

Bad Neighbors Make Good Fences: How Politicians Mitigate the Electoral Consequences of Nearby Corruption in Brazil*

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Abstract

Anti-corruption interventions that seek to bridge the gap between voters and politicians' performance in office should improve electoral accountability. However, the cumulative evidence suggests that voters rarely punish corrupt politicians. Recent work explains this puzzle by suggesting that politicians anticipate electoral sanctions and adjust their behavior in office by avoiding association with corruption. However, research to date cannot disentangle whether this behavior emerges due to an electoral accountability mechanism or from the prospect of top-down legal sanctions. This paper overcomes that difficulty by focusing on exposure to nearby corruption. I argue that incumbents with reelection incentives react to nearby corruption in a pattern that reveals an attempt to anticipate electoral sanctions. The challenge to studying this

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phenomenon is choosing how to operationalize “nearby,” which this paper overcomes by taking a supervised learning model selection approach. Using data from a long running anti-corruption program in Brazil. I show that increasing nearby corruption encourages incumbent mayors to seek reelection under a different party. Additional analyses show evidence in favor of the electoral accountability mechanism.

1 Introduction

Governments, civil society organizations, and scholars spend considerable resources implementing and evaluating anti-corruption interventions that seek to bridge the gap between voters and politicians’ performance in office. However, the cumulative evidence suggests that voters rarely punish corrupt politicians (Incerti 2020). Even in the cases where exposing corrupt politicians leads to electoral sanctions (e.g. Ferraz and Finan 2008), bottom-up punishment tends to be short lived (Rundlett 2018; Timmons and Garfias 2015). If anything, politicians seem more responsive to the prospects of legal sanctions than to expected changes in electoral behavior in response to corruption (Avis, Ferraz, and Finan 2018).

While most research on the electoral consequences of corruption focuses on understanding why voters fail to sanction corruption (see De Vries and Solaz 2017 for a review), recent work suggests that politicians adjust their behavior in anticipation of expected electoral sanctions, suggesting that lack of sanctioning does not imply lack of accountability. Parties choose not to renominate politicians implicated in corruption scandals in elections (Asquer, Golden, and Hamel 2019), whereas elected officials at the local level avoid association with corrupt parties by switching parties or choosing not to seek reelection (Daniele, Galletta, and Geys 2020). These findings illustrate how politicians avoid association with corruption, yet because the connection is the political party, they cannot disentangle whether this behavior is a response to expected electoral sanctions or an attempt to avoid involvement in future legal investigations, since the same empirical pattern could respond to either electoral accountability or top-down sanctioning mechanisms.

To disentangle between these two explanations, this paper focuses on the electoral consequences

of exposure to information about nearby corruption at the local level. I argue that exposing corruption has spillover effects on the behavior of incumbents eligible for reelection. Exposure to nearby corruption (as opposed to same-party corruption) creates an opportunity to evaluate whether (1) incumbents with reelection incentives are more likely to try to avoid association with corruption and (2) whether they do so at differential rates depending on the distribution of same-party nearby corruption.

One challenge to the study of spillover effects in this context is how to define what “nearby” means. Most of the tools to study spillovers assume that the researcher observes how units are connected, so there is a clear pathway to model spillovers (for reviews, see Aronow et al. 2020; Halloran and Hudgens 2016). For the purposes of this paper, that implies making a statement about how municipalities are connected so that exposing corruption in one place affects the outcome in others. One cannot make that connection without additional assumptions that do not follow from one’s theory. Therefore, I approach the operationalization of “nearby” as a model selection problem in supervised machine learning (Diaz 2021). Using cross-validation, I find a plausible range for the upper bound at which exposure to information about corruption politicians’ strategic decisions in nearby localities.

I evaluate the effect of exposure to nearby corruption using data from a long running anti-corruption program in Brazil, created using a novel combination of text-as-data and supervised learning tools to overcome researcher bias in the coding of corruption. The program randomly selected municipalities to audit the use of federal funds, releasing reports to the relevant authorities and the media. I show that more nearby infractions increase the probability that the incumbent mayor will seek reelection under a different party. These effects only appear in the subset of municipalities exposed to nearby corruption that are not audited themselves, which suggests that this behavior is a viable strategy only when voters do not have access to their own incumbent’s corruption record.

I also evaluate second order implications to provide additional evidence in favor of the

electoral accountability mechanism. I show that effects are similar across municipalities exposed to varying proportions of same-party corruption. Considering the high number of parties and the weakness of party brands in local level elections in Brazil (Klašnja and Titiunik 2017; Novaes 2017), this result suggests that the findings in this paper are distinct from the potential of top-down sanctions. I also show that nearby corruption does not affect the rates at which incumbents seek or win reelection, which suggests an incentive to anticipate electoral sanctions, as opposed to mere opportunistic behavior. Finally, I describe how reelection-eligible mayors choosing not to switch parties win elections less often as nearby corruption increases.

This paper makes three contributions. First, it expands on the literature on the electoral consequences of corruption by showing how anti-corruption efforts have effects beyond the immediate locales where they are implemented. This puts previous findings in perspective, as the limited evidence in favor of voter sanctioning outside of the survey framework (e.g. Boas, Hidalgo, and Melo 2018; Incerti 2020) may arise because politicians respond strategically to avoid punishment (Fisman and Golden 2017), and not necessarily because voters are not inclined to sanction corruption. In that regard, this paper extends on recent work suggesting this mechanism but not testing it directly (Asquer, Golden, and Hamel 2019; Daniele, Galletta, and Geys 2020).

Second, this paper applies a novel approach to study spillovers in observational studies (see Diaz 2021 for details). Approaching spillovers as a model selection problem in supervised learning has the advantage of avoiding modeling assumptions that do not follow from theory and minimizes the bias that emerges from not knowing the true pathway through which spillovers occur. The researcher still has to make decisions about the pathways through which spillovers travel (in this paper, I assume spillovers travel through geography), but instead of committing to a specific model, an algorithm suggests a range of plausible models based on the data.

