumbents adapt public resources in response to the reputation shocks. Evidence suggests that conditional cash transfer program (Manacorda et al., 2011; De La O, 2013; Labonne, 2013) and public employment (Enikolopov, 2014) are used to drive electoral support as they can be easily targeted.

Conditional cash transfer program. Brazil has one of the largest conditional cash transfers program in the world reaching nearly 14 million people. This program - called Bolsa Família (BF) - is administered by the Social Development Ministry, which sets the eligibility criteria, and pays beneficiaries directly. However, municipalities are responsible for enrolling beneficiaries into a national database, as well as maintaining and updating it. This involvement in selecting beneficiaries allows the mayor's credit claiming for the benefits distributed and there is evidence that the BF has been used for electoral purposes (Zucco, 2013; Brollo et al., 2015; Frey, 2016). Data on the BF program is obtained from the IBGE.

Public employment. I analyze permanent and transitory employees. Permanent employees are required to pass an exam and cannot be easily dismissed if a new mayor is appointed, whereas transitory employees are appointed by the mayor and do not need to satisfy any specific requirement making these positions more likely to use as patronage (Brollo and Troiano, 2016). Information from employment is obtained from *Perfil dos Mu-*

[22]This could be driven by an increase in the incumbent's effort in gathering funding sources or more firms approaching the incumbent, among others. Although it is interesting, analyzing the reasons for the changes is outside the scope of the paper.

nicipios Brasileiros.[23] Finally, according to electoral legislation, incumbents cannot affect public employment three months before the elections (Klein and Sakurai, 2015). Hence, the capacity of incumbents to use patronage to gather political support is limited when scandals damaging their reputation occur close to the elections. Although, incumbents can promise public jobs conditional on being reelected. Given that incumbents cannot easily hire or fire public employees in the last year of their mandate, I analyze whether shocks that occurred before the last year of the mayoral term had any effect on public employment.

Table 10 shows the result of estimating model 2 using the number of beneficiary families as a percentage of the municipal population (columns (1) to (2)), the average annual value of the benefits received by the beneficiary family within the municipality (columns (3) to (4)), the share of permanent positions (columns (5) to (6)) and the share of transitory positions (columns (7) to (8)).

[Table 10 here]

Regarding the conditional cash transfer program, the evidence suggests that incumbents respond to reputation shock by adapting the share of beneficiaries within the municipalities, but not for the total value of the benefits. This goes in line with the fact that mayors are not involved in the allocation of resources for the program but are involved in the registration of individuals receiving the benefits. A detrimental reputation shock implies an increase in the number of people registered in the program. Whereas the eligibility for the program cannot be adapted, there is substantial anecdotal evidence suggesting that mayors tend to register political supporters into the program.[24] It is interesting to see that beneficial reputation shocks induce a reduction in the share of people receiving the benefits. This could be due to mayors reducing their effort in maintaining the list of beneficiaries. An alternative hypothesis is related to the clientelistic relationship between mayors and citizens as it has been documented that mayors are subject to pressures from citizens asking for a favor in return for electoral support.[25] In this sense, incumbents receiving beneficial reputation shocks might not be subject to meet these expectations or might not succumb to pressures to maintain their position in office.

In terms of public employment, the evidence suggests that reputation shocks do not affect the share of people hired by the municipality, regardless of the content of the information and the type of position. If anything, incumbents facing beneficial reputation

[23] The survey runs for the following years 2001, 2002, 2004 for the mayoral term 2001-2004, and 2005, 2006, and 2008 the mayoral term 2005-2008. Depending on the year of the survey, the number of public employees can be divided between estatutários, estagiário, commissionados, sin vinculo permanente, CLT (which comes from Consolidação das Leis Trabalhistas), and others. Transitory employment includes commissioned, intern, and employees without a permanent link.

[24] See *https://www.theguardian.com/global-development/2013/dec/19/brazil-bolsa-familia-political-tool-social-welfare* or *http://oglobo.globo.com/brasil/belagua-cidade-dilmista-ja-tem-seus-arrependidos-15665083*.

[25] Johannessen (2017) shows that voters push local politicians to prioritize visible projects and selective benefits, rather than less visible public goods that are more consistent with citizens' preferences.

shocks the year before the election year have a higher number of permanent and transitory employees, while those with detrimental reputation shocks have a lower share. Although the standard errors are large.[26]

Overall, evidence from tables 4 and 10 reflect the type of political instruments that are most likely to be used by mayors to react to reputation shocks. It seems that campaign expenditure is the preferred method given its high electoral impact (can reach a large part of the electorate) and can be easily adjusted just before the election. In turn, the reach of the use of patronage is limited, meanwhile, BF has more coverage the room for manipulation is constrained by the federal government.

8 Conclusion

Campaign spending is one of the most visible and effective ways for politicians to influence and inform the electorate. This paper shows how candidates' adapt their campaign spending when information affecting a candidate's reputation is released. I find that both incumbents' and challengers' campaign spending decrease (increase) with beneficial (detrimental) reputation shocks. Information affecting the incumbent's reputation impacts the incumbent's expected margin of victory, and hence the anticipating closeness of the election affects candidates' investments in campaigning.

Candidates' ability to react to information shocks before the elections taking place has often been neglected. The substitution between a candidate's reputation and the number of resources spent in campaigning shed lights on the crucial role of money in politics and electoral accountability. The fact that campaign spending allows politicians to reach a large part of the electorate and can be easily manipulated allows them to counteract the direct effects of reputation shocks. Front runners try to compensate for the negative effect of detrimental information on electoral outcomes by investing more in campaigning. On the other hand, the crowding-out effect that beneficial information produces on incumbents' campaigning effort could affect their chances of reelection.

Previous research has suggested that imposing caps on campaign expenditure might favor the incumbent rather than the challenger (Pastine and Pastine, 2012). These policies have to be carefully thought in lights of how candidates use campaign expenditure to respond to the disclosure of information.

