

FUNDAÇÃO GETULIO VARGAS
ESCOLA DE ECONOMIA DE SÃO PAULO

JESSÉ BARBOSA PIZZINO

**Does Electoral Competition Affect Political Selection, Campaign Funds
and Performance? Evidence from Brazilian Municipal Elections**

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2020

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Dissertação apresentada à Escola de Economia de São Paulo da Fundação Getúlio Vargas como requisito para obtenção do título de Mestre em Economia de Empresas.

Campo de Conhecimento:
Economia Política

Orientador: Prof. Dr. Enlison Mattos
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ABSTRACT

This paper analyzes the causal impact of electoral competition on political selection, campaign funds, and performance in office. We use, for investigation, the 2012 Brazilian mayoral elections. To overcome potential endogeneity concerns and identify the causal effect, we adopt the empirical strategy proposed by [Shaukat \(2019\)](#), which adapts the traditional shift-share instrument to the electoral competition context. This approach explores aggregate changes in party popularity over time (at the national and state levels) to capture exogenous variation in electoral competition at the municipal level in Brazil. As main results, first, we find evidence that electoral competition favors the selection and election of older politicians, the election of women, of less wealthy candidates, and without any type of electoral incumbency (i.e., politicians who do not occupy, at the time of candidacy, an elective office). We consider these results a beneficial effect since electoral competition increases the electoral success of politician profiles underrepresented in the Brazilian political scenario. Second, we find robust evidence that electoral competition increases campaign financing and expenditures. We explain these results using the particular relevance of some channels, and we interpret them as a strategic allocation of resources by political agents. Finally, we find evidence that electoral competition increases the performance of the mayor in office, as measured by municipal performance indicators in terms of investment, education, personnel expenditures, and liquidity. Overall, our results highlight the relevance of electoral incentives in the behavior of political agents in Brazil.

Key-words: Electoral competition, political selection, campaign funds, performance in office

RESUMO

Este artigo analisa o impacto causal da competição eleitoral em seleção política, fundos de campanha e desempenho durante o mandato. Utilizamos, para investigação, as eleições brasileiras para prefeitos em 2012. Com o propósito de superar potenciais preocupações com endogeneidade e identificar o efeito causal, adotamos a estratégia empírica proposta por [Shaukat \(2019\)](#), a qual adapta o tradicional instrumento *shift-share* ao contexto da competição eleitoral. Este método explora mudanças agregadas na popularidade dos partidos ao longo do tempo (nos níveis nacional e estadual) para capturar variações exógenas na competição eleitoral a nível municipal no Brasil. Como resultados principais, primeiro, encontramos evidência de que a competição eleitoral favorece a seleção e a eleição de políticos mais velhos, a eleição de mulheres, de candidatos menos ricos, e sem qualquer tipo de incumbência eleitoral (i.e., políticos que não ocupam, no momento da candidatura, um cargo eletivo). Consideramos esses resultados como um efeito benéfico uma vez que a competição eleitoral aumenta o sucesso eleitoral de políticos com perfis sub-representados no cenário político brasileiro. Segundo, encontramos evidência robusta de que a competição eleitoral aumenta o financiamento e as despesas de campanha. Explicamos esses resultados utilizando a relevância particular de alguns canais e os interpretamos como uma alocação estratégica de recursos por agentes políticos. Finalmente, encontramos evidência de que a competição eleitoral aumenta o desempenho do prefeito durante seu mandato. O efeito é constatado quando o desempenho é medido por indicadores municipais em termos de investimento, educação, gastos com pessoal e liquidez. De forma geral, nossos resultados ressaltam a relevância dos incentivos eleitorais no comportamento dos agentes políticos no Brasil.

Palavras-chave: Competição eleitoral, seleção política, fundos de campanha, desempenho durante o mandato

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1 Introduction

What is the impact of a higher electoral competition on political outcomes? There is a vast literature studying this question using theoretical and empirical approaches, and analyzing particular countries or institutional contexts. For example, [Stigler \(1972\)](#) attributes a positive impact of electoral competition on voter welfare. Stigler's seminal paper argues that competition in political markets performs a similar role to competition in competitive economic markets. In other words, competition would select better producers (better political selection) and would increase the quality of the products (improving politicians' performance).

More recent literature, however, suggests that competition in political markets may not lead to better outcomes as in competitive economic markets. For example, [Camargo and Degan \(2019\)](#) show that, in a political career concerns framework, the relationship between political competition and voter welfare is not clear due to imperfections in political markets related to contractual incompleteness. They argue that compensations in these markets are usually not directly tied to performance and show that electoral competition increases voter welfare if voters have a sufficient number of mechanisms allowing them to tie rewards to politicians' performance.

The study of the impacts of electoral competition is, therefore, a fruitful empirical research field since there is no unambiguous direction of the effect on variables that determine vote welfare. As the empirical literature in this topic indicates, discussed in details in [Section 2](#), the impact of electoral competition varies according to a set of local conditions.

The purpose of this work is to estimate the causal impact of electoral competition, at the municipal level in Brazil, on political selection, campaign funds, and performance in office. We focus our analysis on the 2012 mayoral elections. Our estimates capture both the strategic behavior of political agents *before* the election (political selection and campaign funds) and *after* the election (performance in office) in response to a higher degree of electoral competition. In other words, our estimates explore how political agents react to electoral competition during the campaign period, when choosing the allocation of candidates and resources across municipalities to maximize electoral success, and after the election, when changing the incumbent performance during his term.

The estimation of the effects of electoral competition without an appropriate empirical approach could lead to biased estimates since the level of electoral competition is possibly endogenous to outcomes of campaign funds, political selection, and performance in office. For example, when we study the effect of electoral competition on campaign funds or political

selection *prior* to an election, possibly there is endogeneity due to reverse causality. In other words, the political selection (e.g., politicians profile), as well as politician and party actions (e.g., campaign funds decisions), affect the level of competition in an election. One possible intuition is that parties have greater incentive to allocate more qualified candidates and more resources to municipalities with higher *expected* competition since these are the cases with greater electoral returns. In less competitive municipalities, otherwise, voters likely vote based on party loyalty, which ensures the victory with more probability or makes the defeat inevitable even with huge party efforts (Shaukat, 2019). As a consequence, these allocation choices of politicians and resources affect the *realized* level of competition. Similarly, if we are interested in the effect of electoral competition on politicians' performance *after* the election, possibly there is endogeneity due to omitted variable bias since there could exist some unobserved municipal characteristic in the error term correlated with electoral competition. For example, in each municipality, the population can exert varying levels of informal political participation, e.g., inspecting and requiring right politicians' actions, which affects the political competition in the local elections and the provision of municipal public goods.

Recognizing that electoral competition is probably endogenous to the outcomes of interest, we adopt the empirical strategy proposed by Shaukat (2019), which adapts the traditional shift-share instrument to the electoral competition context. The core idea behind this strategy is to explore aggregate changes in party popularity over time (at the national and state levels) to capture exogenous variation in electoral competition at the municipal level in Brazil. These shifts in party popularity affect electoral competition non-monotonically across municipalities, depending on local initial party preferences. In other words, the same shift increases or decreases electoral competition depending on local initial party preferences. For example, suppose that a party suffered a positive popularity shift at the state level. Electoral competition increases in municipalities in which this party is opposition, but decreases in municipalities in which this party is the incumbent. As we will discuss in detail, this non-monotonicity of electoral competition to aggregate shocks is a necessary condition for identification in our setting.

We present three sets of results. First, we find evidence that electoral competition in mayoral elections in Brazil intensifies the selection and election of older politicians, the election of women, of less wealthy candidates, and without any type of current electoral incumbency (i.e., politicians who do not occupy, at the time of candidacy, an elective office). We interpret these finds as a beneficial effect of electoral competition since there is a favoring for the election of politician profiles that are typically underrepresented in Brazilian political scenario (*outsiders*), which eventually could implement better public policies.¹

¹ For example, Brollo and Troiano (2016) show the beneficial effects in the election of mayoral women in Brazil.

Second, we find robust evidence that electoral competition increases campaign financing and expenditures. This result shows the importance of money in the elections and its role in increasing the probability of electoral success in more competitive races. For campaign financing of the candidates, all channels (party funds, donations, and own funds) are qualitatively relevant to explain the growth in campaign financing in response to competition, but in the case of the campaign financing of the elected candidates, the growth is driven almost exclusively by donations. For campaign expenditures, all channels (advertising expenditures and other expenditures) are qualitatively relevant to explain the increase for candidates and elected candidates. We interpret the particular relevance of each channel as a strategic allocation of resources. Political agents choose the allocation of resources more effective to enhance the electoral success chances in reaction to electoral competition.

Third, we find evidence that electoral competition increases the performance of the mayor in office, as measured by municipal indicators in investment, education, personnel expenditures, and liquidity. We choose as outcomes for performance some municipal indicators produced by FIRJAN (Industry Federation of the State of Rio de Janeiro), which are the consolidation of municipal variables that are under direct influence (or control) of mayors and municipal public administration. Our results suggest that electoral competition in Brazilian municipalities increases voter welfare since it improves public administration.

This work contributes to the literature that investigates the empirical impacts of electoral competition. The two other papers on the municipal level in Brazil ([Arvate, 2013](#); [Chamon et al., 2019](#)) analyze the Brazilian case studying the effect of electoral competition on performance outcomes exclusively. Common in this literature, these papers use institutional rules to explore exogenous variation in electoral competition and estimate the causal effect. To the Brazilian municipal elections context, our paper is the first that generates evidence on the impacts of electoral competition on political selection and campaign funds outcomes. Additionally, we produce more recent and embracing evidence about the effects of electoral competition on performance outcomes. Moreover, our paper exploits an empirical strategy that uses aggregate variation in party popularity to deal with potential endogeneity issues. This is a difference in our work relative to the conventional approach used in the literature since we exploit an empirical strategy that does not rely on the use of discontinuities in institutional rules. This enables us to use a direct measure of electoral competition (variation in party popularity across electoral cycles), rather than a combination of competition and institutional factors, to address endogeneity issues ([Shaukat, 2019](#)).

Female mayors are less likely to engage in corruption and hire fewer temporary public employees during the electoral year.

The remainder of this work is organized as follows. Section 2 presents a brief literature review of the impacts of electoral competition, Section 3 describes the data, Section 4 presents the empirical strategy used in this work, Section 5 presents the results of our estimations, and Section 6 concludes.

2 Literature Review

In this section, we present a brief literature review about the effects of electoral competition on political outcomes. The works that investigate this issue adopt both theoretical and empirical approaches. For the empirical ones, a core strategy for identification is to explore some institutional aspect or, less common, use electoral results in the previous elections or at any different geographic level. Also, as shortly discussed, a key conclusion when we analyze the literature on this topic is that the direction (positive or negative) of the effects of electoral competition on outcomes that determine voter welfare depends on a set of circumstances and local conditions. For example, in a cross-country panel data analysis, [Gottlieb and Kosec \(2019\)](#) show that the direction of the impact of political competition on the provision of public goods depends on the level of party system institutionalization and government transparency, i.e., depends on the level of institutional development of a country.

