

# Interest Groups' Contributions and Political Selection: Evidence from Brazil

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## Abstract

While the role of interest groups' contributions in shaping policies has been well-studied, little is known about their effects on political selection and electoral outcomes. This paper studies a Brazilian reform that banned firms' contributions to provide evidence in this regard. I use a weighted differences-in-differences strategy exploiting variation in municipalities' and candidates' dependence on firms' funding before the reform. I find that the ban had little effect on political competition. However, it deteriorated the electoral advantage of low-educated incumbents and of incumbents from traditional political parties. The negative effects for incumbents are concentrated in oil-dependent municipalities, where rent-seeking is more likely, and in localities with lower economic growth and higher mortality rates. These results are consistent with the reform crowding out incumbents who heavily relied on the financial advantage to be re-elected rather than on a good performance while in power.

**Keywords:** interest groups contributions, quality incumbency advantage, financial incumbency advantage, political selection.

**JEL Codes:** D72, D73, H70.

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# 1 Introduction

Campaign contributions from interest groups have been primarily analyzed in the literature as a means of influencing policies.<sup>1</sup> In spite of this, 75% of countries that hold elections allow corporate donations to candidates (IDEA, 2020).<sup>2</sup> This paper asks whether financial support from interest groups also shapes the type of candidates who run for office as well as their probability of being elected. Addressing this question is important because politicians' characteristics matter for socio-economic outcomes at multiple levels.<sup>3</sup> By affecting political selection, money in politics could shape a much broader set of policies and outcomes than the one interest groups directly target.

The lack of empirical evidence on the effects of interest groups' contributions on candidates' selection and electoral outcomes can be explained by two main challenges. First, we rarely observe exogenous changes in interest groups' contributions. Second, we need data on the entire pool of candidates' characteristics and funding sources to analyze these effects. In this paper, I exploit the Brazilian 2015 electoral reform that banned firms' contributions in political campaigns to provide causal evidence on this matter.

To identify the effects of the 2015 nationwide electoral reform, I argue that municipalities and candidates were differently exposed to the reform according to their previous level of dependence on firms' contributions. Using this variable as the level of *treatment*, my empirical strategy amounts to a differences-in-differences approach at the municipality and at the candidate level. In this setting, selection into treatment can still threaten the estimation of the causal effects. Units (municipalities or candidates) that received a higher amount of corporate donations before the adoption of the reform may have different observable and unobservable characteristics that are endogenous to the amount of firms' contributions. To

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<sup>1</sup>See e.g. Bertrand et al. (2014); Fowler et al. (2020); Grossman and Helpman (1994); Imai et al. (2009); Kroszner and Stratmann (1998).

<sup>2</sup>This share is calculated over the 169 countries without missing data.

<sup>3</sup>See e.g. Alesina et al. (2019); Besley (2005); Besley et al. (2011); Brollo and Troiano (2016); Brown (2020); Chattopadhyay and Duflo (2004); Dal Bó and Finan (2018); Dreher et al. (2009); François et al. (2020); Jochimsen and Thomasius (2014); Lahoti and Sahoo (2020); Mercier (2016); Peveri (2021).

overcome this issue, I use weighted regressions where weights are calibrated to ensure comparable groups of units across different levels of treatment on selected covariates. The weighting accounts for time-variant selection on observables, while the differences-in-differences strategy deals with time-invariant selection on unobservables.

I find that interest groups' contributions were not fully compensated by alternative sources after the ban. Consequently, campaign spending decreased more in those municipalities where candidates used to rely more on corporate funds. However, the reform has minor composition effects at the aggregate level. The pool of candidates was stable in terms of size, total wealth, and entry of new candidates. Political competition outcomes, such as the margin of victory or the Herfindahl-Hirschman index, were also unaffected. At the candidate level of analysis, female candidates who relied on firms' funds were less likely to re-contest than men. This effect varies from  $-7\%$  to  $-20\%$  depending on the incumbency status and the level of firms' dependence.

The reform resulted in a significant drop in the probability of winning for incumbents with specific characteristics, suggesting that corporate contributions were relevant for the selection of elected politicians. In particular, low-educated incumbents and incumbents from big parties who were previously relying on firms' contributions lost around 5% of their share of votes. In contrast, graduate incumbents and incumbents from small parties kept their previous level of electoral support. The effects are non-monotonic as they are concentrated in incumbents with intermediate levels of firms' dependence rather than in high-dependent ones. The latter were better able to substitute their contributions with alternative fundings, curbing the electoral effects of lower funds.