However, level the playing field between incumbents and challengers is challenging as not only incumbents generally have more access to funding sources and better technology in spending them, but as shown in the paper, incumbents can also adapt public programs. Incumbent adapt conditional cash transfer programs depending on the type of information disclosed before the elections. Further research needs to be done to understand what methods and policies are used by incumbents to respond to information and which give them an extra advantage compared to challengers.

[26] The results do not change when analyzing shock before the election.

While this paper uses reputation shocks based on information about corruption coming from audit reports, other types of information could have similar impacts (e.g. sexual scandals or politicians' disclosure about their wealth) depending on how citizen's process the information. Furthermore, this information does not even have to be true but have to be visible and a substantial part of the electorate has to believe this information. This is particularly relevant due to the increasing importance of social media and fake news in the political arena (Allcott and Gentzkow, 2017).

The elements analyzed in this paper have a broader application. For instance, firms competing in public procurement, employees contesting for a promotion, firms attracting the most talented candidate, among others. In these settings, information affecting the strongest contestant would trigger a similar behavior. If a well-established firm participating in public procurement is affected by a corporate scandal produced by media investigations, then contesting firms might improve their efforts in obtaining procurement as their chances of winning the procurement are better. Empirically studying other contest-like settings when a contestant is affected by the release of the information would be interesting.

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A Tables

Table 1: Evidence of corruption from audits by electoral term.

	Corruption		Share corruption (%)					
Term	Obs.	Mean (%)	Obs.	Mean	p25	p50	p75	Max.
2001-2004	808	70	776	4.43	0	0.09	4.41	84.3
2005-2008	557	88	511	5.79	0	2.03	7.13	90.5

Notes. Corruption is a dummy denoting whether the audit report showed evidence of irregularities in the use of federal funds. Share corruption is the ratio between the total amount of funds involved in the violations over the total amount audited in the municipality. Data from lotteries 2-29 are included and only for mayors eligible to rerun. Share corruption is not available for lottery 19. See Brollo (2011) and Brollo et al. (2013) for more details.

Table 2: Summary statistics for incumbents in municipalities receiving information shocks before or after the elections

	Postelection		Preelection			
Variable	Mean	s.d.	Mean	s.d.	Difference	p-value
A. Reputation shocks						
Corruption	0.81	(0.40)	0.78	(0.42)	-0.03	(0.27)
Share corruption	4.96	(10.06)	5.40	(10.49)	0.44	(0.54)
B. Mayor characteristics						
Male	0.93	(0.25)	0.93	(0.26)	-0.00	(0.82)
Married	0.79	(0.41)	0.80	(0.40)	0.01	(0.62)
Age	44.97	(8.97)	45.64	(9.71)	0.66	(0.29)
Education	6.30	(1.78)	6.40	(1.70)	0.10	(0.39)
Previous mayor	0.01	(0.11)	0.05	(0.22)	0.04	(0.00)
Previous win margin	1.87	(13.06)	1.32	(10.82)	-0.55	(0.50)
Workers' Party dummy	0.05	(0.21)	0.08	(0.28)	0.04	(0.04)
C. Municipal characteristics						
GDP per capita (in ln)	5.60	(0.59)	5.62	(0.57)	0.01	(0.76)
AM Radio Station	23.64	(42.54)	24.17	(42.86)	0.53	(0.85)
Gini index	55.44	(7.10)	55.06	(6.68)	-0.38	(0.40)
Illiteracy rate	25.08	(13.85)	25.11	(13.66)	0.03	(0.97)
Share urban population	59.34	(22.79)	58.77	(23.89)	-0.56	(0.71)

Note: This table reports the comparison of the mean for mayor and socioeconomic characteristics. The sample includes audited municipalities in lotteries 2-29 for terms 2001-2004 and 2005-2008 and in which the mayor reran. 461 observations after the elections and 422 observations before the election. Errors are clustered at municipal level.

Table 3: Summary statistics for challengers in municipalities receiving information shocks before or after the elections

	Postelection		Preelection			
Variable	Mean	s.d.	Mean	s.d.	Difference	p-value
A. Reputation shocks						
Corruption	0.78	(0.41)	0.77	(0.42)	-0.01	(0.81)
Share corruption	4.72	(9.88)	5.45	(10.61)	0.73	(0.32)
B. Challenger characteristics						
Male	0.88	(0.32)	0.90	(0.30)	0.02	(0.33)
Married	0.76	(0.43)	0.77	(0.42)	0.01	(0.66)
Age	47.77	(10.04)	48.46	(9.49)	0.68	(0.31)
Education	6.37	(1.80)	6.51	(1.75)	0.14	(0.26)
Previous mayor	0.16	(0.37)	0.24	(0.43)	0.08	(0.00)
Workers' Party dummy	0.12	(0.32)	0.11	(0.31)	-0.01	(0.55)
C. Municipal characteristics						
GDP per capita (in ln)	5.63	(0.59)	5.63	(0.57)	-0.00	(0.91)
AM Radio Station	25.45	(43.61)	24.05	(42.79)	-1.40	(0.62)
Gini index	55.26	(7.15)	54.87	(6.73)	-0.39	(0.39)
Illiteracy rate	24.09	(13.40)	24.79	(13.68)	0.70	(0.43)
Share urban population	60.33	(22.47)	58.88	(23.97)	-1.45	(0.35)

Note: This table reports the comparison of the mean for challengers and socioeconomic characteristics. The sample includes audited municipalities in lotteries 2-29 for terms 2001-2004 and 2005-2008 and in which the mayor reran. 444 observations after the elections and 395 observations before the election. Errors are clustered at municipal level.