Empirical works usually adopt institutional factors, as a source of exogenous variation in electoral competition, such as changes in electoral laws, discontinuities in electoral rules, institutional features, or some relevant political event. For example, [Besley et al. \(2010\)](#) use the change in elections rules in the US brought about by the Voting Rights Act of 1965. For Italy, [Paola and Scoppa \(2011\)](#) adopt as IV a dummy variable indicating whether the previous Municipal Council survived until the end of its legislative term, and [Galasso and Nannicini \(2011\)](#) exploit exogenous changes in national political alliances caused by the judiciary scandals *Mani pulite* (1992-94). Additionally, some works for Italy explore institutional reforms, such as the change in the electoral rule system from a proportional to a majoritarian one in 1994 ([Galasso and Nannicini, 2011](#)), and the change in the regions' governance system from the parliamentary to a presidential one in 1995 ([Padovano and Ricciuti, 2009](#)). Finally, for Brazil, the works explore discontinuities in the municipal elections rules defined by the local population size, exogenous to municipalities. [Arvate \(2013\)](#) builds an IV for electoral competition in the 2000 Brazilian mayoral elections using the number of seats on the local legislative branch in the previous (1996) election, and [Chamon et al. \(2019\)](#) explore a discontinuity in the Brazilian mayoral elections rules that determines the possibility of run-off elections. In short, this kind of strategy is a core path to explore exogenous variation in electoral competition, address endogeneity concerns, and ensure the identification of the causal effect of electoral competition on political outcomes.

Similar to the approach proposed in [Shaukat \(2019\)](#) and used in our paper, other works also explore electoral results in the empirical strategy. For example, [Nyblade and Reed \(2008\)](#)

use the previous elections results to build a predicted victory margin, [Svaleryd and Vlachos \(2009\)](#) instrument competitiveness at the local level elections using national election results, and [Griffin \(2006\)](#) instrument competitiveness in the legislative elections using presidential election results.

A strand of the literature shows that electoral competition could lead to a negative effect on performance. The main reasons are the reduction of the incumbency advantage and reelection probability, and changes in the strategic behavior of parties. For example, [Banerjee et al. \(2013\)](#) show that interventions that reduce the incumbency advantage in local elections in rural India encourage the entry of less politically experienced candidates and generate worse short-run performance. [Nath \(2018\)](#) shows that electoral competition leads to worse performance of bureaucrats due to lower probability of politician reelection and the impact in bureaucrats' incentives. Finally, [Chhibber and Nooruddin \(2004\)](#) show that the two-party competition, in India's state elections, provides more public goods than the multiparty competition. This happens since, in the first case, the parties offer public goods to ensure the support of many social groups to win the election, while, in the second one, only the provision of public goods to ensure the support of smaller segments of the population is electorally necessary.²

Interestingly, some theoretical and empirical papers show that electoral competition has a non-linear ([Man, 2014](#)), or an inverted U-shaped ([Alfano et al., 2015](#); [Alfano and Baraldi, 2016](#)) relationship with economic growth, which suggests the existence of an optimal level of political competition in terms of economic performance.³ Still, other papers show a U-shaped relationship between electoral competition and innovation ([Acemoglu and Robinson, 2006](#)).

Empirical works that explore elections at the local level show some different results for each particular country. For example, electoral competition has a negative effect on municipal economic growth in South Africa ([Obikili, 2019](#)), and no significant impact on the municipal provision of public goods in Mexico ([Cleary, 2007](#)). However, most papers in the literature found that electoral competition at the local level has a positive effect on variables that determine voter welfare. Electoral competition reduces rent extraction in Swedish ([Svaleryd and Vlachos, 2009](#)) and Flemish municipalities ([Ashworth et al., 2010](#)), it reduces corruption in Greek municipal governments ([Batzilis, 2019](#)), it improves the quality of politicians in Italian municipalities ([Paola and Scoppa, 2011](#)),⁴ and it increments the municipal provision of public goods in Flanders

² This result is consistent with the findings in [Griffin \(2006\)](#). According to [Griffin \(2006\)](#), electoral competition increases the politicians' responsiveness toward electorates' preferences.

³ Nevertheless, [Besley et al. \(2010\)](#) found a positive effect of political competition on the implementation of economic growth-promoting policies in US states.

⁴ For Italy, electoral competition also has a positive impact on the quality of politicians in parliamentary elections ([Galasso and Nannicini, 2011](#)), and on regions' economic performance ([Padovano and Ricciuti, 2009](#)).

(Ashworth et al., 2010). Specifically to the Brazilian municipalities, electoral competition increases government performance outcomes relative to the supply of municipal public goods (student enrollments, teachers and free immunizations) (Arvate, 2013), and relative to the induction of more investment, less current expenditures and more construction of schools (Chamon et al., 2019). At large, these results, the reduction in political rents and the increase in the supply of public goods, are in line with some theoretical findings (Polo, 1998).

Finally, Shaukat (2019) suggests that electoral competition leads to strategic behavior by political agents *prior* to an election. According to Shaukat (2019), electoral competition in Indian state elections selects more electable politicians in terms of higher educational level, less criminal records, and higher net assets. Also, it leads to a significant reallocation of state-run resources towards more competitive constituencies, and it affects the type of party that chooses to enter an election since it increases (decreases) the proportion of parties with higher (lower) electoral chances. Despite these changes in campaign strategy, there is no evidence that electoral competition affects incumbent performance in India's constituencies.

3 Data

We use data between 2006 and 2016, which come from different national sources: TSE, CEPESP data, FIRJAN, IBGE (2010 population census), and STN (*FINBRA* dataset).

We analyze the effects of electoral competition using the 2012 Brazilian mayoral elections. We opt for not using the mayoral elections in 2016 since this is the first election with campaign spending limits, besides the ban of corporate donations to candidates and parties, which could generate a confounding effect in our estimates.⁵

We obtain the electoral dataset from TSE and CEPESP data.⁶ We use data from mayoral elections results in 2008 (a baseline year) and 2012 (our year of interest). To explore the aggregate variation in party popularity, we use data from national and state elections results in 2006 and 2010. All the data contain results at the individual/party levels and results at the respective geographic level. These data allow building the vote share for all parties that ran each of these elections.

The TSE and CEPESP data also provide information about political selection and campaign funds outcomes for the 2012 Brazilian mayoral elections. First, we compute the data relative to the characteristics of the politicians that ran for the 2012 mayoral elections. We use as outcomes for political selection the variables of age (in years), current electoral incumbency of any type (measured by a *dummy* variable that indicates if the politician occupies an elective office at the time of candidacy), net assets (measured by the declared wealth (in \ln)), education (measured by a *dummy* variable that assumes the value one if the politician has at least an undergraduate degree and zero otherwise), and male (dummy variable that assumes the value one if the politician is male and zero otherwise). Finally, we compute the data relative to the campaign funds information in natural logarithms (\ln). We classify the information about official campaign financing in categories according to the source of revenue: all funds, party funds, donations, and own funds. For official campaign expenditures, we have descriptions of spending in various categories, and we classify the information in common categories: all expenditures, advertising expenditures, and other expenditures.

We impose some sample restrictions. The Brazilian electoral rules establish the possibility of two-round elections in municipalities with a population of registered voters above 200,000. In the 2012 Brazilian municipal elections, there were 83 municipalities in

⁵ See [Avis et al. \(2017\)](#) for a complete discussion of the rule that established a cap for campaign spending for mayoral elections and its impact on political entry, selection, and political behavior.

⁶ The data are available online on [TSE \(2019\)](#) and [CEPESP \(2019\)](#), respectively.

this situation, which represented less than 1.5 percent of municipalities in Brazil. We choose to exclude these municipalities from our sample for the following reasons. First, almost all municipalities in Brazil are small and medium-sized, so we opt to estimate results that describe a representative effect of electoral competition to the Brazilian case. Second, the exclusion of the large municipalities in our study ensures that aggregate shocks in party popularity are exogenous to local conditions. In other words, we keep only municipalities that arguably cannot influence individually aggregate election results at the national and state levels. Third, we cannot discern completely if campaign funds outcomes refer exclusively to the first or the second-round election in municipalities with the possibility of second-round runoff elections, so we choose to keep only municipalities that follow a single-round election rule.

We use as measures of performance the data produced by FIRJAN (Industry Federation of the State of Rio de Janeiro)⁷ in two nationwide annual studies at the municipal level: IFGF (FIRJAN Index of Fiscal Management) and IFDM (FIRJAN Municipal Development Index).^{8,9} For each of the two indexes (IFGF and IFDM), there are some sub-indexes (dimensions) that vary in the interval 0 to 1, where the higher values represent better municipal performance in the respective dimension. For each dimension, we use the 2013-2016 annual average to represent the performance for the politician elected in the 2012 election.

The first index, the IFGF, measures the efficiency of fiscal management of Brazilian municipalities. There are four dimensions in the IFGF index: *Autonomy*, *Personnel expenditures*, *Liquidity*, and *Investments*. The dimension *Autonomy* evaluates the local capacity to generate sufficient resources to finance the structure of the municipal public administration (cost of maintaining the city council and the administrative function of the executive branch). The dimension *Personnel expenditures* evaluates the degree of rigidity of the municipal budget, that is, this dimension evaluates the commitment of budget with personnel expenditures in municipal public service. The dimension *Liquidity* evaluates the municipal capacity in fulfilling the contracted financial obligations, that is, it assesses whether the municipal management has sufficient financial resources to cover the expenses postponed to the following year.¹⁰ Finally,

⁷ In Portuguese, *Federação das Indústrias do Estado do Rio de Janeiro*.

⁸ In Portuguese, *Índice FIRJAN de Gestão Fiscal* and *Índice FIRJAN de Desenvolvimento Municipal*, respectively.

⁹ We analyzed the use of other indicators as a measure of performance at the municipal level. For example, the CNM (*Confederação Nacional dos Municípios*), an independent municipal entity in Brazil, elaborates the IRFS (*Índice de Responsabilidade Fiscal, Social e de Gestão*). The IRFS is an index with a similar structure to FIRJAN indexes, besides approaching the same qualitative municipalities issues. The use of FIRJAN indexes here is justified by the quality of the methodological approach, the rich data used and produced by FIRJAN indexes, and the data availability for the period of the analysis.