Third, this paper overcomes the limitations in previous work using data from the aforementioned anti-corruption program in Brazil. Previous research relies on human coding to measure corruption in a subset of the data, without a measure of coding reliability and potentially ignoring general trends over time (Brollo et al. 2013; Cavalcanti, Daniele, and Galletta 2018; Ferraz and Finan 2008, 2011; Timmons and Garfias 2015). I overcome these difficulties using a text-as-data approach to code corruption. I use the audit report documents as a bridge between labeled and unlabeled cases, creating a measure of corruption that reproduces the official coding for the entirety of the program’s duration.

2 Previous Evidence on the Electoral Consequences of Corruption

Formal theoretical models of electoral accountability highlight voters’ adverse selection problem. Voters prefer to have good over bad politicians in office, but they can only infer an incumbent’s type from observable outputs (Barro 1973; Fearon 1999; Ferejohn 1986). Therefore, politicians have incentives to hide corrupt activities from voters (Gambetta 2002; Rose-Ackerman 1978, 1999), so voters do not have enough information to link experiences with and perceptions of corruption with those responsible for it.

The literature in electoral accountability suggests that information plays a key role in minimizing voters’ adverse selection problem (Adsera, Boix, and Payne 2003; Dunning, Grossman, Humphreys, Hyde, McIntosh, and Nellis 2019; Dunning, Grossman, Humphreys, Hyde, McIntosh, Nellis, Adida, et al. 2019; Tavits 2007). Both observational studies (e.g. Chang, Golden, and Hill 2010; Ferraz and Finan 2008; Welch and Hibbing 1997) and field experiments (e.g. Buntaine et al. 2018; Chong et al. 2015; Green, Zelizer, and Kirby 2018) in various contexts suggest that exposing corrupt politicians leads to electoral sanctions. However, the cumulative evidence suggests that the electoral consequences of corruption are limited (see De Vries and Solaz 2017 for a review). Recent work highlights the discrepancy between

self-reported and actual political behavior in reaction to corruption. While respondents in survey experiments consistently report their inclination to sanction corrupt politicians, evidence from field experiments suggests that preferences do not translate to votes (Boas, Hidalgo, and Melo 2018; Incerti 2020).

Current explanations for the limited electoral sanctions emphasize the circumstances in which voters choose not to punish corruption. One prominent explanation is that voters forgive corruption when politicians satisfy their expectations in other areas.¹ Evidence from survey experiments and observational studies suggests that voters forgive corruption among co-partisans (Anduiza, Gallego, and Muñoz 2013; Eggers 2014) or when it comes with positive economic outcomes (Fernández-Vázquez, Barberá, and Rivero 2016; Konstantinidis and Xezonakis 2013; Muñoz, Anduiza, and Gallego 2016; Pereira and Melo 2015).² Another explanation is that, in the absence of viable alternatives to replace corrupt politicians, corruption demobilizes voters (Boas, Hidalgo, and Melo 2018; Chong et al. 2015; Pavão 2018).

Recent work proposes another alternative explanation, politicians anticipate electoral sanctions and manipulate these factors to counteract voter punishment. Research on local elections in Brazil evaluates this mechanism indirectly, showing how parties in municipalities where audits reveal high corruption present more-educated candidates (a proxy for candidate quality) in city council elections (Cavalcanti, Daniele, and Galletta 2018). Recent work on Italy's Clean Hands scandal also suggests that politicians avoid association with corruption, arguing for (but not proving) an electoral accountability mechanism. Asquer, Golden, and Hamel (2019) show how parties attempt to protect their public brand by avoiding the renomination of legislators who face extensive media coverage around corruption. Daniele, Galletta, and Geys (2020) show how local politicians from parties implicated in the scandal are less likely to seek

¹Another prominent explanation that I do not discuss is voters ignoring information about corruption when the source is not credible (Botero et al. 2015; Weitz-Shapiro and Winters 2017; Winters and Weitz-Shapiro 2018).

²See Breitenstein (2019) and Winters and Weitz-Shapiro (2013) for counterpoints. Both pieces suggest that voters do not trade corruption for economic performance.

reelection and more likely to switch parties.

Research showing that politicians avoid association with corruption suggests electoral accountability as the underlying mechanism. Parties and individual politicians avoid the connection with corruption to safeguard their reputations and future electoral chances. However, research from Brazil suggests that, if anything, anti-corruption interventions succeed in reducing subsequent corruption because politicians are responsive to the prospect of future investigation or legal sanction (Avis, Ferraz, and Finan 2018). Conversely, bottom-up punishment through voting behavior or local tax revenue tends to be short-lived (Rundlett 2018; Timmons and Garfias 2015).

In other words, research that focuses on the party as the connection between corrupt politicians and those trying to avoid association with them cannot disentangle whether between the bottom-up and top-down sanctioning. To illustrate this limitation, consider case of Rodrigo Neves, former mayor of the municipality of Nitéroï in the state of Rio de Janeiro. In the leadup to the 2016 local election in Brazil, Neves switched allegiance from the Worker’s Party (PT) to the opposition Green Party (PV). As media coverage suggested at the time, the purpose of this move was to improve his electoral chances by avoiding association with president Dilma Rousseff’s administration in the midst of corruption allegations that affected public opinion negatively and eventually lead to her impeachment.³

Neves would go on to secure reelection under the new party. However, halfway into his term he was detained and prosecuted as part of the investigation around the *Lava Jato* (Operation Car Wash) scandal.⁴ This can be interpreted in two ways, either Neves originally tried and failed to avoid investigation, or the fact that he was investigated anyway suggests that improving electoral performance was the original goal because party switching does not

³For details, see <https://oglobo.globo.com/rio/bairros/rodrigo-neves-decide-deixar-pt-pdt-pmdb-saopossiveis-destinos-18915753> and <http://g1.globo.com/rio-de-janeiro/eleicoes/2016/noticia/2016/10/rodrigoneves-do-pv-e-reeleito-prefeito-de-niteroi-rj.html> (in Portuguese).

⁴See <https://g1.globo.com/rj/rio-de-janeiro/noticia/2018/12/10/forca-tarefa-no-rj-faz-operacao-para-prender-rodrigo-neves-por-desvio-de-dinheiro.ghtml> for details (in Portuguese).

protect politicians from legal consequences.