Table 4: Effect of reputation shocks on incumbents' campaign expenditure (per capita)

	Information disclosure		Corruption		Share corruption		Median Corruption		Quartiles Corruption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Before	-0.095	-0.048	-0.851*	-0.766*	-0.481*	-0.427*	-0.871**	-0.781**	-1.125**	-1.053**
	(0.215)	(0.210)	(0.471)	(0.456)	(0.249)	(0.246)	(0.368)	(0.362)	(0.448)	(0.439)
Corruption			-0.703*	-0.715*						
			(0.424)	(0.427)						
Before × corruption			0.919*	0.866*						
			(0.508)	(0.501)						
Share corruption					-0.039***	-0.041***				
					(0.012)	(0.012)				
Before × share corruption					0.069**	0.066**				
					(0.028)	(0.028)				
Above median corruption							-0.983**	-0.956**		
							(0.414)	(0.405)		
Before × Above median corruption							1.425***	1.325***		
							(0.507)	(0.512)		
2nd quartile of corruption									-0.742	-0.694
									(0.534)	(0.546)
3rd quartile of corruption									-1.146**	-1.135**
									(0.505)	(0.505)
4th quartile of corruption									-1.126**	-1.068**
									(0.485)	(0.472)
Before × 2nd quartile of corruption									1.026	1.144
									(0.739)	(0.754)
Before × 3rd quartile of corruption									1.680***	1.676***
									(0.603)	(0.603)
Before × 4th quartile of corruption									1.614**	1.486**
									(0.647)	(0.655)
Observations	883	883	883	883	836	836	836	836	836	836
Dep. Var. Mean	2.870	2.870	2.870	2.870	2.854	2.854	2.854	2.854	2.854	2.854
Mayor and municipal controls		✓		✓		✓		✓		✓
State and term FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.134	0.149	0.136	0.151	0.133	0.146	0.134	0.147	0.132	0.145
$\beta_0 + \beta_2\, c_{ist}$			0.068	0.100	-0.127	-0.088	0.555	0.545	0.489	0.433
p-value			0.772	0.669	0.553	0.673	0.078	0.085	0.269	0.333

Notes. This table reports the impact of reputation shocks (in the form of revelation of corruption or lack of it) on campaign expenditure per capita (in Reals at 2000 prices). 'Before' denotes whether the information was disclosed before elections. Municipal controls include log GDP per capita, presence of radio AM in 2005, the Gini in 2000, the rate of illiteracy and the share of urban population. Mayor controls: Male, married, age, education, dummy for previous mayors, margin of victory in the previous election and party dummy for candidates from the national ruling party (PT). Mayoral terms 2001-2004 and 2005-2008. Robust standard errors clustered at the municipality level in parentheses.

$*p < 0.10, **p < 0.05, ***p < 0.01$.

Table 5: Effect of incumbents' reputation shocks on the main challengers' campaign expenditure (per capita)

	Information disclosure		Corruption		Share corruption		Median Corruption		Quartiles Corruption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Before	0.235	0.294	-0.553	-0.335	-0.045	0.003	-0.628*	-0.555	-0.880**	-0.743**
	(0.251)	(0.250)	(0.473)	(0.481)	(0.287)	(0.284)	(0.353)	(0.347)	(0.377)	(0.375)
Corruption			-0.243	-0.147						
			(0.428)	(0.418)						
Before × corruption			1.050*	0.848						
			(0.545)	(0.566)						
Share corruption					-0.039***	-0.044***				
					(0.013)	(0.013)				
Before × share corruption					0.059***	0.060***				
					(0.020)	(0.020)				
Above median corruption							-0.867***	-0.846**		
							(0.334)	(0.333)		
Before × Above median corruption							1.800***	1.772***		
							(0.539)	(0.542)		
2nd quartile of corruption									-0.218	0.013
									(0.699)	(0.680)
3rd quartile of corruption									-0.997**	-0.851*
									(0.434)	(0.437)
4th quartile of corruption									-0.805**	-0.796*
									(0.392)	(0.407)
Before × 2nd quartile of corruption									1.110	0.890
									(0.904)	(0.882)
Before × 3rd quartile of corruption									2.392***	2.283***
									(0.762)	(0.758)
Before × 4th quartile of corruption									1.807***	1.763***
									(0.606)	(0.641)
Observations	839	839	839	839	784	784	784	784	784	784
Dep. Var. Mean	3.268	3.268	3.268	3.268	3.258	3.258	3.258	3.258	3.258	3.258
Mayor and municipal controls		✓		✓		✓		✓		✓
State and term FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.146	0.162	0.148	0.163	0.163	0.178	0.170	0.183	0.169	0.182
$\beta_0 + \beta_2\, c_{ist}$			0.497	0.513	0.251	0.308	1.172	1.217	0.927	1.020
p-value			0.090	0.084	0.338	0.236	0.004	0.003	0.050	0.038

Notes. This table reports the impact of reputation shocks (in the form of revelation of corruption or lack of it) on the main challenger's campaign expenditure per capita (in Reals at 2000 prices). 'Before' denotes whether the information affecting incumbent's reputation was disclosed before elections. Municipal controls include log GDP per capita, presence of radio AM in 2005, the Gini in 2000, the rate of illiteracy and the share of urban population. Challenger's controls include Male, married, age, education, dummy for previous mayors, margin of victory in the previous election and party dummy for candidates from the national ruling party (PT). Mayoral terms 2001-2004 and 2005-2008. Robust standard errors clustered at the municipality level in parentheses.

$*p < 0.10, **p < 0.05, ***p < 0.01$.

Table 6: Effect of the timing of the reputation shocks on campaign expenditures per capita

	Information disclosure		Median Corruption	
	(1)	(2)	(3)	(4)
Before 3 months	-0.116	-0.035	-0.434	-0.084
	(0.577)	(0.590)	(1.171)	(1.164)
Between 3 to 12 months	0.045	0.088	-0.807*	-0.744*
	(0.290)	(0.285)	(0.440)	(0.446)
Over 12 months	-0.242	-0.200	-1.007***	-0.933**
	(0.267)	(0.268)	(0.385)	(0.379)
Above median corruption			-0.986**	-0.967**
			(0.414)	(0.406)
Before 3 months × Above median corruption			0.590	0.121
			(1.270)	(1.234)
Between 3-12 months × Above median corruption			1.592**	1.553**
			(0.702)	(0.725)
Over 12 months × Above median corruption			1.367**	1.277**
			(0.560)	(0.562)
Observations	883	883	836	836
Dep. Var. Mean	2.870	2.870	2.854	2.854
Mayor and municipal controls		✓		✓
State and term FE	✓	✓	✓	✓
Adjusted R^2	0.133	0.148	0.131	0.145
$\beta_0 + \beta_2\, c_{ist}$ (< 3 months)			0.157	0.037
p-value			0.773	0.947
$\beta_0 + \beta_2\, c_{ist}$ (3 to 12 months)			0.785	0.810
p-value			0.100	0.091
$\beta_0 + \beta_2\, c_{ist}$ (> 12 months)			0.360	0.343
p-value			0.410	0.439