¹⁰ Particularly, the dimensions *Autonomy* and *Liquidity* are built considering the level at which municipalities obey some governance criteria established in the LRF (*Lei de Responsabilidade Fiscal*), a Brazilian law promulgated in 2000 that disciplines the public expenditures by different government spheres in Brazil.

the dimension *Investments* evaluates the share of investments in the municipal budget. These dimensions of IFGF use exclusively fiscal data provided by official sources, mainly from Siconfi, a centralized system from the National Treasury Secretariat (STN).¹¹

The second index, the IFDM, measures the level of human and socioeconomic development of Brazilian municipalities. In our study, we use the dimensions *Health* and *Education*. These dimensions are evaluated by weighting some municipal indicators in education and health provided by official public sources such as Ministry of Education and Ministry of Health.¹²

We choose these FIRJAN indexes as outcomes to measure the effects of electoral competition on performance at the municipal level in Brazil since each dimension is formed by a set of variables that is under direct influence (or control) of mayors and municipal public administration: basic assistance in health, offer and quality of elementary education,¹³ and municipal finance management.¹⁴

Table 1 presents the descriptive statistics of all outcomes used in this work. For political selection and campaign funds, we use the variables for candidates and elected candidates. Since the Brazilian municipalities are the object in the study, we calculate each outcome for the candidates by an average involving all candidates that ran the 2012 mayoral election in each municipality, including the elected. As we can see in Panel A, on average, within each municipality, the mean age of the politicians are above 48 years old, around 20% has some type of current electoral incumbency (occupies an elective office at the time of candidacy), almost half of the politicians have at least an undergraduate degree (47% for all candidates and 49% for the elected), and nearly 87% are male. In general, for political selection variables, the differences, in mean, between candidates and elected politicians are small. The exception is for the any electoral incumbency variable since the elected candidates are 20% more likely to occupy some elective office at the time of candidacy than the average candidate in a municipality.

Panels B and C report the descriptive statistics for campaign funds outcomes. In all categories of financing and expenditures, the mean dependent variables for elected candidates are greater than for candidates, suggesting the relevance of money for electoral success.¹⁵

¹¹ All information and data of IFGF are available online on [FIRJAN \(2019a\)](#). For a complete discussion of the variables used in the construction of each dimension, the weights, and the procedure, see [FIRJAN \(2019b\)](#).

¹² All information and data of IFDM are available online on [FIRJAN \(2018a\)](#). For a complete discussion of the variables used in the construction of each dimension, the weights, and the procedure, see [FIRJAN \(2018b\)](#).

¹³ The public goods provision in basic health and primary education is a well-known function of municipal governments in Brazil, as established by the 1988 Brazilian Constitution.

¹⁴ There is a third dimension in the IFDM index: Employment & Income. We choose not to use this dimension as a performance outcome in our analysis since we consider that it captures municipal conditions that, in general, are not under the total control of municipal management. In other words, this dimension of IFDM also depends on macroeconomic conditions.

¹⁵ The literature shows that greater campaign financing and expenditures increase the probability of electoral

Finally, Panel E reports the descriptive statistics for performance outcomes. It is interesting to note that, on average, the municipalities in Brazil present low performance on fiscal management outcomes (autonomy, personnel expenditures, liquidity, and investments). Moreover, we see a relevant heterogeneity on the quality of fiscal management across Brazilian municipalities since the standard deviations for these dimensions are high. For the human development outcomes (health and education), the opposite occurs: the performance on these dimensions are, on average, moderate/high while the dispersion across municipalities is low.

Finally, we describe in Table 2 the descriptive statistics for some municipal characteristics. As we detail in Section 4.4, we use the variables in the Panels A, B, D, and E as control variables in our specifications.

Panels A and B report the descriptive statistics of some demographics, economics, and municipal expenditures variables from the 2010 population census (IBGE) and *FINBRA* dataset (STN).¹⁶ On average, each municipality in Brazil has 25% of the population with age below 14 years old, 12% above 60 years old, 51% of men, 47% of white, 63% living in urban areas, and has an annual population growth of 1%. The annual per capita municipal GDP is, on average, near to R\$ 12,400, but has a remarkable dispersion (the standard deviation is high, and the variability is on the range between R\$ 2,260 and R\$ 311,900). Finally, on average, the annual average per capita municipal expenditures are equal to R\$ 1,800.

Panels C and D present political competition and electoral variables extracted from TSE and CEPESP data. We see on Panel C that, on average, the number of candidates in the 2012 Brazilian municipal elections, in each municipality, is equal to 2.66, and, although the range goes from 1 to 9, the dispersion is low (the standard deviation is below 1). These statistics indicate that, in general, the number of candidates that ran the 2012 mayoral elections in Brazil, in each municipality, is low. We also report in Panel C the descriptive statistics for the two measures of electoral competition used in this work. $Comp^W$ is equal to one minus the winning margin and $Comp^H$ is equal to one minus the Herfindahl-Hirshman Index (HHI).¹⁷ In general, the two measures indicate that the level of electoral competition in the Brazilian municipal elections is moderate/high. The average winning margin is equal to 15 percentual points but has a considerable dispersion across municipalities. The average level of competition for the measure $Comp^H$ is equal to 0.52, which represents nearly 60% for the maximum value possible in a municipality in our sample.¹⁸ In Panel D, we report the variables that represent some

success. See, for example, Jacobson (2006), Lemos et al. (2010) and Paranhos et al. (2013).

¹⁶ The data can be accessed in IPEA (2019).

¹⁷ See Section 4.2 for details.

¹⁸ Since the maximum number of candidates for a municipality in our sample is equal to 9, the maximum value possible for $Comp^H$ for a municipality in our sample is equal to $1 - 1/9 \approx 0.89$. This value is near the

electoral characteristics of the mayors. In the periods 2009-2012 and 2013-2016, 62% and 76%, respectively, of the mayors are in the first term, which indicates the high level of political renewal in the local municipal governments and the low incumbency advantage in Brazil.¹⁹ Finally, 11% and 19% of the mayors elected for the term period 2013-2016 (2012 elections) belong to the same party that the president and the state governor, respectively, elected to the term period 2011-2014 (2010 elections).

Lastly, we report in Panel E the descriptive statistics of the performance outcomes in 2010, i.e., before the 2012 mayoral elections. Comparing individually with the indicators of performance in the years used as outcomes (Table 1) we see that, on average, the variables here are higher for the fiscal management indicators (except for autonomy), but lower for the human development ones. This indicates that municipal socioeconomic characteristics vary over time.

maximum realized in the sample (0.85). See Section 4.2 for algebraic details.

¹⁹ This is a consolidated result in the literature for Brazil. See [Avis et al. \(2017\)](#), for example.

4 Empirical Strategy

This section presents the identification strategy proposed by [Shaukat \(2019\)](#) used here to estimate the causal effect of electoral competition in the 2012 Brazilian mayoral elections on political selection, campaign funds, and performance.

4.1 Basic Specification

The basic specification to estimate the causal effect of electoral competition using the 2012 mayoral elections in Brazil is given by:

$$y_{mst} = \beta Comp_{mst} + \mathbf{X}'_{mst} \Psi + \delta_s + \epsilon_{mst}, \quad (1)$$

where y_{mst} is an outcome of political selection, campaign funds or performance in office for a municipality m in state s and year τ , and $Comp_{mst}$ is a measure of electoral competition that can be *anticipated* ($\tau \leq t$) or *realized* ($\tau \geq t$).²⁰ The vector \mathbf{X}'_{mst} represents the control variables, and δ_s are state fixed effects. The inclusion of state fixed effects aims to capture the effect of time-invariant omitted variables on outcomes, common among municipalities within a state. Finally, we are interested in the coefficient β , which measures the effect on municipal outcomes of a higher degree of electoral competition in a municipality compared with other municipalities with a lower level of electoral competition.

We adopt the *anticipated* measure of electoral competition when we are studying political selection and campaign funds, and the *realized* measure when we are studying performance in office. For the first case, one interpretation is that political agents, during the campaign period, anticipate the level of electoral competition and react to it ([Shaukat, 2019](#)). For the second case, one interpretation is that electoral competition induces a disciplinary component on the politicians' behavior. A higher level of electoral competition generates incentives to the elected politician to provide information to voters about his capacity ([Chamon et al., 2019](#); [Batzilis, 2019](#)).

To identify the causal effect of electoral competition, we adopt the empirical strategy proposed by [Shaukat \(2019\)](#). Intuitively, the empirical strategy explores aggregate changes in

²⁰ We can measure electoral competition using an election result that occurs before or after the realization of an outcome. See [Arvate \(2013\)](#), [Shaukat \(2019\)](#) and [Chamon et al. \(2019\)](#) for a complete discussion on this issue.

party popularity over time (at the national and state levels) to capture exogenous variation in electoral competition at the municipal level in Brazil.

4.2 Defining Electoral Competition

We use the vote share of each party p in the mayoral election (s_{pmst}) to define two measures of electoral competition.

First we define the measure based on the winning margin as:

$$Comp_{mst}^W := 1 - |s_{imst} - s_{omst}|, \quad (2)$$

where $s_{imst} := \max\{s_{1mst}, s_{2mst}, \dots, s_{nmst}\}$ is the vote share of the incumbent party and $s_{omst} := \max\{\{s_{1mst}, s_{2mst}, \dots, s_{nmst}\} \setminus \{s_{imst}\}\}$ is the vote share of the runner-up (the strongest opposition). This measure of competition varies from 0 (the incumbent has the total votes) to 1 (the top two candidates have the same vote share). The winning margin measure is particularly interesting to capture competition when the top two candidates are the relevant players in the election. The closer are these party vote shares, the more competitive is the election.

Second we define the measure based on the Herfindahl-Hirshman Index (HHI) as:

$$Comp_{mst}^H := 1 - \sum_{p=1}^n (s_{pmst})^2 \quad (3)$$

This measure of competition varies from 0 (the incumbent has the total votes) to $1 - 1/n$ (votes are dispersed equally among the n parties in the election). The HHI measure is more appropriated to capture the electoral competition that is driven by a higher number of candidates. Unlike the margin of victory, HHI considers the case where the incumbent has challengers other than the runner-up since the measure captures the dispersion in vote shares between all parties in the election. The higher the dispersion of these party vote shares, the more competitive is the election.

4.3 Endogeneity Issues and Instrument Construction

The estimation of the model in (1) without an appropriate instrumental variable could lead to biased estimates of β since the level of electoral competition is possibly endogenous

to outcomes of campaign funds, political selection, and performance in office. For example, when we study the effect of electoral competition on political selection or campaign funds *prior* to an election, possibly there is endogeneity due to reverse causality. In other words, the political selection (e.g., politicians profile), as well as politician and party actions (e.g., campaign funds decisions), affect the level of competition in an election. Similarly, if we are interested in the effect of electoral competition on politician performance *after* the election, possibly there is endogeneity due to omitted variable bias since could exist some unobserved municipal characteristic in the error term correlated with electoral competition. For example, in each municipality the population can exert daily levels of informal political participation, e.g. inspecting and requiring good politicians' actions, which affects the political competition in the local elections and the provision of municipal public goods.