3 The Effect of Exposure to Nearby Corruption

To overcome the difficulties of using the political party as the connection, I focus on exposure to information about nearby corruption. I argue that politicians react to nearby corruption in anticipation of electoral sanctions. Why would politicians expect their constituencies to hold them accountable for corruption exposed in other places? The broader literature on electoral accountability suggests that voters hold politicians accountable for events that are outside their control (Achen and Bartels 2016; Gasper and Reeves 2011; Healy and Malhotra 2009, 2010, 2013). Findings in the domain of performance-based voting in Latin America also point in this direction. Voters hold local governments accountable for the national economic performance (Remmer and Gélinau 2003), and sanction elected officials for the performance of their staff members (Winters and Weitz-Shapiro 2016). While this line of work cannot produce a definitive judgment on voter rationality (Gailmard and Patty 2018), it does imply that voters rely on informational shortcuts to infer incumbent performance.

This suggests that politicians would expect voters hearing about nearby corruption to update their priors about the likelihood of corruption in their own locality and pay more attention to their own incumbent's performance, yet it does not guarantee that voters will hold incumbents accountable for nearby corruption. Public opinion data from Slovakia suggests that anti-corruption voting is only possible when personal experience or sociotropic perceptions make the issue salient in voters' minds (Klašnja, Tucker, and Deegan-Krause 2016). Exposure to nearby corruption may serve a similar purpose by priming voters about their own incumbent's corruption record. However, nearby corruption may also contribute to the perception that corruption is widespread. Previous work using survey data and focus groups in Brazil suggests that the perception of corruption being pervasive leads voters to believe that all politicians are implicated with it, which in turn prevents them from identifying credible alternatives to

replace corrupt politicians and makes them less likely to sanction corruption (Pavão 2018). A survey experiment in Spain supports this argument by showing how voters only sanction corruption when a clean alternative is available (Agerberg 2020). However, survey experiments in Argentina, Chile, and Uruguay suggest that perceptions of widespread corruption do not mitigate voters' intention to sanction it (Klašnja, Lupu, and Tucker 2020). For the purposes of this paper, I assume that nearby corruption, at least in average, leads politicians to believe that voters in their constituency are more likely to hold them accountable.

If incumbents expect accountability for nearby corruption, then they should update their behavior in office to counter potential electoral sanctions. While incumbents revealed as corrupt can only achieve this by improving their performance in other areas, for example, through better economic performance (Fernández-Vázquez, Barberá, and Rivero 2016; Konstantinidis and Xezonakis 2013; Muñoz, Anduiza, and Gallego 2016; Pereira and Melo 2015), incumbents exposed to nearby corruption may resort to party switching as a more cost-effective alternative. At the federal level in Brazil, legislators switch parties to further their policy and career goals (Desposato 2006). While mayoral candidates must run under a party brand, weak parties and poor accountability at the local level combine to produce anti-incumbent party bias among voters (Klašnja and Titunik 2017), which in turn creates incentives for incumbent mayors to switch parties in search for more resources to secure reelection (Novaes 2017). Therefore, incumbent mayors who experience higher scrutiny from voters as a result of exposure to nearby corruption have higher incentives to switch parties, as opposed to devoting their own resources, to secure reelection.

Under what circumstances would politicians react to nearby corruption? I argue that party switching is not a viable strategy among incumbents that are already being investigate for corruption, since allegations or ongoing investigations will not disappear just because the incumbent switched parties, and as previous research shows (Asquer, Golden, and Hamel 2019), party organizations avoid association with corrupt politicians to protect their brand.

In other words, I expect exposure to nearby corruption to have an effect only among those mayors who are not exposed as corrupt themselves.

4 Research Design

4.1 Background and Data

Between 2003 and 2015, the Brazilian government implemented an anti-corruption program through the *Controladoria Geral da União* (CGU, the country's supreme audit institution). The program randomly selected municipalities with less than 500 thousand inhabitants to audit their use of federal funds.⁵ The auditors' task is to identify irregularities in the implementation of public services and welfare programs. The audits cover a varying range of budget areas over time, focusing on program implementation in education, health, welfare, and public works.⁶

After inspection, the CGU reports the findings from each audited municipality to authorities and the general public. Reports include a detailed account of the findings and monetary amounts involved.⁷ In its duration, the program organized 40 lotteries, encompassing 2,187 audits across 1,918 municipalities. Previous research highlights the effectiveness of this program in helping voters hold politicians accountable. Exposing corruption in the context of the CGU audit program led voters to sanction corrupt incumbents (Ferraz and Finan 2008) and to a reduction in local tax revenue (Timmons and Garfias 2015). Both findings reflect the program's effect at its early stage. Timmons and Garfias (2015) remark how the effects on local tax revenue are short-lived. Moreover, recent work finds no evidence for electoral

⁵Municipalities with less than 500 thousand inhabitants comprise about 92% of the 5,570 municipalities in Brazil.

⁶After 2015, the CGU was incorporated into the transparency ministry and the program changed to include both random and non-random audits.

⁷Reports are available from <https://auditoria.cgu.gov.br/>. For an example of the type of information that becomes public, see <https://www.gov.br/cgu/pt-br/assuntos/noticias/2008/01/cgu-encontra-muitas-irregularidades-na-23a-edicao-do-programa-de-sorteios> (in Portuguese).

sanctions beyond the 2004 local election (Rundlett 2018).⁸

Starting with the 20th lottery in 2006, the CGU included explicit corruption categories in the reports, classifying each infraction as mismanagement, moderate infraction, or severe infraction.⁹ Following previous research using similar data (Avis, Ferraz, and Finan 2018), I code corruption as the sum of the number of moderate and severe infractions, divided by the number of service orders. Service order is the term used by the CGU to identify different municipality budget items associated with federal transfers (e.g. a conditional cash transfer program is a service order). For each municipality selected for auditing, the CGU chooses a random sample of service orders in the last three or four years.

The motivation behind this coding decision is twofold. First, as Avis et al (2018) argue, moderate and severe infractions are hard to distinguish from each other in intensity, especially since the effects of exposing corruption through these audit reports depend on the presence of local media (Ferraz and Finan 2008). Second, the coverage of the audit reports, both in terms of number and types of service orders, varies over time and across municipalities. Dividing the number infractions by the number of service orders makes audits comparable over time.