Notes. This table reports the impact of reputation shocks (in the form of revelation of corruption or lack of it) on campaign expenditure per capita (in Reals at 2000 prices) depending on when the information was released. Municipal controls include log GDP per capita, presence of radio AM in 2005, the Gini in 2000, the rate of illiteracy and the share of urban population. Mayor controls: Male, married, age, education, dummy for previous mayors, margin of victory in the previous election and party dummy for candidates from the national ruling party (PT). Mayoral terms 2001-2004 and 2005-2008. Robust standard errors clustered at the municipality level in parentheses.

$*p < 0.10, **p < 0.05, ***p < 0.01$.

Table 7: Effect of reputation shocks on campaign expenditures per capita by previous win margin

	Weak incumbent (head start ≈ 0)				Strong Incumbent (head start >> 0)			
	(1) Median	(2) Median	(3) Quartile	(4) Quartile	(5) Median	(6) Median	(7) Quartile	(8) Quartile
Before	-1.085*	-1.048	-1.215	-1.271	-0.615	-0.683	-1.043**	-1.165**
	(0.643)	(0.655)	(0.787)	(0.811)	(0.399)	(0.473)	(0.480)	(0.526)
Above median corruption	-1.134**	-1.138**			-0.751*	-0.841*		
	(0.568)	(0.553)			(0.433)	(0.487)		
Before × Above median corruption	1.075	1.098			1.812***	1.906**		
	(0.754)	(0.762)			(0.689)	(0.887)		
2nd quartile of corruption			-0.149	-0.030			-1.635***	-1.710***
			(0.789)	(0.816)			(0.587)	(0.613)
3rd quartile of corruption			-0.846	-0.881			-1.455**	-1.611**
			(0.729)	(0.757)			(0.611)	(0.643)
4th quartile of corruption			-1.153	-1.063			-0.958*	-1.048*
			(0.706)	(0.677)			(0.549)	(0.605)
Before × 2nd quartile of corruption			0.862	1.314			1.445	1.621*
			(1.035)	(1.044)			(0.879)	(0.973)
Before × 3rd quartile of corruption			1.068	1.321			2.297***	2.580***
			(0.923)	(0.959)			(0.768)	(0.843)
Before × 4th quartile of corruption			1.195	1.254			2.035**	2.078*
			(0.951)	(0.943)			(0.931)	(1.081)
Observations	416	416	416	416	420	420	420	420
Dep. Var. Mean	2.910	2.910	2.910	2.910	2.798	2.798	2.798	2.798
Mayor and municipal controls		✓		✓		✓		✓
State and term FE	✓	✓	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.198	0.209	0.189	0.202	0.095	0.098	0.098	0.102
$\beta_0 + \beta_2\, c_{ist}$	-0.009	0.050	-0.020	-0.017	1.198	1.222	0.992	0.913
p-value	0.980	0.898	0.968	0.973	0.016	0.032	0.180	0.237

Notes. This table reports the effect of reputation shocks (in the form of revelation of corruption or lack of it) on campaign expenditure by type of incumbent. Strong (weak) incumbents are those above the median previous margin of victory. 'Before' denotes whether the information was disclosed before elections. Municipal controls include log GDP per capita, presence of radio AM in 2005, the Gini in 2000, the rate of illiteracy and the share of urban population. Mayor controls: Male, married, age, education, dummy for previous mayors, margin of victory in the previous election and party dummy for candidates from the national ruling party (PT). Mayoral terms 2001-2004 and 2005-2008. Robust standard errors clustered at the municipality level in parentheses.

$*p < 0.10, **p < 0.05, ***p < 0.01$.

Table 8: Effect of reputation shocks on spending categories (per capita)

	(1) Advertising	(2) Staff	(3) Utilities	(4) Leased assets	(5) Services by Third parties	(6) Cash	(7) Not specified	(8) Others
Before	-0.211	-0.039	0.002	0.021	-0.074*	-0.125	-0.056*	-0.281
	(0.171)	(0.079)	(0.059)	(0.038)	(0.040)	(0.096)	(0.034)	(0.277)
Above median corruption	-0.201	-0.063	0.029	-0.018	0.008	-0.081	-0.053	-0.519
	(0.193)	(0.054)	(0.061)	(0.037)	(0.039)	(0.078)	(0.033)	(0.333)
Before × Above median corruption	0.318	0.034	0.081	0.042	0.122*	0.190	0.067	0.382
	(0.217)	(0.098)	(0.095)	(0.071)	(0.067)	(0.129)	(0.043)	(0.335)
Observations	823	823	823	823	823	823	823	823
Dep. Var. Mean	0.983	0.188	0.415	0.189	0.176	0.410	0.110	0.372
Adjusted R^2	0.038	0.153	0.060	0.050	0.015	0.217	0.043	0.045
$\beta_0 + \beta_2\, c_{ist}$	0.106	-0.005	0.083	0.063	0.048	0.065	0.011	0.100
p-value	0.384	0.931	0.237	0.299	0.369	0.511	0.736	0.340

Notes. This table reports the effect of reputation shocks (in the form of revelation of corruption or lack of it) on spending categories (per capita). 'Before' denotes whether the information was disclosed before elections. Municipal controls include log GDP per capita, presence of radio AM in 2005, the Gini in 2000, the rate of illiteracy and the share of urban population. Mayor controls: Male, married, age, education, dummy for previous mayors, margin of victory in the previous election and party dummy for candidates from the national ruling party (PT). Mayoral terms 2001-2004 and 2005-2008. Robust standard errors clustered at the municipality level in parentheses.
$*p < 0.10, **p < 0.05, ***p < 0.01$.