Among incumbents with a moderate level of firms' dependence, the heterogeneity among educational levels and party size is not driven by differences in re-contesting decisions or in abilities to compensate for firms' funds. On the contrary, heterogenous spillover effects are at play. More precisely, the number of challengers after the reform increased in municipalities run by low-educated incumbents or incumbents from a big political party who were previously

funded by firms. Yet, the effects on electoral outcomes persist even when controlling for candidates' entry and variation in contributions. This highlights differences in marginal returns of contributions across individual characteristics as a complementary mechanism.

I present a theoretical framework that helps to interpret the empirical findings. I build on the interaction between the financial and the quality incumbency advantage. Low-performant incumbents rely more on campaign spending to manipulate voters' perception of their quality. This can explain why, for a given drop in contributions and a given entry of challengers, high-educated incumbents were less penalized by voters than non-graduate officeholders. The mechanism would be the same for the heterogeneity with respect to party size if, conditional on being funded by firms, candidates from big parties were more prone to rent-seeking behaviors. I further assume that the entry of challengers inversely depends on the incumbent's probability of winning. Therefore, for a given drop in incumbent's contributions, challengers are more prone to run for office if there is a low-quality incumbent rather than a high-performant politician holding power. This is consistent with the aforementioned heterogeneous spillover effects. Finally, I model total contributions as a sum of different types of donors' contributions, who give different weights to each candidate's characteristic. Hence, the reform may penalize candidates who have difficulties in fund-raising despite their level of performance, explaining the lower likelihood of female candidates in re-contesting.

I provide additional evidence in favor of the interaction between the financial and the quality incumbency advantage by using alternative proxies for quality: (i) a dummy to identify incumbents associated with a high local economic growth; (ii) a dummy to assess high levels of mortality rates in the municipality and (iii) a dummy to identify oil-dependent municipalities. Regarding the latest, [Caselli and Michaels \(2013\)](#) provide evidence that oil revenues in Brazilian municipalities do not translate into improvements in welfare-relevant outcomes, but they are instead associated with a high level of corruption. I find that the adverse effects for incumbents' electoral advantage are concentrated in oil-dependent municipalities and in municipalities where incumbents were associated with low economic performance and high

mortality rates. This result reinforces the claim that banning interest groups' contributions mostly affected the electoral prospects of low-quality incumbents. Moreover, results are robust when controlling for candidates' declared wealth, which can be correlated with other individual characteristics such as educational level, gender and party orientation.

This paper contributes to the literature on interest groups' effects in politics. There is no consensus on how interest groups affect electoral outcomes. One view is that interest groups contribute to candidates to buy political influence. Accordingly, contributions can be assimilated to an investment that will only pay off if the recipient wins the election. As a result, interest groups will tend to contribute more to the electoral favorite ([Grossman and Helpman, 2001](#)). An alternative argument is that interest groups can increase the probability of winning of the candidates they support by boosting their resources for campaign spending, leading to a self-fulfilling prophecy.<sup>4</sup> These upshots are especially relevant for incumbents. Since incumbents usually enjoy good electoral prospects, their higher attraction of corporate contributions can be a plausible source of their electoral advantage or a simple correlation ([Fouirnaies and Hall, 2014](#)). To the best of my knowledge, there is only one recent work providing empirical evidence in this regard. [Fouirnaies \(2021\)](#) analyzes candidates who ran for the Party Labour in the UK parliamentary elections and finds that candidates who were sponsored by trade unions electorally out-performed other ones. He focuses on revealing the mechanisms through which interest groups can affect electoral outcomes. He finds that those effects are mainly driven by the role of interest groups in preliminary stages by increasing candidates' probability of being nominated in constituencies where their party has high electoral support. Using a very different setting, where first stage nominations do not play a role, I provide further evidence that interest groups' contributions affect the likelihood of a candidate being elected.

This paper generally speaks to the large literature which studies the sources of the incumbency advantage. In particular, a quality advantage relative to challengers has been

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<sup>4</sup>For the literature of the effects on campaign spending on electoral outcomes see [Bombardini and Trebbi \(2011\)](#); [Levitt \(1994\)](#), among others.

pointed out by [Ashworth and Bueno de Mesquita \(2008\)](#) and [Eggers \(2017\)](#). On the other side, [Fouirnaies and Hall \(2014\)](#) use legislative races for the US to provide evidence of the existence of a financial incumbency advantage, primarily triggered by access-oriented interest groups' contributions. However, there is a lack of empirical evidence for this financial advantage as a source of electoral success that this paper aims to fill in. My results suggest that there is a causal effect for low-educated incumbents and incumbents from big parties.

Closely connected is the scarce literature on the effects of interest groups' contributions on politicians' selection. [Coate and Morris \(1995\)](#) assume that only “*bad*” politicians are willing to deviate from citizens' ideal policies to favor special groups in exchange for money. If that is the case, interest groups' campaign contributions are likely to go towards politicians of lower quality. Further, if different donors sponsor different types of politicians, as suggested by [Barber \(2016\)](#) and [Hall \(2014\)](#), the pool of contributors can be an important determinant of the pool of candidates. I provide evidence that corporate donations have little effect on the selection of the pool of candidates but significantly affect the selection of elected politicians.