The audit reports before the 20th lottery do not include corruption categories. To reproduce the CGU’s coding on this subset of the data, I leverage text data extracted from the original audit report documents. Following a bag-of-words approach, I train a random forest on the labeled cases, using word frequencies as predictors, to predict the corruption variable in unlabeled cases. Section A in the appendix outlines this protocol in more detail and reports its predictive performance. The algorithm performs well for most cases, but it tends to underestimate corruption among outliers with a large number of infractions. This implies that models including data from the 2004 election (where most of the machine-coded categories

⁸Table A1 of the appendix replicates the findings from Rundlett (2018) with the data from this paper, showing a similar trend.

⁹In Portuguese: *falha formal*, *falha média*, and *falha grave*.

are) will underestimate the effect on the outcomes of interest. Table B6 in the appendix disaggregates results by election year and shows that findings do not depend on machine-coded corruption.

4.2 Outcome Variables

I construct the outcome variables using data from the Brazilian electoral court (*Tribunal Superior Eleitoral*, TSE).¹⁰ The main outcome is a binary indicator of whether the incumbent mayors seeks reelection under a different party. In additional analyses, I also focus on a binary indicator denoting whether the incumbent mayor is reelected.

I analyze the mayoral elections in 2004, 2008, 2012, and 2016, since these are the years that overlap with the CGU audit program. Mayors in Brazil can only serve for up to two consecutive terms, so I focus on municipalities where the incumbent mayor is not term-limited.

Table 1 shows the cross-tabulations of the aforementioned variables in this sample. In the period under study, about 60% of the mayors eligible for reelection do not seek reelection. About 13% of the total seek reelection under a different party, which corresponds to roughly 32% (2116/6539) of those seeking reelection. Roughly 28% (1258/4423) of the mayors who seek reelection without switching parties win the election, while 32% (680/2116) of those who seek reelection under a different party win. This suggests that party mayors seeking reelection under a different party tend to do so to improve their electoral chances.

4.3 Explanatory Variables

4.3.1 Defining nearby

The main explanatory variable is the number of nearby corruption infractions, which requires an operationalization of “nearby.” The most parsimonious model considers a municipality

¹⁰These are available from the TSE website: <http://www.tse.jus.br/>. An API alternative is also available from the *Centro de Política e Economia do Setor Público* (CEPESP) at *Fundação Getúlio Vargas* (FGV): <http://cepespdata.io/>.

Seeks reelection	Switches party	Wins reelection	N	%
No	No	No	9761	59.88
Yes	No	No	3165	19.42
Yes	No	Yes	1258	7.72
Yes	Yes	No	1436	8.81
Yes	Yes	Yes	680	4.17

Table 1: Distribution of mayors eligible for reelection that seek reelection, switch party, and win reelection

as exposed to information about nearby corruption if it shares borders with at least one audited municipality. That decision excludes municipalities that do not share a border with an audited municipality, but still are close to one. I could expand the definition of nearby to include more municipalities, but without a standard to determine the appropriate range I would not know where to stop.

To overcome this difficulty, I approach the operationalization of nearby as a model selection problem in supervised learning (see Diaz 2021 for details). The task is to identify an upper bound within which information about nearby corruption has an effect on party switching rates. I count the number of infractions per audited neighbor using increases contiguity order upper bounds. The most parsimonious operationalization counts corruption among those neighbors with which a municipality shares a border (first order), the second order includes infractions among first order neighbors and the neighbors or the neighbors, and so on up to the tenth order of contiguity.¹¹

I choose to count nearby infractions per audited neighbor up to the tenth order of contiguity as a reasonable upper bound for spillovers. Figure C1 in the appendix shows the distribution of neighbors and audited neighbors by contiguity order. The average number of neighbors at the first order of contiguity is 5.8, out of which an average of 1.4 are audited. At the tenth level of contiguity, the average number of neighbors is about 93.2 and the average number of audited neighbors is 8.5. Figure 1 shows the distribution of nearby corruption under the

¹¹I create each of these operationalizations using queen contiguity, which implies municipalities are neighbors if they share a border in any direction.

different operationalizations of nearby.

Each one of these operationalizations implies a different OLS regression model of nearby corruption on party switching, also including an interaction with a municipality’s own audit status and election-year fixed effects to account for time variance in the outcome. I select among models by computing their root mean squared error (RMSE) via 10-fold cross validation. Table B1 in the appendix summarizes the result of this procedure. The model that minimizes RMSE is a plausible candidate for an appropriate operationalization of nearby. A standard practice to in supervised learning to avoid overfitting is to choose the most parsimonious model with an RMSE within one standard deviation from the minimum (Hastie, Tibshirani, and Friedman 2009). In this application, the model that minimizes RMSE counts nearby corruption up to fifth contiguity order, and the most parsimonious model with RMSE within one standard deviation from the minimum counts nearby corruption up to the second. I consider all models within this range as plausible definitions of nearby. I interpret results based on this range, yet for transparency I report the main results using all the pre-specified operationalizations of nearby.

4.3.2 Audit status

I argue that exposure to nearby corruption does not affect party switching among mayors in municipalities where voters have access to credible information about their own incumbent’s corruption record. To capture this heterogeneous effect, I use a binary indicator of whether a municipality had an audit report released before the election. In the sample of 16,917 municipality-election years with at least one audited neighbor within ten neighbors apart, 1,708 (about 10%) are audited themselves.

Despite the difference in proportions, since audits are randomly assigned within audit waves, audited and non-audited municipalities are not different from each other in expectation.¹²

Table C1 in the appendix compares non-audited and audited municipalities along selected

¹²Moreover, once audited, a municipality cannot be audited within the next year.