To deal with these concerns, we present in this section the shift-share instrument used in this paper, as developed and described by [Shaukat \(2019\)](#). The construction of the IV can be summarized in the following steps, which will be detailed carefully in the next subsections:

1. We predict party vote shares (\hat{s}_{pmst}) for each municipality using shifts and shares:
 - Shift (g_{pst}): A measure that represents changes to aggregate party popularity over time at the national and state levels.
 - Share (z_{pms}): A measure that represents the local initial party preferences.
2. We use \hat{s}_{pmst} to predict electoral competition ($PredComp_{mst}$).
3. We use $PredComp_{mst}$ to instrument for the actual electoral competition ($Comp_{mst}$).

4.3.1 Predicting Party Vote Shares (\hat{s}_{pmst})

To predict party vote shares, we use aggregate variation in party popularity at the national and state levels together with a measure of local initial party preferences. The use of aggregate changes in party popularity to compute the shifts and then to calculate the predicted party vote shares aims to ensure that the variation in the instrumental variable is not related to municipal characteristics.

Let z_{pms} be the measure of local initial party preference in a municipality, which will be measured using the party vote share in the municipal election in a baseline year (*shares*). We adopt the 2008 elections as the municipal baseline year elections. Let g_{pst} be an aggregate

measure of the change in party popularity in the national and state levels between a baseline year b and a year t , which will be measured using aggregate variation in party vote shares in the national and state levels elections (*shifts*). We adopt the 2006 (baseline year) and 2010 (year t) elections at the national and state levels to compute the measure g_{pst} . The predicted party vote share is defined as:

$$\hat{s}_{pmst} := z_{pms} + g_{pst} \quad (4)$$

Observe that the predicted party vote shares (\hat{s}_{pmst}) will be close to the actual party vote shares (s_{pmst}) in municipalities where the local party preferences shifts along with aggregate trends in party popularity. This situation is more likely in municipalities with a high proportion of *swing voters*, which possibly react more strongly to the aggregate performance of parties and not only to the local context. Nevertheless, it is less likely in municipalities with a high proportion of *partisan voters* since their party preferences react little to aggregate shifts. It is the variation of the swing voters' preferences to the aggregate context that allows us to build the instrument (Shaukat, 2019).

To verify if predicted party vote shares (\hat{s}_{pmst}) are close to actual party vote shares (s_{pmst}) we estimate the following specification, where μ_{pmst} represents the error term:

$$s_{pmst} = \gamma \hat{s}_{pmst} + \delta_s + \mu_{pmst} \quad (5)$$

4.3.1.1 Building the Shifts (g_{pst})

Let J be the set of national and state level elections in Brazil: chamber of deputies (state and federal levels), senate, state governments, and presidency (for the presidential election, we use the results within each state and at the national level). To compute the shifts, we proceed in two steps. First, we compute the shifts for each party p in each aggregate election j (g_{pst}^j) using the difference in vote shares between time t (s_{pst}^j) and a baseline year b (s_{psb}^j), i.e.:

$$g_{pst}^j := s_{pst}^j - s_{psb}^j, \quad \forall j \in J. \quad (6)$$

where we adopt the 2006 elections as the baseline year b elections and 2010 elections as the elections in year t . Second, we compute the final shifts, an aggregate measure of variation in party popularity over time, using aggregate variation in party vote shares in all national and state elections in Brazil. To do this, since the idea is to consider the electoral performance for

each party p in all elections jointly, we define the final shift for a party (g_{pst}) by a weighting of the intermediary shifts of the all j elections (g_{pst}^j) in the following way:

$$g_{pst} := \sum_{j \in J} \alpha^j g_{pst}^j, \quad \sum_{j \in J} \alpha^j = 1. \quad (7)$$

We attribute equal initial weights α^j for each $j \in J$ and reweight if the party p , in state s , did not run in election j in both years, since we cannot define a non-null shift for election j in this case. Similarly, if a party did not run the municipal election in the baseline year, we assign the value 0 to the measure of local initial party preference (z_{pms}). Despite some cases of these peculiarities in the data, we show that our predictions are strong.

4.3.2 Predicting Electoral Competition ($PredComp_{mst}$)

Using the metrics of electoral competition in (2) and (3), and the predicted vote shares (\hat{s}_{pmst}) in (4), we build the instruments.

First we define the instrument based on the winning margin as:

$$PredComp_{mst}^W := 1 - |\hat{s}_{imst} - \hat{s}_{omst}|, \quad (8)$$

where $\hat{s}_{imst} = \max\{\hat{s}_{1mst}, \hat{s}_{2mst}, \dots, \hat{s}_{nmst}\}$ is the predicted vote share for the predicted incumbent and $\hat{s}_{omst} = \max\{\{\hat{s}_{1mst}, \hat{s}_{2mst}, \dots, \hat{s}_{nmst}\} \setminus \{\hat{s}_{imst}\}\}$ is the predicted vote share for the predicted runner-up (the predicted vote share for the predicted strongest opposition).

Finally we define the instrument based on the Herfindahl-Hirshman Index (HHI) as:

$$PredComp_{mst}^H := 1 - \sum_{p=1}^n (\hat{s}_{pmst})^2 \quad (9)$$

4.3.3 Use $PredComp_{mst}$ to Instrument $Comp_{mst}$

We present below our main specification:

- **First Stage**

$$Comp_{mst} = \gamma PredComp_{mst} + \mathbf{X}'_{mst} \Omega + \delta_s + \nu_{mst} \quad (10)$$

- **Second Stage**

$$y_{mst} = \beta \widehat{Comp}_{mst} + \mathbf{X}'_{mst} \Psi + \delta_s + \epsilon_{mst} \quad (11)$$

Since we already exposed the instrument construction and the two-stage equations, we now specify how the aggregate shifts in party popularity allow for the identification of the causal effect of electoral competition at the municipal level. Observe that the *shifts* in party popularity affect predicted electoral competition non-monotonically across municipalities, i.e., the same *shift* increases or decreases the level of competition in a municipality depending on the local initial party preference (*shares*). In other words, a positive *shift* in the popularity of a party increases competition in municipalities in which this party is opposition, but decreases competition in municipalities in which this party is the incumbent. Consequently, in response to a *shift*, the *shares* determine how predicted competition reacts in intensity and direction, allowing to explore an exogenous variation in electoral competition at the municipal level. This non-monotonicity of competition in vote shares is a necessary condition for identification for this shift-share instrument strategy. Therefore, since the predicted competition, conditional on the set of controls, captures the portion of the competition that is driven by exogenous shocks at the aggregate level and not by local conditions, the empirical strategy overcomes endogeneity concerns (Shaukat, 2019).

4.4 Identifying Assumptions

This section presents the necessary assumptions for the identification of the causal effect. Particularly, we are interested in ensuring the validity of the exclusion restriction assumption to achieve the consistency of the instrument. In other words, we have to guarantee that there are no other channels through which predicted electoral competition affects outcomes other than by actual electoral competition. We address the potential threats to this assumption: the violation of the stable unit treatment value assumption (SUTVA) and the endogeneity concerns due to omitted variables.

SUTVA: We are interested in the coefficient β , which measures the causal effect of a higher degree of electoral competition on outcomes for a municipality compared with other municipalities, *within* the same state, which suffered a lower degree of electoral competition. According to Shaukat (2019), this is a proper interpretation of β to guarantee the validity of the stable unit treatment value assumption (SUTVA).

To see this in the Brazilian context, suppose, for example, that a party strategically prioritizes the allocation of resources for a specific state (state A) in the state elections. This

event probably increases the party popularity in state A and induces a variation in the electoral competition in the municipal elections within the state A. Since the amount of resources is fixed (or limited), such an increase implies a reduction of the resources in the state elections from this party in another state (state B). Thus, we expect a decline in the party popularity in the state B and also a consequent variation in electoral competition in the municipal elections within this state B. In summary, since the parties in Brazil are national, what happens in the state elections in state A (in this example, a positive shift in party popularity) affects the state elections in state B (here, a negative shift in party popularity) and consequently modifies the competition in the municipal elections within state B. This situation would represent a potential violation of SUTVA.

The appropriate interpretation of β addresses the SUTVA concern since the predicted competition in a municipality only depends on the interaction between the aggregate shifts in party popularity and the local initial party preference and does not depend on the events involving other particular municipalities within the same state. In other words, comparing municipalities within the same state is suitable, despite municipalities within a state share the same shifts in party popularity, since the shifts represent a state aggregate factor, exogenous to municipalities, and not a component at the local level involving other municipalities within the state.

Control Variables: We present and justify here the choice of the control variables. All covariates were included to control for local conditions that could bias the estimation of β . Therefore, we ensure the identification of the causal effect of electoral competition conditional on covariate set \mathbf{X}'_{mst} . In short, we include in \mathbf{X}'_{mst} municipal covariates (demographics, economics, municipal expenditures, electoral and performance variables), the predicted party vote shares $(\hat{s}_{1mst}, \dots, \hat{s}_{nmst})$, the party vote shares in the baseline year $(z_{1ms}, \dots, z_{nms})$, and the initial level of competition $(Comp_{msb})$.

We first justify the use of the municipal covariates. The Panels A, B, D, and E in Table 2 present the municipal controls. The Panels A, B, and D represent the municipal characteristics that we include as control variables based on Arvate (2013). In Panels A and B, we report the variables that capture demographics, economics, and expenditures characteristics at the municipal level.

In Panel D, we report the municipal electoral variables. In particular, we include dummy variables that indicate if the mayor is in his first-term in the years of each outcome and dummy variables that indicate if the mayor belongs to the presidential and the state governor party. Observe that, for campaign funds and political selection outcomes, we use the first-term dummy

for the period between 2009-2012 since this is the period that affects these outcomes in 2012. However, since the outcomes to performance refer to the period 2013-2016, we use the first-term dummy for this same period since it is the term period that affects mayors' performance. The inclusion of the variables in Panel D as covariates addresses the concern that the effect is not driven by reelection incentives (mayors in the first term can be reelected) and also is not driven by the alignment and cooperation between the mayor and other government spheres (mayors that belong to the same party that the president or the state governor possibly has facilitated access to resources from other government spheres).

Panel E presents the municipal variables that we add as controls exclusively to performance outcomes. For each outcome of FIRJAN, we add as control *exclusively* the respective outcome in the year of 2010. This inclusion aims to control for a baseline measure of each indicator.

Finally, we justify the choice of other control variables. Following [Shaukat \(2019\)](#), we also include the predicted party vote shares in our specifications to control for the direct impact driven by party popularity and party preferences per se and not by the competition between parties. Observe that this is possible since electoral competition is a function of the vote shares of the parties in the election, which allows capturing the effect of the interaction between parties and not the effect driven by each party individually. Similarly, the inclusion of the initial level of competition, and the party vote shares in the baseline year aims to address the concern that the impact is not driven by the baseline electoral results. Therefore, β estimates the causal effect of electoral competition on outcomes, conditional on municipal covariates, the initial level of competition, party preferences in the present and baseline year, and state fixed effects ([Shaukat, 2019](#)).