Finally, this paper relates to the literature on campaign funding reforms. In particular, [Avis et al. \(2021 forthcoming\)](#) analyze the other big component of the 2015 Brazilian reform, the introduction of campaign spending limits. They find that stricter limits lead to a larger pool of candidates that is on average less wealthy and they also reduce the probability that mayors are re-elected. This paper adds to the understanding of the overall effects of the aforementioned electoral reform. Moreover, studying the ban of corporate donations is particularly relevant as it can be followed by the vast majority of electoral democracies. I show that in Brazil the reform led to a better selection of elected politicians. Further research is encouraged for the external validity of this result.

The remainder of the paper is organized as follows. Section 2 describes the institutional context of Brazilian municipal elections, the background of the reform, the data and the empirical strategy. The results are presented in Section 3, following by a theoretical framework to interpret the results in Section 4 and robustness in Section 5. Lastly, Section 6 contains

concluding remarks.

## 2 Empirical framework

### 2.1 Institutional context

This paper focuses on candidates who run for mayor positions in Brazilian municipalities. Elections occur once every four years. Mayors are elected by absolute majority vote through a two-round system and face a term limit after their second consecutive term. Voting in Brazil is mandatory for all literate citizens over 18 and under 70, and optional for illiterate citizens, the ones aged 16 and 17, and those older than 70.

Mayors are important political figures in Brazil. They are the executive authority at the local level, responsible for providing public services, urban planning, raising local taxes, and administering the municipality's budget.

I exploit the 2015 electoral reform introduced of campaign funding regulation. This law bans contributions from firms and imposes campaign spending limits.<sup>5</sup> This reform was a response to the revelations of Operation Car Wash (*Operação Lava Jato*) which disclosed a large-scale corruption scandal in Brazil, mostly related to money laundering, and led to the incarceration of several influential businessmen and politicians. Much of the bribery was connected to the Brazilian construction firm Odebrecht which paid billions of dollars, mainly in the form of legal campaign contributions, to several Latin politicians in exchange of over-inflated public contracts.

### 2.2 Data

Data on contributions and candidates' characteristics is rich in Brazil. All candidates and parties have to open a bank account to be used for campaign purposes exclusively. For

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<sup>5</sup>New aspects such as the creation of a public fund to finance part of electoral campaigns based on performance clauses and the changes on individual contributions limits were voted but were from 2020 only, which I do not add to the analysis.

each donation made, the information about the donor and the amount of the contributions is publicly available. Besides, the *Tribunal Superior Eleitoral* provides information about candidates' characteristics such as name, gender, age, occupation, level of education and political party. I use candidates' characteristics and campaigns contributions data from 2004, 2008, 2012 and 2016 elections.

Table 1 shows some descriptive statistics about candidates running for mayor in the sample of elections. Brazil's politics is characterized by multi-party competition (34 parties were present in the last local elections). The percentage of men was around 87% in 2012 and 2016, with a mean age of 49 years old. About half of the candidates under consideration do not have a university degree. Another fact of particular relevance is that the occupational category with the highest level of representation among challengers is businessmen, which could reinforce the influence firms have in politics.

Before the reform, firms were responsible for around 15% of the campaign resources. After it, candidates relied relatively more on their own resources and contributions from citizens. We can observe a reduction of the mean and the median campaign donations after the 2015 electoral reform took place. However, the standard deviations of all these variables suggest a high heterogeneity across parties and candidates. Information regarding economic sectors of corporate donors is only available from 2012 and are listed in Appendix A3 ranked according to 2012 donations size. The category which is ranked first is *Building construction*. Other related construction sectors, such as *Construction of highways and railways* and *Construction of water supply networks, sewage collection, and related constructions* appear 3<sup>rd</sup> and 19<sup>th</sup> respectively in the ranking. Real estates and related financial corporations also have an important weight in candidates' funding. To complement the analysis, I report in Table A4 the most repeated words in firms' names in the three elections before the reform. The main words used in corporations' names among donors are "trade", "office" and "construction". Together with the Car Wash's revelations aforementioned, it raises alarm bells on a potential trade between firms' contributions and over-rated construction public leases.



Table 1: Descriptive statistics.