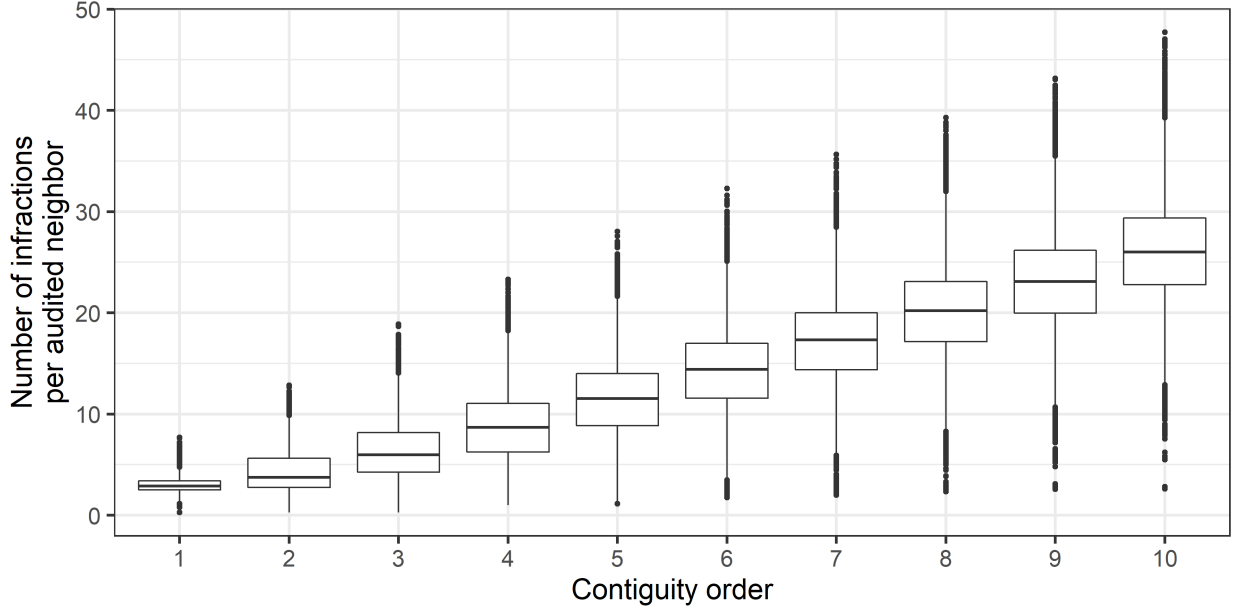


Figure 1: Distribution of nearby corruption infractions at different orders of contiguity

covariates.¹³ In short, audited and non-audited municipalities are balanced in most of the observed covariates, and in the cases where they are not, the differences are negligible.

5 Results

5.1 Main results

Figure 2 shows the effect of one unit increase in nearby corruption on seeking reelection under a different party in the subset of municipalities where the mayor is not term-limited. Each value in the horizontal axis denotes a separate OLS regression model, including an interaction with a municipality’s own audit status, election year fixed effects, and clustered standard errors by election year. Increasing values in the horizontal axis indicate a more inclusive

¹³These include the total number of neighbors, the number of audited neighbors, the number of infractions per audited neighbor, population, proportion female population, proportion living in rural areas, local HDI, local GDP per capita, proportion of illiterate population, proportion with college degree, the incumbent party’s previous vote margin in mayoral elections, the proportion of PT and PSDB incumbents, the proportion of municipalities in the states of Minas Gerais and São Paulo, the proportion of municipalities in the Northeast region, and the proportion of municipalities across election years.

definition of nearby, based on cumulative contiguity order. For example, when the cumulative contiguity order equals 1, the model considers a municipality as exposed to corruption if they share borders with at least one audited neighbor. At a value of 10, the model considers a municipality as exposed to corruption if they have at least one audited neighbor within 10 degrees of separation. The shaded region indicates the optimal operationalizations of nearby based on the model selection process described in the previous section.¹⁴

Figure 2 illustrates the importance of avoiding a narrow definition of nearby. Focusing only on immediate neighbors suggests a positive effect of nearby corruption on party switching, albeit indistinguishable from zero. A narrow definition also leads to a wide confidence interval in the subset of audited municipalities. Within the range of plausible upper bounds, the effect of nearby corruption is different from zero among non-audited municipalities, but indistinguishable from zero among audited municipalities. In average, and using the most parsimonious definition of nearby within the optimal range, a one standard deviation increase in nearby corruption increases the party switching rate by two percent.¹⁵

These results suggest that nearby corruption encourages incumbent mayors eligible for reelection to run with a different party, but only in the subset of municipalities that are not audited themselves. This aligns with the argument that politicians react to nearby corruption only in the cases when they expect voters to hold them accountable for nearby corruption. A critique to this interpretation is that, while municipalities are randomly selected for auditing, observed corruption infractions are not random, which opens the door for omitted variable bias. Rather than addressing every possible unobserved confounder individually, I choose to address the omitted variable bias critique in general (Cinelli and Hazlett 2020). Figure C2 in the appendix shows that, given the current model specification, an unobserved confounder would need to explain more than 50% of the partial R^2 in nearby corruption or party switching

¹⁴Section B in the appendix shows tables with the numerical results underlying the results in this paper. Table C2 shows that results are similar with logistic regression.

¹⁵As a benchmark, the validation exercise in table A1 of the appendix suggests that one standard deviation increase in corruption in 2004 (the only year that exhibits a non-zero effect) decreases incumbent party vote shares by about 2.7 percent.