4.5 Inference

[Adão et al. \(2019\)](#) argue that empirical strategies that apply shift-share designs and usual standard error estimators (robust or clustered at some geographic level) may suffer overrejection problem of the null hypothesis due to eventual cross-regional correlation in the regression residuals. This case could happen in specifications with similar values of the shift-share regressor, which would occur between regions with similar initial shares.²¹ In other words, the authors argue that the shift-share approach could lead to a non-independence in the residuals across regions if they contain relevant shift-share components that influence the

²¹ The similarity in initial shares in our case refers to municipalities within the same state since the shifts here are common at the state level.

outcome through the same shares that define the covariate of interest. [Adão et al. \(2019\)](#) propose a procedure to minimize this possible inference problem. We argue here that this is not an issue in our empirical approach.

First, the procedure in [Adão et al. \(2019\)](#) builds on the standard shift-share framework, where the instrument (or the regressor) is the inner product of shares and shifts, and the shifts have a linear effect on the outcomes. This case is somewhat different from the instrument used here. Our instrument is built by computing a non-monotonic function of shifts and shares, and, for this reason, the shifts have a non-monotonic effect on electoral competition depending on the shares.²² Due to this fundamental difference in the IV construction, the hypothesis in each framework,²³ and some technical conditions (e.g., the procedure requires infinite sample properties for a good overrejection correction, not applicable in our context), the steps of the procedure are not suitable in our approach.

Second, we argue that the similarity in the initial shares is an event with low probability in our context. Observe that the similarity in the initial shares *between* municipalities *within* the same state refers to a comparison party by party individually since, despite the shifts be common for all municipalities in a state, they are specific for each party. For example, the similarity in the initial shares means that, in a comparison involving only two municipalities within a state, the vote share of each specific party is similar across municipalities and this happens for all parties that ran the two municipal elections. Additionally, note that the number and which specific parties run the municipal elections vary by municipality, which contributes to making the event of similarity in the initial shares less likely.

Third, [Adão et al. \(2019\)](#) show that the overrejection in traditional inference is more relevant when the standard shift-share framework is used to build the OLS regressor but less in the IV approach. This situation happens since there are not many shift-share components left in the first-stage regression residual. Furthermore, they argue that the use of an IV that absorbs the relevant part of the shift-share components across regions, and the inclusion of an appropriate set of covariates in the IV approach, renders the overrejection problem negligible. This happens in our strategy since our IV explores the shares (at the municipal level) and a large number of shocks in party popularity in all aggregate elections in Brazil (at the state and national levels). Moreover, the vector of controls includes a rich set of municipal covariates, state fixed effects, and the shift-share terms. The inclusion of state fixed effects is relevant since they control for a

²² See Appendix B in [Shaukat \(2019\)](#) for a complete algebraic illustration of the difference between the standard shift-share instrument and the instrument used here.

²³ See [Goldsmith-Pinkham et al. \(2018\)](#) and [Borusyak et al. \(2018\)](#) for a theoretical discussion about the assumptions needed for identification on the standard shift-share instrument designs.

common component that affects all shifters. Furthermore, the direct inclusion of the shift-share terms in the regressions, besides the inclusion in the IV construction, allows us to control for the linear and non-linear effects of the shift-share components. Therefore, our approach overcomes the inference issue discussed in [Adão et al. \(2019\)](#) since it addresses the existence of shift-share components in the regression residuals and eventual correlation in residuals across regions due to the shift-share framework.

We follow the inference approach used by [Shaukat \(2019\)](#), in the cross-sectional regressions, and adopt the robust Huber–White standard errors.²⁴ We choose not to use any type of errors clustered at some geographic level within each state, e.g., at meso-region or micro-region level (geographic divisions within states in Brazil), due to the following reasons. First, the interpretation of the effect of electoral competition remains at the municipal level within states, according to the discussion to guarantee SUTVA (described in Section 4.4), i.e., we measure the effect of a higher degree of electoral competition *between* municipalities *within* the same state. Second, in general, there is a low number of these geographic divisions in each Brazilian state, which harms the use of errors clustered at these geographic levels. Third, the use of clusters at these geographic levels requires the assumption of independence in the error terms across these clusters, which does not solve the potential issue indicated by [Adão et al. \(2019\)](#). The possible overrejection problem depends on the similarity in initial shares between municipalities within the same state and does not depend on the geographic location or proximity.

²⁴ This is the same inference approach used in the literature that analyzes cross-section regressions with Brazilian municipalities. See, for example, [Arvate \(2013\)](#), [Ferraz and Finan \(2009\)](#) and [Arvate et al. \(2010\)](#)

5 Results

In Table 3, we report the estimates that show the association between the predicted and the actual values of vote shares and competition. First, in Column (1), we show the results in estimating the specification (5). The estimate for predicted party vote share (\hat{s}_{pmst}) is positive and statistically significant, indicating that aggregate shocks in party popularity highly influence the actual electoral results (s_{pmst}). Finally, Columns (2) to (5) show the first stage estimates (specification (10)) for each measure of electoral competition, based on winning margin (Columns (2) and (3)) and HHI (Columns (4) and (5)). For each measure, we ran the specifications without (Columns (2) and (4)) and with (Columns (3) and (5)) the set of control variables.²⁵ All estimates are positive and statistically significant. The F-statistic for the excluded instrument, the test for the relevance condition, is above conventional levels. Therefore, the results show the strong relationship between the measures of electoral competition and the respective IVs, even after including the set of control variables.

In the next subsections, we present the empirical results of electoral competition in the 2012 Brazilian municipal elections. For political selection and campaign funds (subsections 5.1 and 5.2), we present the impact during the campaign period, i.e., *before* the election, and for performance (subsection 5.3), we present the impact during the term period 2013-2016, i.e., *after* the election. For all outcomes, we report both the simple OLS regressions results and the causal effect obtained with the shift-share IV approach (2SLS). The main findings are the 2SLS estimates, given the endogeneity concerns discussed in Section 4.3.

5.1 Effects on Political Selection

This subsection presents the empirical effects of electoral competition on political selection during the campaign period, i.e., *before* the election. As detailed in the Data section, we use as outcomes for political selection the variables of age, any electoral incumbency, net assets, education, and male. Tables 4 and 5 present the impact of the electoral competition on political selection for candidates and elected candidates, respectively. In all cases where there is a significant effect for both OLS and 2SLS estimates, the impact is more expressive in the last one.

²⁵ We include party control variables: the predicted party vote shares ($\hat{s}_{1mst}, \dots, \hat{s}_{nmst}$), the party vote shares in the baseline year (z_{1ms}, \dots, z_{nms}), and the initial level of competition ($Comp_{msb}$). We also include municipal control variables: demographics, economics, municipal expenditures, and electoral variables. See Table 2 for more details about municipal covariates.

It is interesting to note that, when the 2SLS is significant, only one of the two measures of competition has a significant effect. This indicates that, for political selection, the result is driven exclusively by one of the two parcels of competition: the competition between the top two candidates (captured by the measure of competition based on winning margin) or the competition given by the dispersion among all candidates (captured by the measure of competition based on HHI). This shows the importance of using more than one measure of competition since the two metrics represent different types of exercises and different approaches to the electoral competition. Therefore, the significant effect in only one of the two metrics does not mean that electoral competition has not a relevant impact on a specific outcome. It means, rather, that a particular electoral competition aspect drives the effect.

Columns (1) and (2) in Tables 4 and 5 report OLS and 2SLS estimates for age. First, for both candidates and elected candidates, a higher degree of electoral competition (measured by $Comp^H$) causes the selection of a politician profile that, on average, are older. For candidates and elected candidates, the 2SLS estimates suggest that a one standard deviation (the standard deviation of the measure of competition $Comp^H$ is approximately 0.11) increase in competition leads to a selection of politicians that are 1.05 and 1.65 years older (an increase of 2.2% and 3.4% relative to the mean), respectively. When the measure $Comp^W$ is used, the OLS estimates are significant, but the 2SLS point estimate is imprecise. One possible intuition for these results is that only the parcel of electoral competition that is driven by a greater number of candidates, what is captured by $Comp^H$, increases a selection of older politicians. Possibly, older politicians are attracted or allocated to more competitive elections.

Columns (3) and (4) in Tables 4 and 5 report OLS and 2SLS estimates for any electoral incumbency. For candidates (Table 4), the 2SLS estimates are imprecise. For elected candidates (Table 5), only for the measure $Comp^W$ the 2SLS estimate is significant: this estimate suggests that a one standard deviation (the standard deviation of the measure of competition $Comp^W$ is approximately 0.17) increase in competition leads to 5.9 percentage point decrease in the likelihood that the elected politician has some current electoral incumbency (a sizeable reduction of 26,6% relative to the mean).

Columns (5) and (6) in Tables 4 and 5 report OLS and 2SLS estimates for net assets. For candidates (Table 4), the 2SLS estimates are imprecise. For elected candidates (Table 5), all estimates are negatives, but only the relatives to the $Comp^H$ measure are significant. The 2SLS estimate for this measure suggests that a one standard deviation increase in competition leads to the election of candidates that, on average, have 11.4% less reported net assets.

Columns (7) and (8) in Tables 4 and 5 report OLS and 2SLS estimates for education.

We do not find evidence that electoral competition affects the selection of politicians in terms of educational level.

Finally, Columns (9) and (10) in Tables 4 and 5 report OLS and 2SLS estimate for gender. The 2SLS estimates for candidates (Table 4) are not significant in both measures of competition. For elected candidates (Table 5), all estimates are negative, but only the relatives to the $Comp^H$ measure are significant. The 2SLS estimate for this measure suggests that a one standard deviation increase in competition leads to a 2.9 percentage point increase in the probability that the elected candidate is a woman (a sizeable rise of 24,8% relative to the mean).

In summary, we find evidence that electoral competition favors the selection of older candidates (Table 4). For elected candidates (Table 5), the electoral competition favors the election of women, of less wealthy politicians, older, and without any type of current electoral incumbency (i.e., politicians who do not occupy, at the time of candidacy, an elective office). We present some suggestive interpretation of these results. We interpret these results as a beneficial effect of electoral competition in mayoral elections since there is a favoring for the election of a politician profile that is underrepresented in the Brazilian political scenario. This is an indication that competition increases the probability of electoral success of *outsiders* of the traditional political field, which eventually could implement better public policies.