	2004	2008	2012	2016
Mean number of candidates per municipality	2.8	2.6	2.5	2.8
Number of political parties (total)	27	27	29	34
Percentage of males	90%	89%	87%	87%
Mean age	47.8	48.7	48.7	49.3
<b>Level of education</b>				
Lower than high-school	25.50%	22.32%	17.51%	16.03%
High-school	24.59%	25.38%	26.63%	25.81%
University incomplete	7.53%	7.93%	6.97%	6.21%
University complete	42.38%	44.37%	48.89%	51.96%
<b>Occupation</b>				
Mayor	15.61%	21.91%	17.19%	17.26%
Businessman	5.52%	8.49%	11.43%	12.86%
Agricultor	11.82%	10.31%	9.28%	8.33%
Public officer	9.25%	8.34%	10.66%	10.46%
Merchant	10.23%	8.26%	6.13%	5.26%
Professor	5.30%	5.05%	5.29%	5.14%
Lawyer	5.33%	4.73%	5.12%	5.70%
<b>Campaign funding</b>				
Mean total campaign contributions	54,830 R\$ (161,943)	94,998 R\$ (550,385)	154,079 R\$ (759,115)	92,708 R\$ (31,5189)
Average % funding by firms	16.77% (28%)	15.14% (24%)	13.85% (22%)	
Average % funding by party's resources	11.71% (29%)	18.46% (30%)	21.23% (31%)	13.41% (24%)
Average % funding by citizens	31.68% (34%)	35% (31%)	32.41% (29%)	44.95% (33%)
Average % own funding	36.89% (39%)	31.12% (33%)	32.34% (32%)	41.54% (33%)
Average % other funding	0.29% (0.15%)	0.02% (0.54%)	0.0004% (0.02%)	0.008% (0.18%)
<b>Campaign funding and electoral outcomes</b>				
% of races won by the candidate who received more contributions	63%	67%	60%	64%
% of races won by the candidate who received more firms' contributions	57%	55%	52%	
% of races won by the incumbent <sup>(1)</sup>	57%	68%	57%	48 %

Data is taken from *Tribunal Superior Eleitoral (TSE)*. <sup>(1)</sup> races are restricted to elections in which the incumbent contests for re-election. Standard deviations are in parenthesis. There is a total of 5,556 municipalities in 2004; 5,541 in 2008, 5,541 in 2012 and 5,568 in 2016.

The bottom part of Table 1 displays some numbers that illustrate the importance of money in politics. In more than 60% of races the candidate who received the most contributions was the one who won, and in more than half of the elections, the individual who attracted more corporate contributions.

Interestingly, the percentage of races won by the incumbent, conditional on the incumbent re-contesting, was about 57% to 68% in the elections before the reform and dropped down

to 48% afterward. This drop in the electoral advantage may not only be a consequence of the ban of interest groups, but it could also arise from the economic recession or from the introduction of spending limits.

In order to test whether different donors support different candidates, I regress the contributions of each group of donors with respect to candidates' characteristics before the reform took place. Figure 1 and Appendix A1 display the coefficient estimates. While gender is not significant in attracting party or firms contributions, citizens favor more female incumbents, but women contribute less to their own campaign than men. Candidates from the extreme parties received significantly fewer contributions from citizens, but also from firms and parties, and the effect is of similar magnitude.