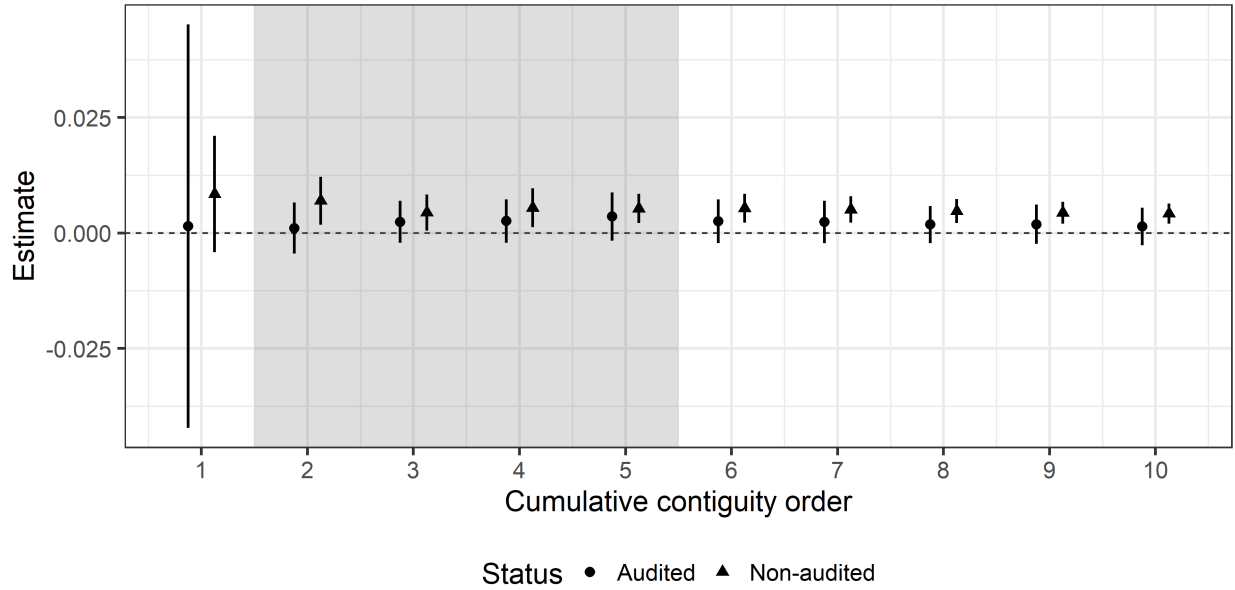


Figure 2: Effect of nearby corruption on incumbent mayor party switching

Note: Based on OLS regression with election year fixed effects and clustered standard errors by election year. The shaded region denotes the optimal range suggested by cross-validation. Vertical lines denote 95 percent confidence intervals.

to turn the observed estimate in any of the optimal operationalizations of nearby into zero.

In the next sub-section, I explore the merit of alternative interpretations of the findings and a second order implication of the electoral accountability mechanism.

5.2 Additional results

5.2.1 Effects on seeking and winning reelection

An alternative explanation for Figure 2 is that exposure to information about nearby corruption creates a favorable public opinion environment for incumbents, especially when they are not audited themselves, which is the opposite of the argument in this paper and implies that incumbents either seek or win reelection more often. If this is true, nearby corruption may affect party switching by construction, since the outcome is measured as whether the incumbent seeks reelection under a different party.

Figure 3 explores this possibility by estimating the effect of nearby corruption in interaction

with audit status on whether the incumbent mayors seeks and wins reelection as separate outcomes. Within the range suggested by cross-validation, the effect of nearby corruption is indistinguishable from zero regardless of audit status. I interpret this as evidence against the argument that nearby corruption promotes incumbents' reelection chances.

This finding also lends support to the interpretation that mayors switch parties more often as nearby corruption increases in an attempt to avoid the consequences of increased scrutiny on their own performance. If the relationship between nearby corruption and party switching responded to strategic behavior from incumbents seeking to take advantage of the misfortune of others by securing a better platform for reelection, then one would also observe a positive effect of nearby corruption on how often incumbents win elections.

5.2.2 Exposure to same-party nearby corruption

Another alternative interpretation of the main results is that politicians react to nearby corruption not in anticipation of electoral punishment, but rather to avoid top-down sanctions. This interpretation has grounds on previous research suggesting that politicians are more reactive to the prospect of police crackdowns or a reduction in federal transfers, than to voter sanctioning (Avis, Ferraz, and Finan 2018; Brollo 2011). To address this possibility, I focus on non-audited municipalities and analyze whether the proportion of audited neighbors from the same party as the incumbent moderates the effect on party switching.

In the 2016 local election, 31 different parties secured at least one mayoral seat. The high number of parties, along with their relative weakness at the local level, suggests that voters focus primarily on individual candidates rather than parties when it comes to local elections (Klašnja and Titunik 2017; Novaes 2017).¹⁶ Since political parties convey little information to voters in local elections, if incumbents are more likely to react to nearby corruption when exposed to same-party corruption, then the top-down sanctions mechanism

¹⁶This contrasts with the general pattern at the national level in the period under study, which is characterized by patterns of positive and negative partisanship towards the Worker's Party (D. Samuels and Zucco 2013; D. J. Samuels and Zucco 2018).

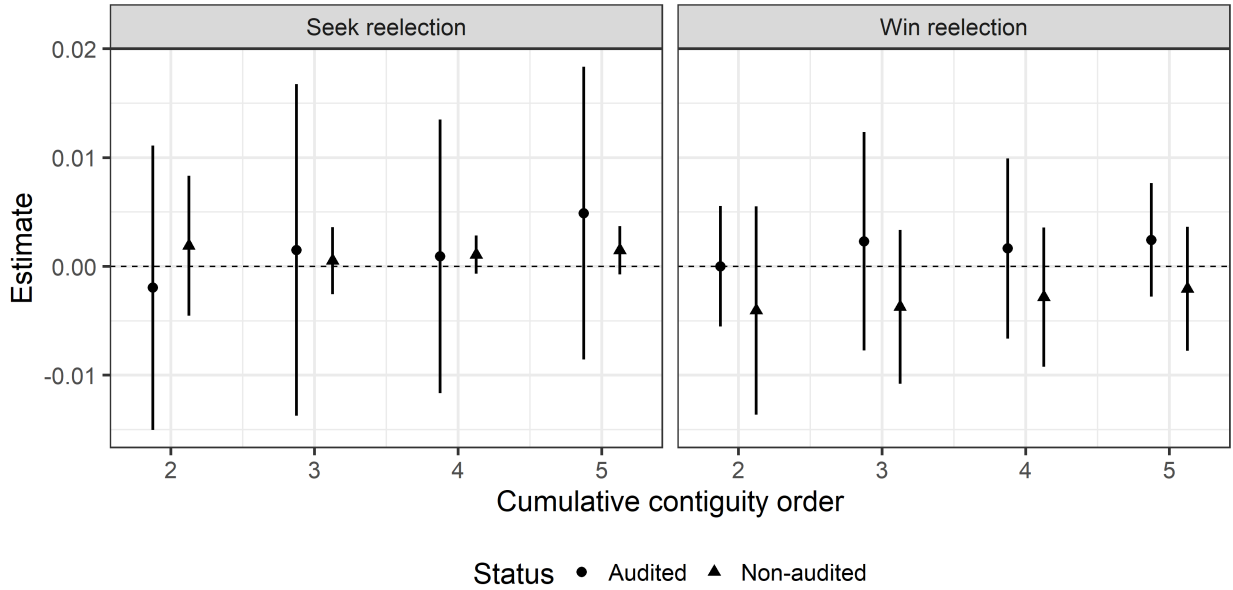


Figure 3: Effect of nearby corruption on seeking and winning reelection

Note: Based on OLS regression with election year fixed effects and clustered standard errors by election year. The figure includes only the operationalizations of nearby suggested by cross-validation. Vertical lines denote 95 percent confidence intervals.