Table 9: Effect of reputation shocks on Campaigning funding sources (per capita)

	(1) Own resources	(2) People donations	(3) Firms donations	(4) Others
Before	-0.129	-0.311	-0.110	-0.172
	(0.224)	(0.230)	(0.110)	(0.113)
Above median corruption	-0.336	-0.443*	-0.054	-0.099
	(0.221)	(0.262)	(0.107)	(0.101)
Before × Above median corruption	0.441	0.383	0.333	0.199
	(0.282)	(0.288)	(0.230)	(0.147)
Observations	831	831	831	831
Dep. Var. Mean	1.032	0.912	0.563	0.364
Adjusted R^2	0.110	0.072	0.031	0.071
$\beta_0 + \beta_2\, c_{ist}$	0.312	0.072	0.223	0.027
p-value	0.106	0.616	0.252	0.790

Notes. This table reports the effect of reputation shocks (in the form of revelation of corruption or lack of it) on campaign funding sources (per capita). 'Before' denotes whether the information was disclosed before elections. Municipal controls include log GDP per capita, presence of radio AM in 2005, the Gini in 2000, the rate of illiteracy and the share of urban population. Mayor controls: Male, married, age, education, dummy for previous mayors, margin of victory in the previous election and party dummy for candidates from the national ruling party (PT). Mayoral terms 2001-2004 and 2005-2008. Robust standard errors clustered at the municipality level in parentheses.
$*p < 0.10, **p < 0.05, ***p < 0.01$.

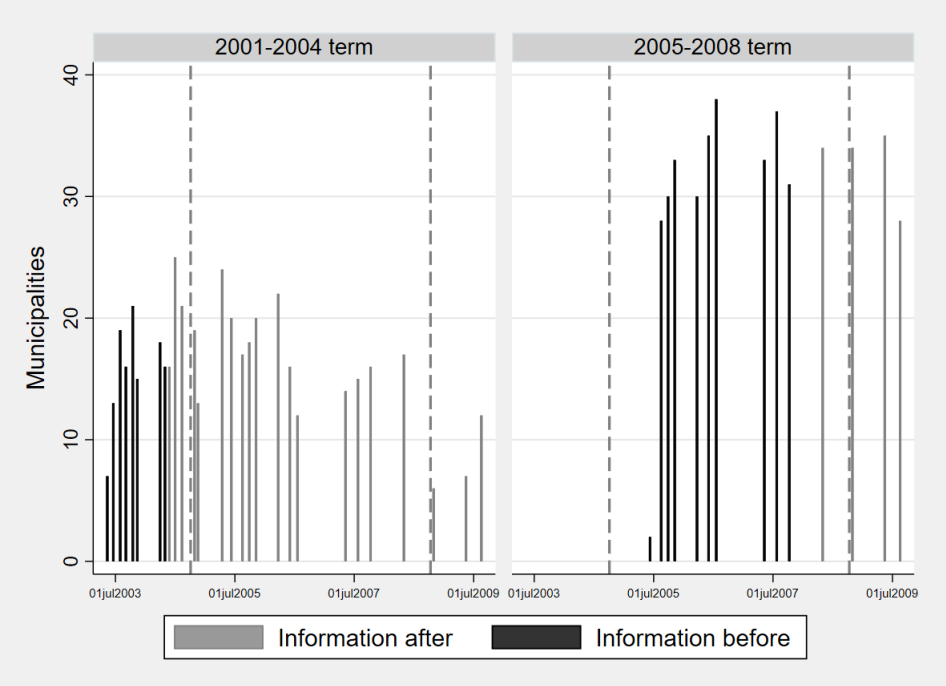
Table 10: Effect of reputation shocks on Bolsa Familia and public employment

	Beneficiary families (% population)		Value of benefits		Permanent employees		Transitory employees	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Median	Quartile	Median	Quartile	Median	Quartile	Median	Quartile
Before	-0.468**	-0.522**	0.389	0.487	0.106	0.103	-0.045	0.011
	(0.186)	(0.208)	(0.258)	(0.301)	(0.115)	(0.128)	(0.078)	(0.080)
Above median corruption	0.148		0.382		0.063		0.008	
	(0.162)		(0.244)		(0.101)		(0.065)	
Before × Above median corruption	0.710***		-0.337		-0.069		0.025	
	(0.243)		(0.336)		(0.136)		(0.096)	
2nd quartile of corruption		0.052		0.467		0.073		0.084
		(0.309)		(0.381)		(0.195)		(0.172)
3rd quartile of corruption		0.224		0.531*		-0.053		0.029
		(0.214)		(0.292)		(0.118)		(0.078)
4th quartile of corruption		0.088		0.410		0.229*		-0.001
		(0.207)		(0.325)		(0.134)		(0.078)
Before × 2nd quartile of corruption		0.308		-0.292		0.065		-0.349*
		(0.425)		(0.553)		(0.267)		(0.192)
Before × 3rd quartile of corruption		0.594*		-0.034		0.080		-0.034
		(0.306)		(0.413)		(0.169)		(0.123)
Before × 4th quartile of corruption		0.947***		-0.704		-0.213		-0.014
		(0.308)		(0.444)		(0.183)		(0.134)
Observations	1,272	1,272	1,272	1,272	1,276	1,276	1,276	1,276
Dep. Var. Mean	6.785	6.785	31.041	31.041	3.035	3.035	0.973	0.973
Adjusted R^2	0.756	0.756	0.632	0.632	0.181	0.181	0.222	0.222
$\beta_0 + \beta_2 c_{ist}$	0.242	0.425	0.053	-0.217	0.037	-0.110	-0.020	-0.002
p-value	0.172	0.081	0.824	0.525	0.745	0.495	0.831	0.987

Notes. This table reports the effect of reputation shocks (in the form of revelation of corruption or lack of it) on Bolsa Familia and public employment. Bolsa Familia: beneficiary families as percentage of the municipality population and on the average value of the benefits per family. Public employment: permanent employment and transitory employment. 'Before' denotes whether the information was disclosed before elections. All especifications control for mayor and municipal controls. Mayoral terms 2001-2004 and 2005-2008. Robust standard errors clustered at the municipality level in parentheses. $*p < 0.10, **p < 0.05, ***p < 0.01$.