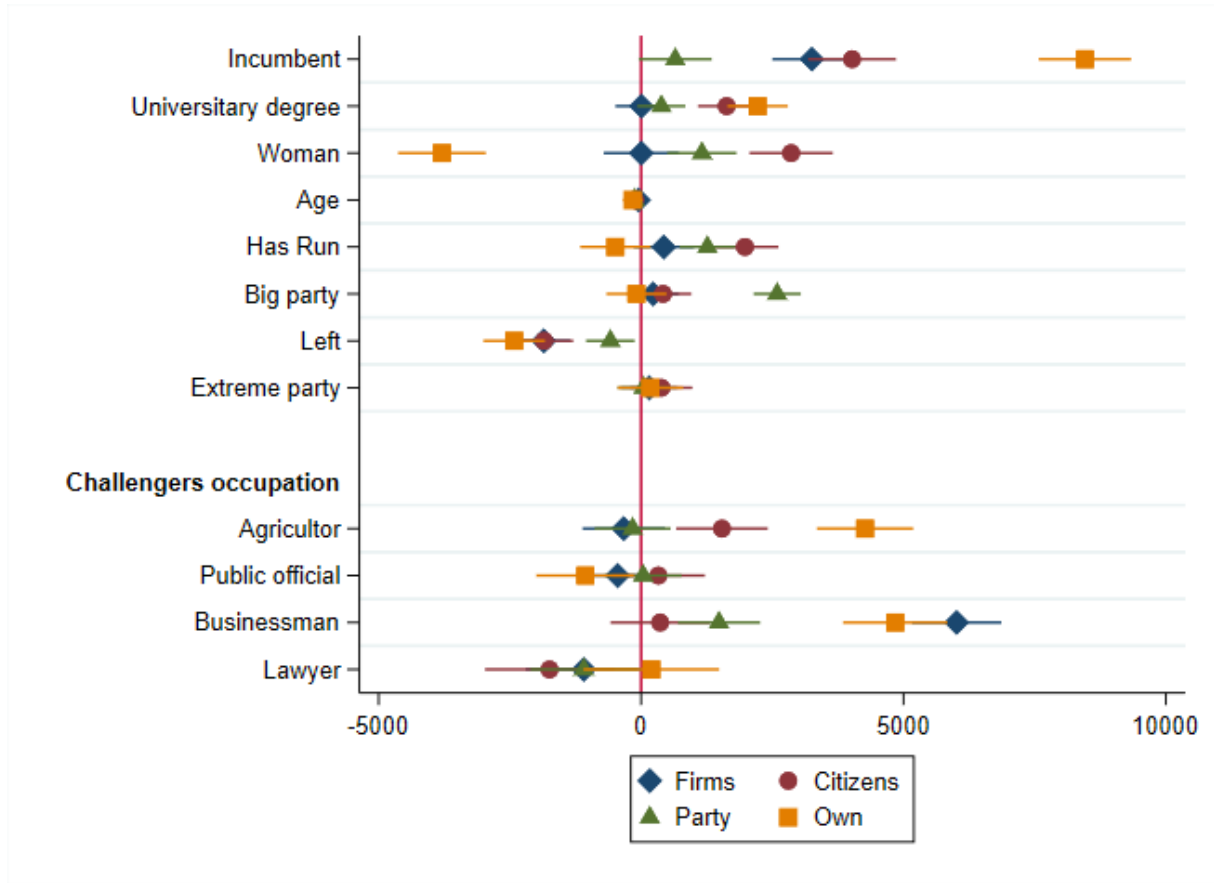
The financial advantage of incumbents is important for the purposes of this paper. Figure 1 shows that everything else equal, they received higher amounts from all types of donors, supporting the existence of a financial incumbency advantage documented by [Fourinaies and Hall \(2014\)](#). When restricting the sample to incumbents (see Appendix A), individual covariates are not explicative of firms' contributions, and only the initial level of local GDP is significant. However, there are important differences between citizens' and candidates' own contributions, which could have implications for the reform analysis if candidates substitute interest groups' funds with these alternative sources. Indeed, if different candidates have different fund-raising costs, banning contributions from a kind of donor may have effects on the selection of candidates.

The most direct mechanism through which contributions can affect electoral outcomes is through campaign spending.<sup>6</sup> Table A5 from Appendix A shows the spending categories for candidates' running for mayor for each election, revealing that candidates mostly spend on advertising, especially through printed materials, employees, and lease of vehicles and real

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<sup>6</sup>However, recent research suggests that interest groups' contributions can also affect candidates' nomination in a first stage ([Fourinaies, 2021](#)) and candidates' manifesto ([Cage et al., 2021](#)).

Figure 1: Donors' contributions and candidates' characteristics.



The graph plots the coefficients corresponding to four OLS regressions where the dependent variables are contributions by one category of donors (firms, citizens, party and the candidate himself) and as regressors candidates' characteristics, population, initial local GDP, year, and regions (i.e the 26 Brazilian states) fixed-effects. The sample is restricted to elections before the reform (2004, 2008 and 2012). Contributions are expressed in reais at 2004 prices. Standard errors are clustered at the municipality level.

estate.<sup>7</sup>

## 2.3 Methodology

I consider the reform of banning interest groups' contributions as a quasi-natural experiment where, even though all the municipalities and candidates were affected by the reform at the same time, some of them were more or less exposed according to how much they were de-

<sup>7</sup>Comparison across elections is limited because of changes in categories' aggregation for spending. The non-comparable years are 2004 and 2008. In 2004 donations in kind were not treated differently from others and categories correspond only to the expending type (publicity, employees, leases, etc.). Yet, in 2008 all donations in kind were grouped together, mixing in this category spending of all types.

pendent on interest groups' funds. I implement a differences-in-differences strategy following equation (1).

$$y_{u,t} = \alpha + \phi \text{ Firms' dependence}_{u,t} + \gamma \text{ Firms' dependence}_{u,t} * 2016 + \delta_r * \delta_t + \epsilon_{u,t} \quad (1)$$

where  $y_{u,t}$  is the outcome for unit  $u$ , firms' dependence $_u$  is the treatment variable,  $\delta_r$  are regions' fixed-effects and  $\delta_t$  are year fixed-effects. The coefficient paired with the interaction between firms' dependence and the year after the reform ( $\gamma$ ) captures the effect of the ban of interest groups.