has more merit than the electoral accountability mechanism. Conversely, if the primary mechanism is politicians anticipating voter sanctions, then effects should not vary with the party affiliation of audited mayors nearby, especially because most candidates are supported by coalitions of parties with considerable variation across municipalities. If the top-down sanctions mechanism holds, and considering that a municipality can be exposed to different proportions of audited neighbors from the same party as the incumbent mayor, an increasing proportion of same-party audited neighbors should lead to a larger effect of exposure to nearby corruption on party switching.

I evaluate this implication by zooming in on non-audited municipalities. I replicate the models reported in Figure 2, introducing an interaction term for the proportion of the nearby audited municipalities with mayors that share party with the incumbent. Figure 4 reports the simulated average marginal effects of nearby corruption at different proportions of same-party audited mayors in the neighborhood.

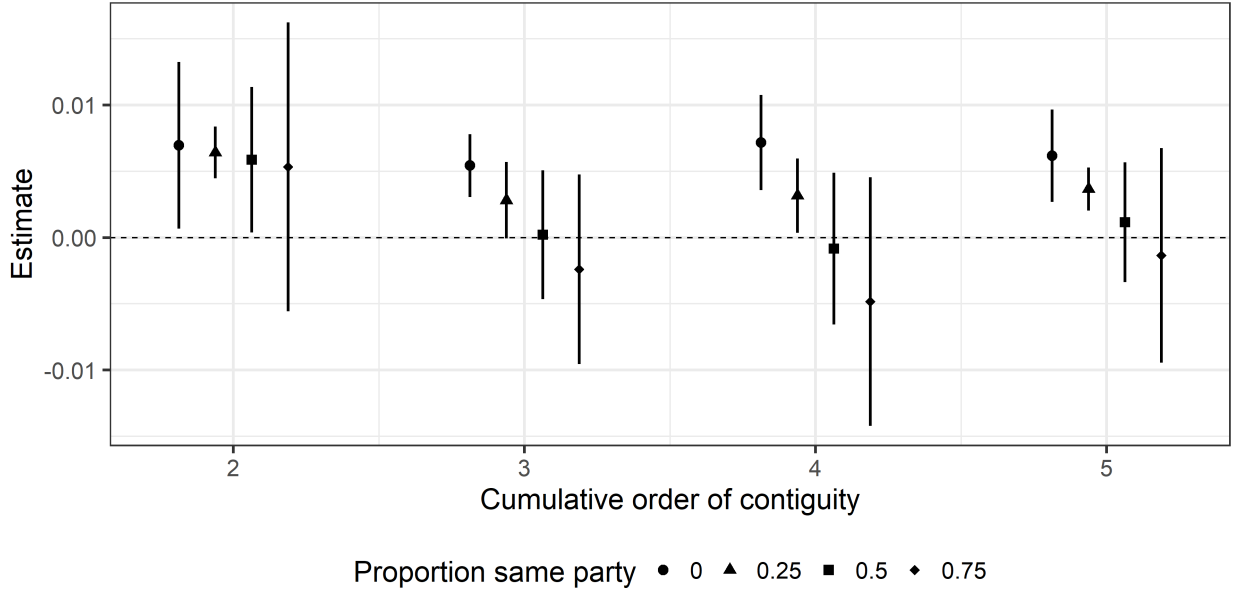


Figure 4: Simulated marginal effect of nearby corruption on incumbent mayor party switching conditional on different proportions of same-party audited neighbors

Note: Based on OLS regression interacting nearby corruption with the proportion of same-party audited neighbors in the sample of non-audited municipalities. Estimation includes election year fixed effects and clustered standard errors by election year. The figure only includes the optimal range suggested by cross-validation. Vertical lines denote 95 percent confidence intervals.

The point estimates at the optimal range suggested by cross-validation suggest, if anything, increasing the proportion of same-party audited neighbors either reduces the marginal effect of nearby corruption or does not change it. Moreover, Table B5 in the appendix shows that the interaction effect between the two variables is indistinguishable from zero, meaning that the slope of the effect of nearby corruption does not change with the proportion of same-party audited neighbors. I interpret this as evidence against the alternative explanation that the observed main result arises from incumbents’ attempt to avoid top-down sanctions.

5.2.3 The consequences of party switching

A sufficient but not necessary condition that follows from the electoral sanctioning mechanism is that incumbent mayors who do not switch parties experience worse electoral fates as nearby corruption increases. This condition is not necessary because mayors not switching parties

may be in a position where party switching would not improve their reelection chances, either because they are too weak or secure enough to not need it. Given the coding of the main outcome variable, mayors who switch parties always run for reelection. However, those who do not switch may be less (or more) likely to seek reelection as nearby corruption increases. Figures 2 and 3 suggest that nearby corruption does not affect the tendency to seek reelection among those who do not switch parties. Absent self-selection, one should expect voters to sanction incumbents that fail to update their behavior in office for nearby corruption.

Figure 5 shows the effect of nearby corruption on whether the incumbent mayor wins the election in the subset of non-audited municipalities, further dividing the data on whether the mayor runs with a different party. In the subset of mayors who switch parties, nearby corruption does not affect their reelection chances, which implies that party switching is a viable strategy to avoid electoral sanctions. However, those who do not switch parties lose elections more often as nearby corruption increases, this estimate is indistinguishable from zero across the optimal ranges suggested by cross validation, but the associated p-value is around 0.06, which is close to the usual rule of thumb used to determine statistical significance. In short, the figure suggests that mayors exposed who do not switch parties experience worse electoral fates as nearby corruption increases, which reinforces the argument for the electoral accountability mechanism.