5.2 Effects on Campaign Funds

This subsection presents the empirical effects of electoral competition on campaign funds during the campaign period, i.e., *before* the election. As detailed in the Data section, we have the information about campaign financing and campaign expenditures in common categories and the data is in natural logarithms (\ln). Tables 6, 7, 8 and 9 present the results on campaign funds. For campaign financing (Tables 6 and 7) and campaign expenditures (Tables 8 and 9) we also present the results for candidates (Tables 6 and 8) and elected candidates (Tables 7 and 9). We find robust evidence that electoral competition in mayoral elections in Brazil increases campaign financing and expenditures.

Columns (1) and (2) in Tables 6 and 7 report the OLS and 2SLS estimates for campaign financing. For candidates (Table 6), the 2SLS estimates in the measures $Comp^W$ and $Comp^H$ indicate that a one standard deviation increase in competition leads to 16.8% and 12.7% increase in financing, respectively. In the case of elected candidates (Table 7), the 2SLS estimates in the same measures indicate that a one standard deviation increase in competition leads to 13% and 8.9% increase in financing, respectively. These estimates represent a sizable effect of electoral

competition on campaign financing, even greater than the OLS ones.

The analysis of the tables relative to campaign financing produces some interesting interpretations. Specifically in the case of the campaign financing of the candidates (Table 6) is interesting to note that all channels (party funds, donations, and own funds) are qualitatively relevant to explain the growth in campaign financing in response to competition, but in the case of the campaign financing of the elected candidates (Table 7) the growth is driven almost exclusively by donations. We now provide some suggestive interpretations for these results. The increase in campaign financing via party funds and own funds to the candidates in response to a greater electoral competition aims the electoral success. The less important role to these channels in case of elected politicians can be explained for the following reason: even in case of greater electoral competition, the party and the own politician do not choose to increase the allocation of campaign resources since there is already a high expectation of electoral success to a near future elected candidate. Alternative allocations of resources are more profitable. In the case of donations, the own perception of a greater electoral competition can lead a supporter to donate to a politician with some probability to be elected, increasing (or ensuring) the electoral success. This politician could be the favorite to the supporter or even the best option compared to the challengers. Moreover, the greater electoral competition could encourage the pursuit of political connections towards the politicians, where the connections are established by donations aiming clientelistic relationships.²⁶

Columns (1) and (2) in Tables 8 and 9 report the OLS and 2SLS estimates for campaign expenditures. For candidates (Table 8), the 2SLS estimates in the measures $Comp^W$ and $Comp^H$ indicate that a one standard deviation increase in competition leads to 16.8% and 12.7% increase in expenditures, respectively. In the case of elected candidates (Table 9), the 2SLS estimates in the same measures indicate that a one standard deviation increase in competition leads to 13.4% and 9.3% increase in expenditures, respectively. These estimates represent a sizable effect of electoral competition on campaign expenditures, even greater than the OLS ones. When we look at the influence of the channels (advertising expenditures and other expenditures), all channels are qualitatively relevant to explain the increase for candidates (Table 8).

Nevertheless, for elected candidates (Table 9), although all channels are relevant for the measure $Comp^W$, only the channel *advertising expenditures* is significant in the measure $Comp^H$. One possible intuition to this result is that an increase in competition driven by a greater number of candidates (captured by the measure of competition $Comp^H$) requires that the nearly elected politician makes additional effort to highlight his candidacy to confront

²⁶ There is a large literature showing the role of political connections. See Colonnelli et al. (2018) and Arvate et al. (2018) for example.

new challengers. This justifies prioritizing the allocation of resources to advertising, a type of expenditures more assertive to expose the politician image than *other expenditures*.

In summary, we find robust evidence that electoral competition in mayoral elections in Brazil increases campaign financing and expenditures. Coherent with the discussion in the Data section, the results show the importance of money in the elections and its role in increasing the probability of electoral success.

5.3 Effects on Performance

This subsection presents the empirical effects of electoral competition on performance during the term period, i.e., *after* the election. Table 10 presents the impacts of the electoral competition on performance in office. As detailed in the Data section, we use as performance indexes the data produced by FIRJAN. We compute for each dimension the annual average in the term period 2013-2016. Each outcome varies in the interval between 0 and 1.

The Columns (1)-(2) and (9)-(10) show that we do not find any significant effect for the dimensions *Autonomy* and *Health*. Similarly to the political selection outcomes, for the dimensions *Personnel expenditures* and *Liquidity*, only one of the two metrics of electoral competition has the 2SLS estimate significant, indicating that a specific approach of competition drives the effect for these outcomes. For *Personnel expenditures*, the 2SLS estimate suggests that a one standard deviation increase in competition (measured by $Comp^H$) leads to a 0.0407 point increase (9.3% of the mean). For *Liquidity*, the 2SLS estimate suggests that a one standard deviation increase in competition (measured by $Comp^W$) leads to a 0.012 point increase (2.5% of the mean).

We find evidence that electoral competition increases the performance of the mayor in office in the dimensions *Investment* and *Education* for the two measures of electoral competition. For *Investment*, the 2SLS estimates in the measures $Comp^W$ and $Comp^H$ indicate that a one standard deviation increase in competition leads to 0.01 and 0.026 point increase (1.9% and 4.9% of the mean), respectively. For *Education*, the 2SLS estimates in the same measures indicate that a one standard deviation increase in competition leads to 0.003 and 0.007 point increase (0.4% and 0.9% of the mean), respectively.

In summary, we find evidence that electoral competition in mayoral elections in Brazil increases the performance of the mayor in office, measured by the *Investment*, *Education*, *Personnel expenditures* and *Liquidity* dimensions. Our results are in line with the findings in [Arvate \(2013\)](#) and [Chamon et al. \(2019\)](#) since they also found positive effects of electoral

competition on the supply of municipal public goods and municipal financial management. Overall, our results show that electoral competition in Brazilian municipalities increases voter welfare since it improves public administration.

6 Conclusions

This paper estimates the causal impact of electoral competition, using the 2012 Brazilian mayoral elections, on political selection, campaign funds, and performance in office. To identify the causal effect, we adopt the empirical strategy proposed by [Shaukat \(2019\)](#), which adapts the traditional shift-share instrument to the electoral competition context. The empirical strategy explores aggregate changes in party popularity over time (at the national and state levels) to capture exogenous variation in electoral competition at the municipal level in Brazil. These shifts in party popularity affect electoral competition non-monotonically across municipalities, depending on local initial party preferences. This non-monotonicity of the local electoral competition to aggregate shocks is a core condition for our identification strategy.

We find interesting results. First, we find evidence that electoral competition in mayoral elections in Brazil increases the selection and election of older politicians, favors the election of women, of less wealthy candidates, and without any type of current electoral incumbency (i.e., politicians who do not occupy, at the time of candidacy, an elective office). We interpret these findings as a beneficial effect of electoral competition since there is a favoring for the election of a politician profile that is underrepresented in the Brazilian political scenario. Second, we find robust evidence that electoral competition increases campaign financing and expenditures. This result shows the importance of money to enhance the probability of electoral success. We explain the overall growth in campaign funds using the particular relevance of each channel,²⁷ and interpret them as strategic allocation of resources. Political agents choose the allocation of resources more effective to enhance the electoral success chances in reaction to electoral competition. Third, we find evidence that electoral competition increases the performance of the mayor in office in the municipal measures of investment, education, personnel expenditures, and liquidity. These results show that electoral competition in Brazilian municipalities increases voter welfare since it improves public administration.

Our work contributes to the literature since it generates novel (political selection and campaign funds), besides more recent and embracing (performance) evidence about the effects of electoral competition in Brazil. Moreover, we go beyond the standard approach used in the literature since we exploit an empirical strategy that does not rely on the use of discontinuities in institutional rules.

Our work does not exhaust the theme for the Brazilian case. For future research, we

²⁷ For campaign financing, the different categories are party funds, donations, and own funds. For campaign expenditures, the different categories are advertising expenditures and other expenditures

suggest exploring other effects of electoral competition in Brazil. First, it would be interesting to verify if electoral competition affects the ideological type of the parties that run the elections or if it leads politicians to change parties. Additionally, following the exercise in [Shaukat \(2019\)](#) to the Indian case, we also suggest investigating other effects of electoral competition to the Brazilian context. It could be interesting to verify if electoral competition in Brazil has an impact on the turnover of politicians, if it affects the political selection in terms of criminal record, if it affects the composition of parties that run the elections in terms of size or if it leads to a strategic allocation of resources by the party that command the state government.²⁸

In summary, our results show the relevance of electoral incentives in the behavior of political agents in a young democracy as Brazil. Moreover, as suggested, there exists an open and fruitful research field, to future works, to study additional effects of electoral competition in Brazil and other countries.

²⁸ In this last case, the goal is to verify the possibility of a favoring to municipalities whose major belongs to the state governor party.

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Tables

Table 1 – Descriptive Statistics of Outcome Variables

Name of Variables	Obs	Average	Std. Dev.	Min	Max
Panel A: Political Selection (2012)					
<i>Panel A.1: Candidates</i>					
Age (years)	5479	48.35	6.87	25.50	73.50
Any Electoral Incumbency (dummy)	5479	0.19	-	0.00	1.00
Net Assets (<i>ln</i>)	5305	10.74	0.84	5.70	13.83
Education (dummy)	5478	0.47	-	0.00	1.00
Male (dummy)	5479	0.87	-	0.00	1.00
<i>Panel A.2: Elected Candidates</i>					
Age (years)	5447	48.08	10.11	21.00	89.00
Any Electoral Incumbency (dummy)	5448	0.22	-	0.00	1.00
Net Assets (<i>ln</i>)	4760	10.71	1.07	3.85	14.51
Education (dummy)	5447	0.49	-	0.00	1.00
Male (dummy)	5448	0.88	-	0.00	1.00
Panel B: Campaign Financing (2012, <i>ln</i>)					
<i>Panel B.1: Candidates</i>					
All Funds	5475	10.93	1.03	5.30	14.67
Party Funds	4513	8.89	1.70	1.61	14.22
Donations	5390	10.02	1.41	1.79	14.08
Own Funds	5363	9.42	1.32	-5.70	14.38
<i>Panel B.2: Elected Candidates</i>					
All Funds	5374	11.08	1.22	3.91	15.30
Party Funds	3264	9.37	1.85	2.30	14.67
Donations	5016	10.18	1.62	-1.05	14.85
Own Funds	4675	9.48	1.64	-4.61	14.96
Panel C: Campaign Expenditures (2012, <i>ln</i>)					
<i>Panel C.1: Candidates</i>					
All Expenditures	5475	10.93	1.04	5.30	14.67
Advertising Expenditures	5468	10.01	1.03	5.25	13.98
Other Expenditures	5467	10.27	1.27	-10.44	14.56
<i>Panel C.2: Elected Candidates</i>					
All Expenditures	5371	11.08	1.21	5.30	15.30
Advertising Expenditures	5327	10.15	1.24	2.08	14.57
Other Expenditures	5322	10.35	1.73	-12.92	14.82
Panel D: Performance (2013-2016, a.a.)					
<i>(continuous, range 0-1)</i>					
Autonomy	5444	0.35	0.38	0.00	1.00
Personnel Expenditures	5444	0.43	0.28	0.00	1.00
Liquidity	5444	0.48	0.27	0.00	1.00
Investment	5444	0.53	0.21	0.02	1.00
Health	5474	0.74	0.14	0.18	0.99
Education	5471	0.76	0.11	0.35	1.00

Notes: This table presents the descriptive statistics of all outcomes used in this work. The outcomes for candidates represent an average involving all candidates that ran the 2012 Brazilian mayoral elections in each municipality, including the elected politician. The Panels A, B, and C present the outcome variables, from TSE and CEPESP data, during the campaign period in the 2012 Brazilian mayoral elections. For political selection, we use the variables of age (in years), any electoral incumbency (measured by a dummy variable that indicates if the politician occupies an elective office at the time of candidacy), net assets (measured by the declared wealth (in *ln*)), education (a dummy variable that assumes the value one if the politician has at least an undergraduate degree and zero otherwise), and male (dummy variable that assumes the value one if the politician is male and zero otherwise). For campaign funds, all the data are in *ln* and we classify the information in common categories. Finally, Panel D presents the incumbent performance outcomes. The data are from IFGF and IFDM (FIRJAN), represent the 2013-2016 annual average and vary in the interval 0 to 1.