There are two important issues to adress. First, the definition of the treatment and the unit of analysis and second, selection into treatment.

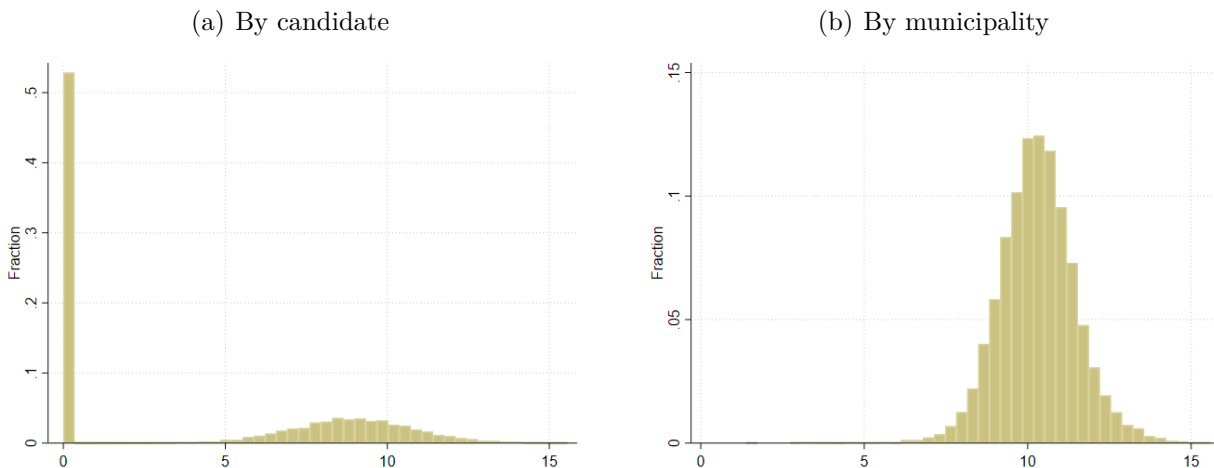
### **Treatment definition and units of observation**

I will use two levels of analysis: a treatment defined at the municipality level and a second at the candidate level. The first has the advantage of assessing the reform's effects on aggregate outcomes, such as the composition of the pool of candidates, the margin of victory, and the entry of new candidates. However, as the treatment aggregates information on all the candidates from a given municipality, it does not identify selection effects at the individual level. The reverse applies to the candidate-level treatment.

Figure 2 shows that corporate contributions were not equally distributed. Sub-figure (a) reveals that a high proportion of candidates (51%) on the three elections before the reform did not receive any donation from firms; these individuals will be used as control group. When aggregation is made at the municipal level, the existence of a control group is not clearly delimited as in the vast majority of municipalities at least one candidate received some amount of firms' donations. In other words, there are not enough municipalities that were completely unfunded by firms. For this reason, when the analysis is performed at the municipality level, I will use a continuous treatment corresponding to the percentage that

firms' contributions represented on the total amount of contributions, averaged on the three elections before the reform.<sup>8</sup> At the individual level, I divide the treated group, i.e candidates whose campaigns were partly sponsored by firms, into two categories: mid-dependent and high-dependent individuals according to whether they were below or above the median of the distribution of firms' contributions. Section 5 provides alternative definitions for the reform exposure for each unit of analysis.

Figure 2: Density of firms' contributions before 2016 (in log.).



Sub-figure (a) shows the density of the log. of firms' contributions funded by firms, expressed in constant prices, in the Brazilian elections for candidates running for mayors in 2004, 2008 and 2008. Sub-figure (b) shows the density of the log. of firms' contributions, expressed in constant prices, averaged per candidate at the municipality level funded by firms in the same election. The log is replaced by 0 if firms' contributions equals 0.

A recent work by [Callaway et al. \(2021\)](#) studies the interpretation of the parameters and the underlying assumptions in cases where the treatment is continuous in the differences-in-differences framework. Several cautions have to be taken with respect to the binary treatment case and a parallel with the dose-response setting helps to the understanding. [Callaway et al. \(2021\)](#) show that under parallel trends assumption on untreated potential outcomes, the average treatment effect of a dose  $d$ , among those who received dose  $d$  ( $ATT(d|d)$ ) is nonparametrically identified, contrary to the average treatment effect  $ATE(d)$  which may

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<sup>8</sup>This approach is similar to the one used in the seminal work by [Card \(1992\)](#) where, to evaluate a national reform of a minimum wage, he relies on the regional variation of the share of workers earning less than the minimum wage.

not be identified in case of selection bias.<sup>9</sup> For the latter to be identified, one needs to make a stronger parallel trend assumption which states that there can be some selection into a particular dose but, on average across exposure levels, there is no selection into a specific level. The authors also state that in the absence of selection bias both  $(ATT(d|d))$  and  $ATE(d)$  are the same.