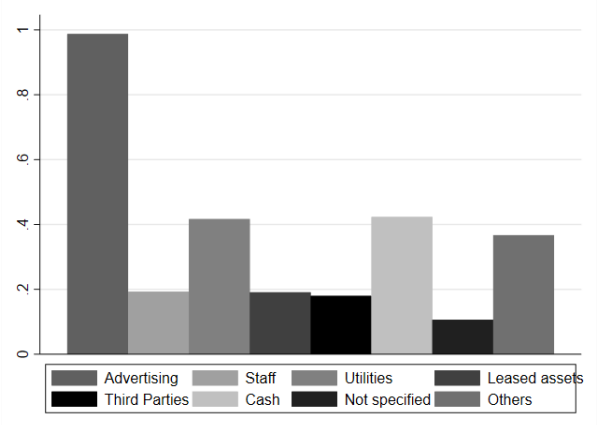
B Figures

Figure 1: Number of municipalities by electoral term and treatment status.



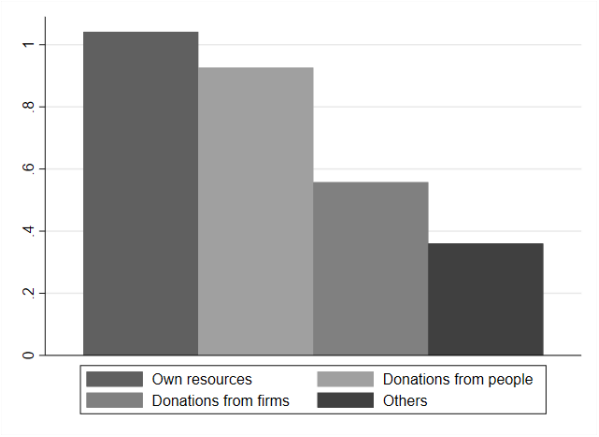
Notes. The figure shows the number of audited municipalities and the dates of the lottery by electoral term. Lotteries where the audit reports were released before the election in black and after the election in gray. Vertical dashed lines denote the corresponding elections on 3 October 2004 and 10 October 2008. The figure contains municipalities where the incumbent ran for the election.

Figure 2: Average amount spent by categories (per capita).



Notes. The figure shows the average per capita amount spent by disbursement categories.

Figure 3: Average amount of money covered by each funding source (per capita).



Notes. The figure shows the average per capita amount of campaign expenditure funded by different sources.

C Proofs

Proof proposition 5.1

Proof Formally, (I^*, C^*) is described by the following equation:

$$\frac{\partial P(I^*, C^*, m)}{\partial I} - K_I'(I^*) = 0$$

$$-\frac{\partial P(I^*, C^*, m)}{\partial C} - K_C'(C^*) = 0$$

Differentiating these equations by m and re-arranging terms we obtain:

$$\frac{dI^*}{dm} = \frac{1}{A}\left(\frac{\partial^2 P}{\partial I \partial m}\left[K_C'' + \frac{\partial^2 P}{\partial C^2}\right] - \frac{\partial^2 P}{\partial C \partial m}\frac{\partial^2 P}{\partial I \partial C}\right)$$

$$\frac{dC^*}{dm} = \frac{1}{A}\left(\frac{\partial^2 P}{\partial C \partial m}\left[K_I'' - \frac{\partial^2 P}{\partial I^2}\right] - \frac{\partial^2 P}{\partial I \partial m}\frac{\partial^2 P}{\partial I \partial C}\right)$$

where

$$A = \left[K_C'' + \frac{\partial^2 P}{\partial C^2}\right]\left[K_I'' - \frac{\partial^2 P}{\partial I^2}\right] + \left[K_I'' + \frac{\partial^2 P}{\partial I \partial C}\right]^2$$

The second-order conditions (see footnote [16]) imply that $\left[K_I'' - \frac{\partial^2 P}{\partial I^2}\right] > 0$ and $\left[K_C'' + \frac{\partial^2 P}{\partial C^2}\right] > 0$. Hence, A is positive. Therefore, the sign of $\frac{dI^*}{dm}$ and $\frac{dC^*}{dm}$ depend on the cross-partial derivatives: $\frac{\partial^2 P}{\partial I \partial m}$, $\frac{\partial^2 P}{\partial C \partial m}$ and $\frac{\partial^2 P}{\partial I \partial C}$.

If $\frac{\partial^2 P}{\partial I \partial m} < 0$, $\frac{\partial^2 P}{\partial C \partial m} > 0$ and $\frac{\partial^2 P}{\partial I \partial C} > 0$, then $\frac{dI^*}{dm} < 0$ and $\frac{dC^*}{dm} < 0$. ■

D Online Appendix

D.1 Data description

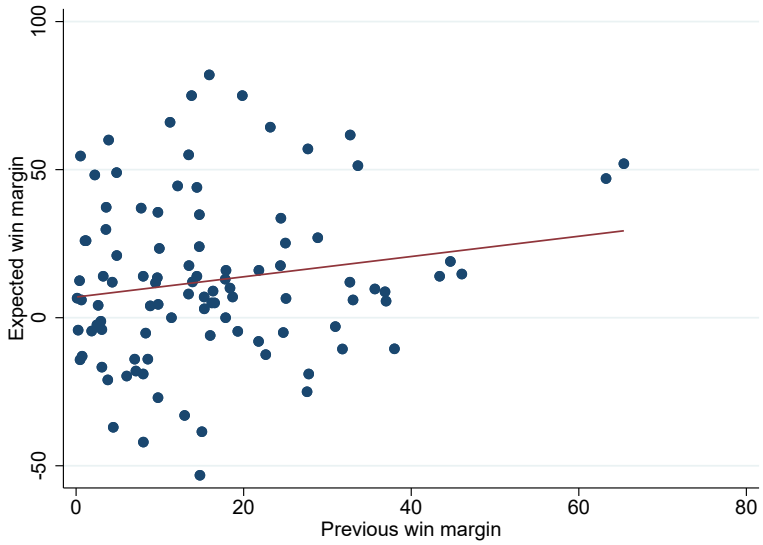
The corruption measure employed in this study comes from Brollo (2011) and Brollo et al. (2013). Data obtained from the author's website. https://sites.google.com/site/fernandabrollo/home/data [accessed on February 2016]. I construct the measures described in section 2 based on the broad definition of corruption which includes irregularities as the following:

- Severe illegal procurement practices: (i) competition has been limited, (ii) bid value has been manipulated, (iii) an irregular firm wins the bid process, (iv) minimum number of bids is not attained, and (v) required procurement procedure is not executed.
- Fraud: e.g. Simulated auction with fake signatures of some firms.
- Favoritism: e.g. donations from the city to some people.
- Over-invoicing: public goods/services are purchased for a value above the market price.
- Diversion of funds.
- Paid but not proven.