Table 2 – Descriptive Statistics of Municipal Characteristics

Name of Variables	Obs	Average	Std. Dev.	Min	Max
Panel A: Demographics and economics (2010)					
Population (<i>ln</i>)	5474	9.36	1.05	6.69	12.69
GDP (<i>ln</i>)	5474	18.50	1.30	15.79	23.57
Per Capita Municipal GDP (R\$ 1000)	5474	12.39	14.55	2.26	311.9
Population below 14 years old (%)	5474	0.25	0.05	0.07	0.51
Population over 60 years old (%)	5474	0.12	0.03	0.03	0.29
Male population (%)	5474	0.51	0.02	0.46	0.81
White population (%)	5474	0.47	0.24	0.01	0.99
Urban population (%)	5474	0.63	0.22	0.04	1.00
Population Density ($\ln(\text{hab}/\text{km}^2)$)	5474	3.15	1.34	-2.03	9.39
Annual Population growth (% 2000-2010)	5416	0.01	0.01	-0.06	0.11
Panel B: Municipal expenditures (2009-2016, annual average)					
Municipal expenditures (<i>ln</i>)	5469	16.77	0.88	15.21	20.73
Per Capita municipal expenditures (R\$ 1000)	5469	1.80	0.85	0.52	17.82
Panel C: Political competition (2012)					
Number of candidates, (<i>n, discrete</i>)	5479	2.66	0.98	1.00	9.00
$Comp^W$ (<i>continuous, range 0-1</i>)	5479	0.85	0.17	0.00	1.00
$Comp^H$ (<i>continuous, range 0 - 1 - 1/n</i>)	5479	0.52	0.11	0.00	0.85
Panel D: Electoral variables (<i>dummy</i>)					
^a Mayor is in the first-term _{2009–2012}	5479	0.62	-	0.00	1.00
^b Mayor is in the first-term _{2013–2016}	5479	0.76	-	0.00	1.00
^c Mayor belongs to presidential party _{2011–2014}	5448	0.11	-	0.00	1.00
^c Mayor belongs to state governor party _{2011–2014}	5448	0.19	-	0.00	1.00
Panel E: Performance (2010) (<i>continuous, range 0-1</i>)					
Autonomy	5168	0.23	0.18	0.01	1.00
Personnel expenditures	5168	0.58	0.20	0.00	1.00
Liquidity	5168	0.57	0.37	0.00	1.00
Investment	5168	0.62	0.28	0.01	1.00
Health	5474	0.67	0.16	0.08	1.00
Education	5466	0.68	0.13	0.25	1.00

Notes: This table presents the descriptive statistics of some municipal characteristics. We use the variables in the Panels A, B, D, and E as control variables in our regressions. Panel A presents demographics and economics variables from the 2010 population census (IBGE). Panel B presents municipal expenditures variables (calculated by the 2009-2016 annual average) from the *FINBRA* dataset (STN). Panel C and D present political competition and electoral variables extracted from TSE and CEPESP data. $Comp^W$ is defined as one minus the winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the 2012 mayoral election. $Comp^H$ is defined as one minus the HHI, that is, one minus the sum of squares of the vote share in the 2012 mayoral election. Finally, Panel E presents 2010 performance outcomes extracted from FIRJAN. For each outcome of FIRJAN we add as control *exclusively* the respective outcome in 2010.

^a Included as control variable only to campaign funds and political selection outcomes.

^b Included as control variable only to performance outcomes.

^c We refer to the mayor in the term period 2013-2016, elected in 2012.

Table 3 – Predicting Vote Shares and First Stage

	s_{pmst}	$Comp_{mst}^W$		$Comp_{mst}^H$	
	(1)	(2)	(3)	(4)	(5)
\hat{s}_{pmst}	0.810*** (0.006)				
$PredComp_{mst}^W$		0.702*** (0.021)	0.806*** (0.032)		
$PredComp_{mst}^H$				0.153*** (0.016)	0.287*** (0.011)
Covariates	No	No	Yes	No	Yes
F-stat excluded instrument		1128.22	624.25	87.40	651.55
R-squared	0.682	0.434	0.451	0.085	0.640
Observations	14,581	5,479	5,474	5,479	5,474

Notes: s_{pmst} and \hat{s}_{pmst} represent the vote share and the predict party vote share of each party in the 2012 mayoral election. $PredComp_{mst}^W$ and $PredComp_{mst}^H$ are the predicted electoral competition and represent the instruments for each measure of electoral competition. $Comp_{mst}^W$ is defined as one minus the winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the 2012 mayoral election. $Comp_{mst}^H$ is defined as one minus the HHI, that is, one minus the sum of squares of the vote share in the 2012 mayoral election. The regressions contain state fixed effects. The covariates refer to the party (the predicted party vote shares, the party vote shares in the baseline year, and the initial level of competition) and to the municipal control variables (demographics, economics, municipal expenditures, and electoral variables). See Table 2 for more details about municipal covariates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4 – Effects of Electoral Competition on Political Selection: Candidates

	Age		Any Electoral Incumbency		Net Assets		Education		Male	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Comp^W</i>										
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	1.875*** (0.668)	1.312 (1.073)	-0.142*** (0.030)	-0.067 (0.045)	0.051 (0.065)	0.119 (0.112)	-0.022 (0.036)	-0.041 (0.057)	0.002 (0.022)	0.005 (0.035)
R-squared	0.084	0.084	0.052	0.050	0.359	0.359	0.124	0.124	0.034	0.034
F-stat excluded instrument		624.2		624.2	551.9			591.1		624.2
<i>Comp^H</i>										
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	4.873*** (1.366)	9.499*** (2.422)	-0.297*** (0.061)	0.026 (0.095)	-0.226* (0.131)	-0.179 (0.242)	-0.057 (0.074)	-0.176 (0.130)	-0.089** (0.045)	-0.058 (0.079)
R-squared	0.081	0.079	0.043	0.033	0.360	0.360	0.123	0.122	0.035	0.035
F-stat excluded instrument		651.6		651.6	591.7			623.0		651.6
Mean Dep. Var.	48.35	48.35	0.185	0.185	10.74	10.74	0.475	0.475	0.869	0.869
N	5474	5474	5474	5474	5301	5301	5380	5380	5474	5474

Notes: This table presents the effects of the electoral competition on political selection of the 2012 mayoral elections candidates. All dependent variables represent an average involving all candidates that ran the 2012 mayoral election in each municipality, including the elected politician. Age represents the age of politicians in years. Any electoral incumbency is measured by a dummy variable that indicates if the politician occupies an elective office at the time of candidacy. Net assets represent the declared wealth (in *ln*). Education is a dummy variable that assumes the value one if the politician has at least an undergraduate degree and zero otherwise. Male is a dummy variable that assumes the value one if the politician is male and zero otherwise. For all outcomes, we report both the simple OLS regressions results and the causal effect obtained with the shift-share IV approach. *Comp^W* is defined as one minus the *anticipated* winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the upcoming election (i.e., 2012). *Comp^H* is defined as one minus the *anticipated* HHI, that is, one minus the sum of squares of the vote share in the upcoming election (i.e., 2012). The regressions contain state fixed effects. We include in all specifications party control variables (the predicted party vote shares, the party vote shares in the baseline year, and the initial level of competition) and municipal control variables (demographics, economics, municipal expenditures, and electoral variables). See Table 2 for more details about municipal covariates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5 – Effects of Electoral Competition on Political Selection: Elected Candidates

	Age		Any Electoral Incumbency		Net Assets		Education		Male	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS	(7) OLS	(8) 2SLS	(9) OLS	(10) 2SLS
$Comp^W$	1.987** (0.818)	-0.366 (1.432)	-0.259*** (0.039)	-0.345*** (0.063)	-0.070 (0.083)	-0.030 (0.144)	-0.018 (0.0433)	-0.048 (0.076)	-0.032 (0.027)	-0.044 (0.044)
R-squared	0.059	0.057	0.039	0.038	0.212	0.212	0.079	0.078	0.023	0.023
F-stat excluded instrument		625.8		625.7	544.9	544.9	591.1			625.7
$Comp^H$	6.090*** (1.734)	14.950*** (3.429)	-0.250*** (0.080)	0.009 (0.140)	-0.544*** (0.171)	-1.038*** (0.332)	0.006 (0.091)	-0.053 (0.175)	-0.093* (0.054)	-0.261*** (0.103)
R-squared	0.055	0.051	0.025	0.023	0.212	0.211	0.078	0.078	0.022	0.021
F-stat excluded instrument		653.7		653.9	587.3	587.3	623.0			653.9
Mean Dep. Var.	48.08	48.08	0.222	0.222	10.71	10.71	0.487	0.487	0.883	0.883
N	5442	5442	5443	5443	4758	4758	5380	5380	5443	5443

Notes: This table presents the effects of the electoral competition on political selection of the elected candidates in the 2012 mayoral elections. Age represents the age of politicians in years. Any electoral incumbency is measured by a dummy variable that indicates if the politician occupies an elective office at the time of candidacy. Net assets represent the declared wealth (in ln). Education is a dummy variable that assumes the value one if the politician has at least an undergraduate degree and zero otherwise. Male is a dummy variable that assumes the value one if the politician is male and zero otherwise. For all outcomes, we report both the simple OLS regressions results and the causal effect obtained with the shift-share IV approach. $Comp^W$ is defined as one minus the *anticipated* winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the upcoming election (i.e., 2012). $Comp^H$ is defined as one minus the *anticipated* HHI, that is, one minus the sum of squares of the vote share in the upcoming election (i.e., 2012). The regressions contain state fixed effects. We include in all specifications party control variables (the predicted party vote shares, the party vote shares in the baseline year, and the initial level of competition) and municipal control variables (demographics, economics, municipal expenditures, and electoral variables). See Table 2 for more details about municipal covariates. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6 – Effects of Electoral Competition on Campaign Financing: Candidates