## Selection into treatment

In the reform under consideration, the fact that localities and candidates attracted more or less money from interest groups may be related to observable and unobservable characteristics that may not only invalidate the parallel trends assumption but also threaten the causal interpretation of the treatment effect. To deal with this issue, I use weighted regressions to have comparable units across different levels of treatment. The weights are obtained using an entropy balancing approach developed by [Hainmueller \(2012\)](#) and extended by [Tübbicke \(2020\)](#) for continuous treatments. It is a data processing approach that calibrates weights in order to exactly adjust inequalities in representation with respect to the first, second, and possibly higher moments of the covariate distributions ([Hainmueller, 2012](#)). This method has been proved to be successful in eradicating correlations between covariates and the continuous treatment variable even when selection into treatment is strong ([Tübbicke, 2020](#)).<sup>10</sup>

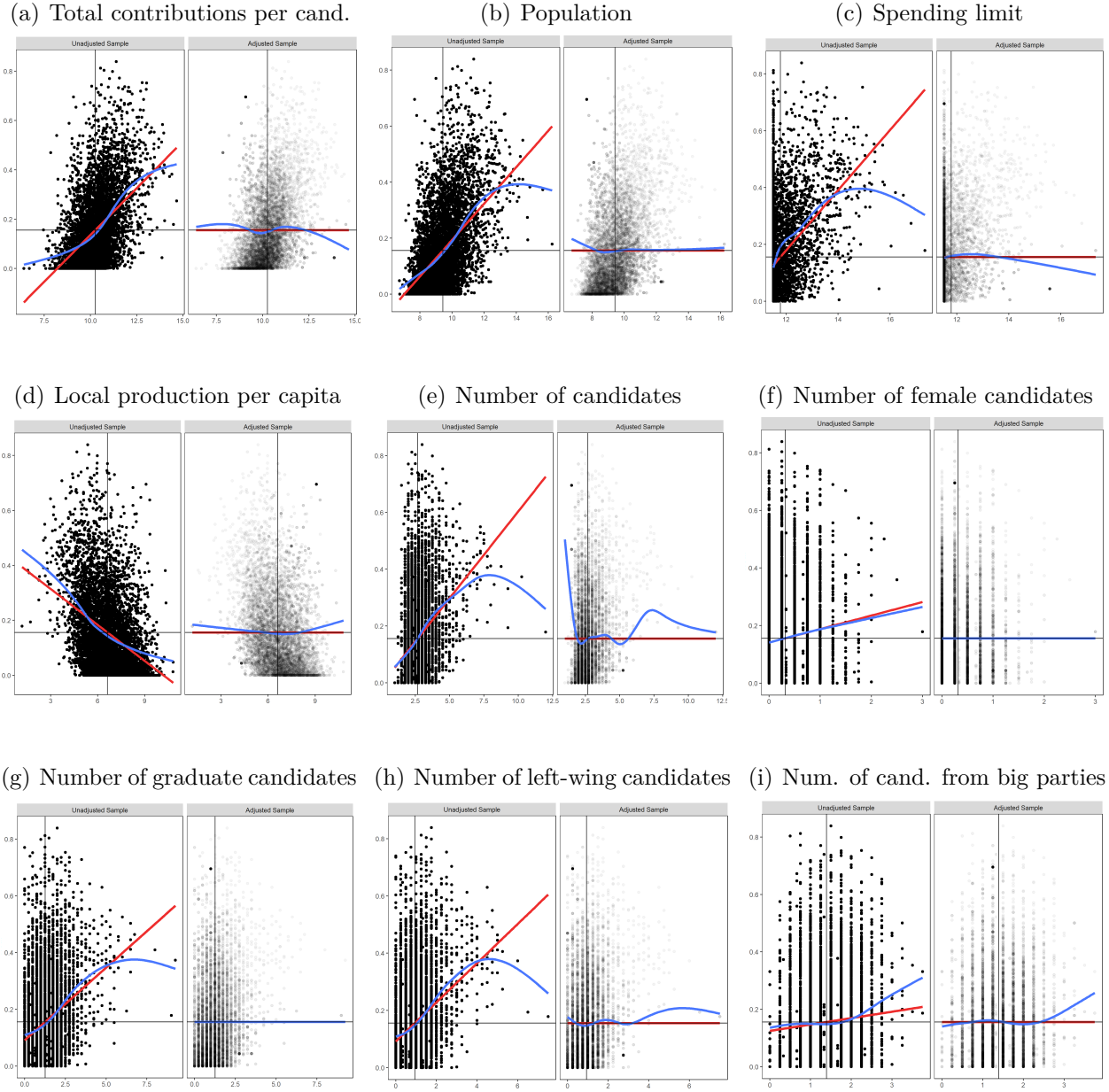
Figure 3 shows the balance of covariates before and after the weighting process for the analysis at the municipal level. It shows that the higher the percentage that corporate contributions represented before the reform (measured by the y-axis), the higher the total level of contributions, the number of candidates of different categories, of population, the spending limit introduced in 2016 and the lower the local per capita GDP. After the weighting procedure instead, all the correlations between the treatment and the selected covariates

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<sup>9</sup>Dose denotes the degree of exposure to the treatment.