For further details refer to Brollo (2011) and Brollo et al. (2013).

D.2 Other tables and figures

Figure D.1: Previous win margin and expected win margin



Note: This figure shows the scatter plot for the previous win margin for incumbents rerunning and their expected win margin according to polls at the beginning of the next electoral campaign. The figure contains incumbents from municipalities not audited and that rerun in 2004 and 2008 elections for which polls data are available. Data for polls come from https://www.poder360.com.br/pesquisas-de-opiniao/.

Table D.1: Summary statistics by treatment status - Elections 2004 and 2008

	After		Before			
Variable	Mean	s.d.	Mean	s.d.	Difference	p-value
A. Reputation shocks						
Corruption	0.78	(0.41)	0.76	(0.43)	-0.02	(0.27)
Share corruption	4.56	(9.79)	5.47	(10.66)	0.91	(0.11)
B. Mayor characteristics						
Male	0.94	(0.25)	0.93	(0.26)	-0.01	(0.60)
Married	0.78	(0.41)	0.79	(0.41)	0.01	(0.79)
Age	46.74	(9.79)	46.40	(9.93)	-0.34	(0.52)
Education	6.22	(1.84)	6.21	(1.81)	-0.01	(0.90)
Previous mayor	0.01	(0.11)	0.05	(0.22)	0.04	(0.00)
Previous win margin	1.22	(10.38)	0.94	(8.93)	-0.28	(0.59)
Workers' Party dummy	0.04	(0.19)	0.07	(0.26)	0.03	(0.01)
C. Municipal characteristics						
GDP per capita (in ln)	5.62	(0.58)	5.61	(0.57)	-0.01	(0.76)
Gini index	55.43	(7.08)	55.37	(6.75)	-0.06	(0.86)
Illiteracy rate	24.86	(13.62)	25.04	(13.26)	0.18	(0.79)
Share urban population	59.14	(22.89)	58.27	(23.28)	-0.87	(0.45)
AM Radio Station	25.64	(43.69)	23.24	(42.27)	-2.40	(0.26)

Note: This table reports the comparison of the mean for mayor and socioeconomic characteristics. The sample includes mayors from audited municipalities in lotteries 2-29 for terms 2001-2004 and 2005-2008. 741 observations after the elections and 624 observations before the election. Errors are clustered at municipal level.

Table D.2: Effect of reputation shocks on incumbents' candidacy

	Information disclosure		Corruption		Share corruption		Median Corruption		Quartiles Corruption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Before	-0.027	-0.027	-0.015	-0.023	-0.018	-0.014	0.025	0.028	0.019	0.021
	(0.027)	(0.026)	(0.053)	(0.052)	(0.030)	(0.029)	(0.037)	(0.036)	(0.042)	(0.041)
Corruption			0.010	-0.013						
			(0.042)	(0.041)						
Before × corruption			-0.015	-0.008						
			(0.059)	(0.058)						
Share corruption					0.000	0.000				
					(0.002)	(0.002)				
Before × share corruption					-0.001	-0.001				
					(0.002)	(0.002)				
Above median corruption							0.053	0.040		
							(0.035)	(0.034)		
Before × Above median corruption							-0.093*	-0.094*		
							(0.051)	(0.050)		
2nd quartile of corruption									-0.002	0.004
									(0.066)	(0.064)
3rd quartile of corruption									0.047	0.039
									(0.044)	(0.044)
4th quartile of corruption									0.060	0.043
									(0.045)	(0.045)
Before × 2nd quartile of corruption									0.026	0.029
									(0.083)	(0.082)
Before × 3rd quartile of corruption									-0.114*	-0.120*
									(0.067)	(0.065)
Before × 4th quartile of corruption									-0.066	-0.059
									(0.064)	(0.063)
Observations	1,365	1,353	1,365	1,353	1,287	1,278	1,287	1,278	1,287	1,278
Dep. Var. Mean	2.870	2.870	2.870	2.870	2.854	2.854	2.854	2.854	2.854	2.854
Mayor and municipal controls		✓		✓		✓		✓		✓
State and term FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.027	0.058	0.025	0.056	0.024	0.056	0.027	0.058	0.025	0.057
$\beta_0 + \beta_2\, c_{ist}$			-0.030	-0.031	-0.023	-0.020	-0.068	-0.066	-0.047	-0.038
p-value			0.314	0.296	0.396	0.455	0.066	0.069	0.343	0.443

Notes. This table reports the effect of reputation shocks (in the form of revelation of corruption or lack of it) on candidates' decision of rerunning. 'Before' is a dummy equal to one if the release of the audit reports occurred before elections or not. 'Corruption' is a dummy equal to one if the report showed evidence of corruption. 'Share corruption' is the ratio between the total amount of funds involved in irregularities over the total amount audited for the municipality. 'Median' is a dummy equal to one if the share of resources in irregular transactions is above the median of the distribution, otherwise is zero. 'Quartile' separates the distribution of the 'Share corruption' in quartiles. Data from lotteries 2-29 are included. Share corruption is not available for lottery 19. Errors are clustered at municipal level.

$*p < 0.10, **p < 0.05, ***p < 0.01$.