	All Funds		Party Funds		Donations		Own Funds	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS	(7) OLS	(8) 2SLS
$Comp^W$	0.726*** (0.061)	0.990*** (0.104)	0.591*** (0.167)	1.001*** (0.335)	0.961*** (0.124)	1.343*** (0.210)	0.522*** (0.107)	0.655*** (0.183)
R-squared	0.611	0.609	0.318	0.317	0.478	0.476	0.171	0.171
F-stat excluded instrument		615.3		307.1		502.8		585.4
$Comp^H$	0.622*** (0.133)	1.161*** (0.255)	0.920** (0.373)	1.755** (0.769)	0.896*** (0.264)	1.855*** (0.483)	0.300 (0.214)	0.876* (0.466)
R-squared	0.606	0.604	0.318	0.317	0.473	0.470	0.169	0.167
F-stat excluded instrument		633.8		275.6		504.1		613.3
Mean Dep. Var.	10.93	10.93	8.892	8.892	10.02	10.02	9.417	9.417
N	5470	5470	4509	4509	5386	5386	5359	5359

Notes: This table reports the effects of the electoral competition on official campaign financing of candidates. The outcomes represent an average involving all candidates that ran the 2012 Brazilian mayoral elections in each municipality, including the elected politician. All outcomes are in \ln . We classify the information in categories according to the source of revenue: all funds, party funds, donations, and own funds. $Comp^W$ is defined as one minus the *anticipated* winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the upcoming election (i.e., 2012). $Comp^H$ is defined as one minus the *anticipated* HHI, that is, one minus the sum of squares of the vote share in the upcoming election (i.e., 2012). The regressions contain state fixed effects. We include in all specifications party control variables (the predicted party vote shares, the party vote shares in the baseline year, and the initial level of competition) and municipal control variables (demographics, economics, municipal expenditures, and electoral variables). See Table 2 for more details about municipal covariates. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7 – Effects of Electoral Competition on Campaign Financing: Elected Candidates

	All Funds		Party Funds		Donations		Own Funds	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS	(7) OLS	(8) 2SLS
$Comp^W$	0.462*** (0.075)	0.769*** (0.127)	0.079 (0.200)	0.496 (0.380)	0.524*** (0.143)	0.977*** (0.248)	0.289** (0.120)	0.394* (0.216)
R-squared	0.506	0.504	0.295	0.294	0.370	0.369	0.118	0.117
F-stat excluded instrument		609.3		254.0		478.3		552.8
$Comp^H$	0.528*** (0.165)	0.808*** (0.302)	0.993** (0.447)	1.423* (0.849)	0.913*** (0.309)	1.803*** (0.562)	-0.148 (0.269)	-0.152 (0.550)
R-squared	0.505	0.505	0.297	0.297	0.370	0.368	0.117	0.117
F-stat excluded instrument		639.3		291.2		509.0		581.2
Mean Dep. Var.	11.08	11.08	9.373	9.373	10.18	10.18	9.480	9.480
N	5369	5369	3260	3260	5012	5012	4671	4671

Notes: This table reports the effects of the electoral competition on official campaign financing of elected candidates that ran the 2012 Brazilian mayoral elections in each municipality. All outcomes are in *ln*. We classify the information in categories according to the source of revenue: all funds, party funds, donations, and own funds. $Comp^W$ is defined as one minus the *anticipated* winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the upcoming election (i.e., 2012). $Comp^H$ is defined as one minus the *anticipated* HHI, that is, one minus the sum of squares of the vote share in the upcoming election (i.e., 2012). The regressions contain state fixed effects. We include in all specifications party control variables (the predicted party vote shares, the party vote shares in the baseline year, and the initial level of competition) and municipal control variables (demographics, economics, municipal expenditures, and electoral variables). See Table 2 for more details about municipal covariates. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8 – Effects of Electoral Competition on Campaign Expenditure: Candidates

	All Expenditures		Advertising Expenditures		Other Expenditures	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS
$Comp^W$	0.732*** (0.061)	0.988*** (0.104)	0.665*** (0.065)	0.945*** (0.108)	0.903*** (0.101)	1.215*** (0.157)
R-squared	0.612	0.610	0.589	0.587	0.508	0.507
F-stat excluded instrument		615.3		607.3		602.5
$Comp^H$	0.626*** (0.133)	1.153*** (0.255)	0.445*** (0.140)	1.005*** (0.269)	0.974*** (0.205)	1.270*** (0.320)
R-squared	0.606	0.605	0.585	0.583	0.504	0.503
F-stat excluded instrument		633.8		622.0		615.7
Mean Dep. Var.	10.93	10.93	10.01	10.01	10.27	10.27
N	5470	5470	5463	5463	5463	5463

Notes: This table reports the effects of the electoral competition on official campaign expenditures of candidates. The outcomes represent an average involving all candidates that ran the 2012 Brazilian mayoral elections in each municipality, including the elected politician. All outcomes are in \ln . We have descriptions of expenditures in categories, and we classify the information in common categories: all expenditures, advertising expenditures, and other expenditures. $Comp^W$ is defined as one minus the *anticipated* winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the upcoming election (i.e., 2012). $Comp^H$ is defined as one minus the *anticipated* HHI, that is, one minus the sum of squares of the vote share in the upcoming election (i.e., 2012). The regressions contain state fixed effects. We include in all specifications party control variables (the predicted party vote shares, the party vote shares in the baseline year, and the initial level of competition) and municipal control variables (demographics, economics, municipal expenditures, and electoral variables). See Table 2 for more details about municipal covariates. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9 – Effects of Electoral Competition on Campaign Expenditure: Elected Candidates

	All Expenditures		Advertising Expenditures		Other Expenditures	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS
$Comp^W$	0.475*** (0.075)	0.788*** (0.127)	0.359*** (0.080)	0.658*** (0.136)	0.689*** (0.138)	1.129*** (0.259)
R-squared	0.514	0.512	0.475	0.474	0.318	0.317
F-stat excluded instrument		609.2		598.5		586.8
$Comp^H$	0.524*** (0.165)	0.842*** (0.301)	0.293* (0.174)	0.695** (0.331)	0.570 (0.414)	0.546 (0.425)
R-squared	0.513	0.513	0.476	0.475	0.317	0.317
F-stat excluded instrument		639.3		622.7		620.6
Mean Dep. Var.	11.08	11.08	10.15	10.15	10.35	10.35
N	5366	5366	5322	5322	5318	5318

Notes: This table reports the effects of the electoral competition on official campaign expenditures of elected candidates that ran the 2012 Brazilian mayoral elections in each municipality. All outcomes are in \ln . We have descriptions of expenditures in categories, and we classify the information in common categories: all expenditures, advertising expenditures, and other expenditures. $Comp^W$ is defined as one minus the *anticipated* winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the upcoming election (i.e., 2012). $Comp^H$ is defined as one minus the *anticipated* HHI, that is, one minus the sum of squares of the vote share in the upcoming election (i.e., 2012). The regressions contain state fixed effects. We include in all specifications party control variables (the predicted party vote shares, the party vote shares in the baseline year, and the initial level of competition) and municipal control variables (demographics, economics, municipal expenditures, and electoral variables). See Table 2 for more details about municipal covariates. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 10 – Effects of Electoral Competition on Performance

	IFGF											IFDM		
	Autonomy		Personnel Expenditures			Liquidity		Investment			Health		Education	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS		
$Comp^W$	-0.005 (0.018)	0.013 (0.030)	0.041** (0.019)	0.043 (0.034)	0.026 (0.020)	0.066* (0.037)	0.063*** (0.017)	0.055* (0.030)	0.002 (0.007)	-0.007 (0.012)	0.009** (0.004)	0.013** (0.006)		
R-squared	0.751	0.750	0.388	0.388	0.254	0.254	0.250	0.249	0.696	0.696	0.900	0.900		
F-stat excluded instrument	569.0		567.3		568.0		568.2		592.5		586.8			
$Comp^H$	-0.027 (0.039)	-0.009 (0.073)	0.145*** (0.040)	0.370*** (0.082)	0.021 (0.045)	0.097 (0.086)	0.130*** (0.036)	0.232*** (0.074)	0.007 (0.015)	-0.009 (0.029)	0.022*** (0.007)	0.061*** (0.015)		
R-squared	0.751	0.751	0.386	0.383	0.254	0.253	0.248	0.247	0.696	0.696	0.900	0.899		
F-stat excluded instrument	578.6		578.6		580.0		571.2		627.0		623.7			
Mean Dep. Var.	0.364	0.364	0.436	0.436	0.484	0.484	0.532	0.532	0.743	0.743	0.756	0.756		
N	5064	5064	5064	5064	5064	5064	5064	5064	5381	5381	5375	5375		

Notes: This table presents the effect of electoral competition on performance of the mayor in office. All outcomes are calculated as the annual average of each dimension in the term period 2013-2016. The values vary in the interval 0 to 1, where the higher values represent a more exceptional municipal performance in the respective dimension. Four outcomes represent the sub-indices of IFGF, which measure the efficiency of fiscal management of Brazilian municipalities. *Autonomy* evaluates the local capacity to generate sufficient resources to finance the structure of the municipal public administration (cost of maintaining the city council and the administrative function of the executive branch). *Personnel expenditures* evaluates the degree of rigidity of the municipal budget, that is, this dimension evaluates the commitment of budget with personnel expenditures in municipal public service. *Liquidity* evaluates the municipal capacity in fulfilling the contracted financial obligations, that is, it assesses whether the municipal management has sufficient financial resources to cover the expenses that postponed to the following year. *Investments* evaluates the share that investments occupy in the municipal budget. The last two outcomes, *Health* and *Education*, represent the sub-indices of IFDM that measure the level of human and socioeconomic development of Brazilian municipalities in these areas. $Comp^W$ is defined as one minus the *realized* winning margin, that is, one minus the margin between the vote share of the incumbent party and the vote share of the runner-up (the strongest opposition) in the past election (i.e., 2012). $Comp^H$ is defined as one minus the *realized* HHI, that is, one minus the sum of squares of the vote share in the past election (i.e., 2012). The regressions contain state fixed effects. We include in all specifications party control variables (the predicted party vote shares, the party vote shares in the baseline year, and the initial level of competition) and municipal control variables (demographics, economics, municipal expenditures, electoral and performance variables). See Table 2 for more details about municipal covariates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1