This finding can only be interpreted descriptively since conditioning on whether the mayor seeks reelection under a different party can induce post-treatment bias. Moreover, previous work suggests that incumbents who switch parties are more likely to be reelection-oriented, as opposed to policy oriented (Peterlevitz 2019), which implies that those who switch parties are not comparable to those who choose not to. Still, nearby corruption having a negative effect on reelection among those who do not switch parties, who are more likely to be policy-oriented, underscores the negative electoral consequences of nearby corruption for those who are unable or unwilling to adjust their behavior in office.

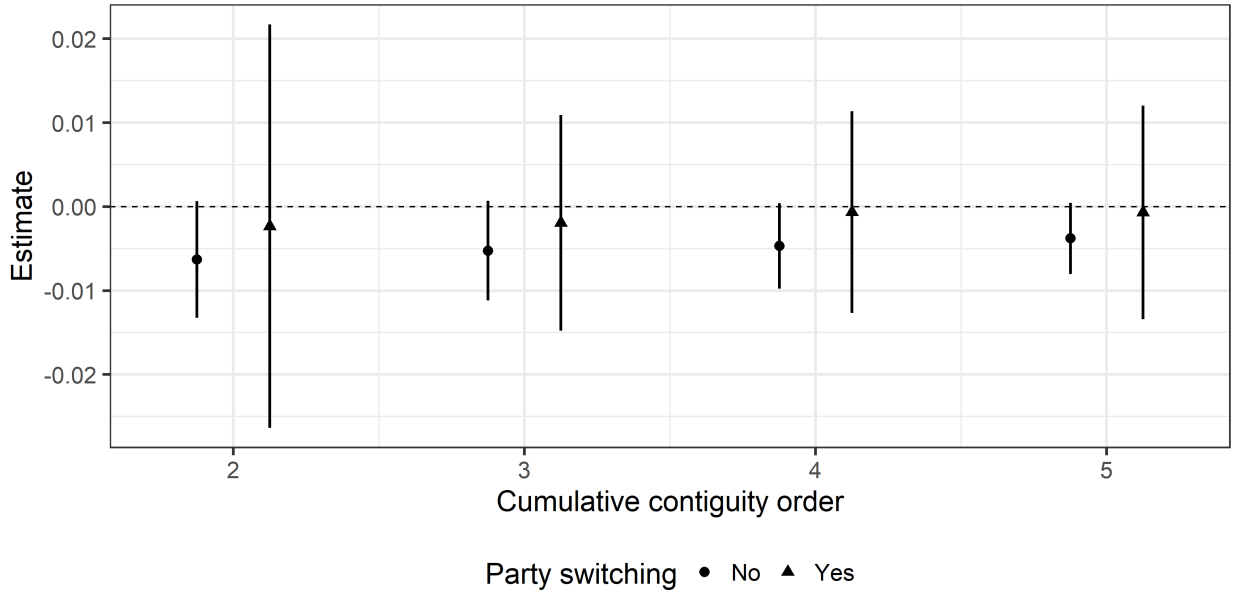


Figure 5: Effect of nearby corruption on whether the incumbent wins reelection in interaction with party switching

Note: Based on OLS regression with election year fixed effects and clustered standard errors by election year. The figure includes only the operationalizations of nearby suggested by cross-validation. Vertical lines denote 95 percent confidence intervals.

6 Conclusion

This paper argues that politicians exposed to nearby corruption react to it by updating candidate selection and entry strategies. Moreover, they do so in a pattern that suggests an attempt to avoid electoral sanctions. I show evidence in favor of this argument using data from a long running anti-corruption program in Brazil. Unlike previous work showing how politicians avoid association with corruption (Asquer, Golden, and Hamel 2019; Daniele, Galletta, and Geys 2020), this paper disentangles electoral accountability from top-down sanctioning mechanisms. In this regard, it strengthens the case for an alternative explanation to the limited evidence in favor of voter sanctions in the corruption literature. While current explanations emphasize how surveys overestimate voters' ability to sanction and suggest more realistic vignettes (e.g. Boas, Hidalgo, and Melo 2018; Incerti 2020), this paper suggests taking into account politicians strategic behavior in reaction to corruption. While this idea is already implicit in the research that explores the circumstances under which voters

choose to forgive corruption, bringing politicians' reaction to the forefront may increase our understanding of the micro-foundations underlying the electoral consequences of corruption.

The main implication for the study of the electoral consequences of corruption is that interventions aimed at reducing the informational gap between voters and politicians' performance in office may bring unintended consequences. Whether these consequences are positive or negative is a matter for future debate. On one hand, the results in this paper suggests that information campaigns to fight corruption create incentives for politicians to pay attention to voter behavior, or at least their belief of what voter behavior will be. On the other hand, they also create incentives for politicians to cloud voters' ability to attribute responsibility.

In emphasizing the unintended consequences of exposing nearby corruption, this paper also highlights how politicians respond strategically to anti-corruption efforts (Fisman and Golden 2017). In that sense, it connects the literature on corruption with accounts of how increasing election monitoring may displace, rather than deter, electoral fraud and violence Ichino and Schündeln (2012), which suggests that the mechanisms in place in this paper may extend to other countries where voters' adverse selection problem is pronounced. While the results from Brazil may not replicate directly in other settings, the underlying logic may apply to other contexts facing challenges to electoral accountability.

Methodologically, this paper makes two contributions. First, it extends previous research on the effects of the CGU anti-corruption program by creating a comprehensive data set that puts 13 years of publicly released audit reports under the same coding scheme, avoiding biases in human coding and reproducing the official supreme audit institution's criteria.

Second, this paper illustrates the importance of taking a modular approach to the study of spillover effects. Recent advances in methodology allow researchers to make valid inferences while relaxing the non-interference assumption, yet they still require the researcher to make modeling assumptions that often do not follow from theory. By adopting a model selection approach, this paper shows an example of how supervised learning can help researchers to

study spillovers in applications where the underlying pathway that connects observations remains unobserved.

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