Table D.3: Effect of incumbent's reputation shocks on the number of challengers

	Information disclosure		Corruption		Share corruption		Median Corruption		Quartiles Corruption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Before	-0.024	-0.050	0.017	-0.055	0.005	-0.026	-0.048	-0.092	0.024	-0.034
	(0.058)	(0.055)	(0.114)	(0.107)	(0.064)	(0.060)	(0.081)	(0.076)	(0.088)	(0.083)
Corruption			-0.051	-0.087						
			(0.096)	(0.090)						
Before × corruption			-0.066	-0.005						
			(0.125)	(0.116)						
Share corruption					0.006	0.005				
					(0.004)	(0.004)				
Before × share corruption					-0.007	-0.005				
					(0.006)	(0.005)				
Above median corruption							-0.037	-0.060		
							(0.080)	(0.074)		
Before × Above median corruption							0.036	0.081		
							(0.108)	(0.103)		
2nd quartile of corruption									0.300*	0.173
									(0.163)	(0.133)
3rd quartile of corruption									0.051	-0.002
									(0.095)	(0.091)
4th quartile of corruption									-0.019	-0.059
									(0.102)	(0.093)
Before × 2nd quartile of corruption									-0.313	-0.278
									(0.208)	(0.183)
Before × 3rd quartile of corruption									-0.043	-0.005
									(0.136)	(0.133)
Before × 4th quartile of corruption									0.006	0.065
									(0.138)	(0.129)
Observations	1,365	1,353	1,365	1,353	1,287	1,278	1,287	1,278	1,287	1,278
Dep. Var. Mean	2.870	2.870	2.870	2.870	2.854	2.854	2.854	2.854	2.854	2.854
Mayor and municipal controls		✓		✓		✓		✓		✓
State and term FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.071	0.191	0.071	0.191	0.072	0.195	0.071	0.195	0.071	0.194
$\beta_0 + \beta_2\, c_{ist}$			-0.049	-0.060	-0.028	-0.050	-0.012	-0.011	0.030	0.031
p-value			0.452	0.328	0.637	0.368	0.882	0.886	0.792	0.774

Notes. This table reports the effect of reputation shocks (in the form of revelation of corruption or lack of it) on challengers candidacy. 'Before' is a dummy equal to one if the release of the audit reports occurred before elections or not. 'Corruption' is a dummy equal to one if the report showed evidence of corruption. 'Share corruption' is the ratio between the total amount of funds involved in irregularities over the total amount audited for the municipality. 'Median' is a dummy equal to one if the share of resources in irregular transactions is above the median of the distribution, otherwise is zero. 'Quartile' separates the distribution of the 'Share corruption' in quartiles. Data from lotteries 2-29 are included. Share corruption is not available for lottery 19. Errors are clustered at municipal level.

$*p < 0.10, **p < 0.05, ***p < 0.01$.

Table D.4: Effect of incumbent's reputation shocks on challengers' quality (education)

	Information disclosure		Corruption		Share corruption		Median Corruption		Quartiles Corruption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Before	-0.007	-0.016	0.013	-0.029	-0.020	-0.026	0.008	-0.021	0.018	-0.031
	(0.090)	(0.086)	(0.176)	(0.170)	(0.101)	(0.096)	(0.128)	(0.121)	(0.143)	(0.137)
Corruption			0.038	0.002						
			(0.130)	(0.125)						
Before × corruption			-0.023	0.019						
			(0.189)	(0.184)						
Share corruption					-0.004	-0.001				
					(0.006)	(0.005)				
Before × share corruption					0.001	0.001				
					(0.008)	(0.007)				
Above median corruption							0.043	0.021		
							(0.112)	(0.107)		
Before × Above median corruption							-0.044	0.007		
							(0.167)	(0.159)		
2nd quartile of corruption									0.120	-0.033
									(0.205)	(0.191)
3rd quartile of corruption									0.165	0.096
									(0.137)	(0.131)
4th quartile of corruption									-0.048	-0.079
									(0.152)	(0.146)
Before × 2nd quartile of corruption									-0.017	0.038
									(0.285)	(0.258)
Before × 3rd quartile of corruption									-0.120	-0.100
									(0.205)	(0.200)
Before × 4th quartile of corruption									0.048	0.136
									(0.219)	(0.209)
Observations	1,347	1,335	1,347	1,335	1,270	1,261	1,270	1,261	1,270	1,261
Dep. Var. Mean	2.883	2.883	2.883	2.883	2.867	2.867	2.867	2.867	2.867	2.867
Mayor and municipal controls		✓		✓		✓		✓		✓
State and term FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Adjusted R^2	0.055	0.136	0.054	0.135	0.047	0.135	0.047	0.135	0.045	0.133
$\beta_0 + \beta_2\, c_{ist}$			-0.010	-0.010	-0.014	-0.019	-0.036	-0.015	0.066	0.105
p-value			0.923	0.915	0.879	0.827	0.766	0.899	0.705	0.528

Notes. This table reports the effect of reputation shocks (in the form of revelation of corruption or lack of it) on challengers candidacy. 'Before' is a dummy equal to one if the release of the audit reports occurred before elections or not. 'Corruption' is a dummy equal to one if the report showed evidence of corruption. 'Share corruption' is the ratio between the total amount of funds involved in irregularities over the total amount audited for the municipality. 'Median' is a dummy equal to one if the share of resources in irregular transactions is above the median of the distribution, otherwise is zero. 'Quartile' separates the distribution of the 'Share corruption' in quartiles. Data from lotteries 2-29 are included. Share corruption is not available for lottery 19. Errors are clustered at municipal level.

$*p < 0.10, **p < 0.05, ***p < 0.01$.

Table D.5: Timing of the release of the information

	Term 2001-2004		Term 2005-2008	
	sum	mean	sum	mean
Less than 3 months before the election	34	0.075	0	0.000
Betweem 3 to 12 months before the election	71	0.156	101	0.236
More than 12 months before the election	20	0.044	196	0.458
After the election	330	0.725	131	0.306
Observations	455		428	

Notes. This table shows the timing of the release of the audit report with respect to the date of the elections for each mayoral term.