<sup>10</sup>[Tübbicke \(2020\)](#) shows that this weighting scheme is double-robust and has several advantages with respect to the generalized propensity score method in achieving covariate balance.

Figure 3: Distributional balancing of selected covariates at the municipal level.



The y-axis measures the treatment used at the local level, i.e. the average percentage that firms' contributions represented on the total local contributions in the three years before the reform. The red line represents the linear fit and the blue curve a smoothed fit. The adjusted sample corresponds to the weighted sample where weights are calibrated using an entropy balancing method for continuous treatment. Contributions, population, spending limit and the local production per capita are in log terms.

become flat, ensuring comparable samples. Similarly, Appendix B10 plots the distributions of the covariates for candidates. Candidates who received firms' donations had an overall higher

level of total contributions, they were more likely to run in more populated municipalities, and in municipalities with more candidates. There are small differences between the level of firms' dependence across gender, party size and party wing. However, the higher the degree of firms' dependence, the higher the proportion of graduate candidates and of incumbents (sub-figures B10 (f) and (i) respectively). The entropy balancing method is highly performant in achieving covariate balancing, as is shown by the distribution of covariates in the adjusted sample.<sup>11</sup>

By including the amount of total contributions as a covariate, the main difference between the control and treated group is the composition of the pool of donors. Further, I also account balance the spending limit introduced in 2016. Therefore, the aim is to compare municipalities (or candidates) with similar characteristics, received a similar amount of total contributions and that were exposed to similar levels of spending limit, but with the key difference that in the second group firms were part of the pool of donors.

Using those weights and the treatments previously defined I estimate equation (1).

### 3 Results

In this section, I analyze the effects of the reform on the pool of candidates, on political competition and on the incumbency advantage. Section 3.1 uses municipalities as units of analysis, while section 3.2 focuses on candidates.

#### 3.1 Effects of banning firms' contributions on aggregate outcomes

Table 2 shows that in municipalities more dependent on firms' contributions the reform had a significant negative effect on candidates' average level of contributions, implying that candidates were not able to fully compensate the loss of firms' money. It is however possible to

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<sup>11</sup>Another advantage of this method, as highlighted by Tübbicke (2020) is that it avoids extreme weights. At the local level of analysis, the weight range is from 0 to 34, and at the individual one, it goes from 0 to 19.



observe in columns (2), (3) and (4) that corporate contributions were highly compensated by party funding, self funding and citizens' donations, making the contributions' structure of municipalities who used to receive donations from firms very similar to the less dependent ones. As expected, the average drop in contributions is translated into less campaign spending (see column (5) of Table 2). The effects are stronger when restricting the sample to those municipalities where the incumbent does not face a term limit, as displayed in Panel B. This is consistent with incumbents being the most affected by the reform as they were the candidates who enjoyed higher funding from firms. Figure 4 provides evidence for parallel trends before the reform using the adjusted sample described in the previous section. As a matter of fact, parallel trends are violated when using an unweighted estimation as shown in Figure B7 of Appendix B.

In Table 3 I test whether the reform shaped the characteristics of the pool of candidates given that different candidates may have different abilities to substitute contributions, as well as different incentives to run for office. I find that preventing interest groups' contributions encouraged the entry of left-wing candidates and discouraged the ones from traditional parties when the incumbent did not face a term limit (Panel B). An interpretation is that as left-wing candidates (candidates from big parties) were relatively less (more) funded by firms (see Figure 1), this reform may have rebalanced this relative disadvantage (advantage). However, those effects are small in magnitude. A 1% increase in the percentage of contributions funded by firms before the reform corresponds to an increase of 0.03 in the entry of left-wing candidates and a decrease of the same magnitude in candidates from the five biggest parties in the aftermaths of the ban. Parallel trends regarding candidates' characteristics are plotted in Figure B8 of Appendix B and they hold for all outcomes.

The last set of results encompasses the incumbency advantage. Following the same methodology, I compare the probability of incumbents to be re-elected conditional on re-contesting across the local level of firms' dependence.<sup>12</sup> Column (1) of Table 4 shows that on

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<sup>12</sup>Weights are re-estimating for each sample restriction.

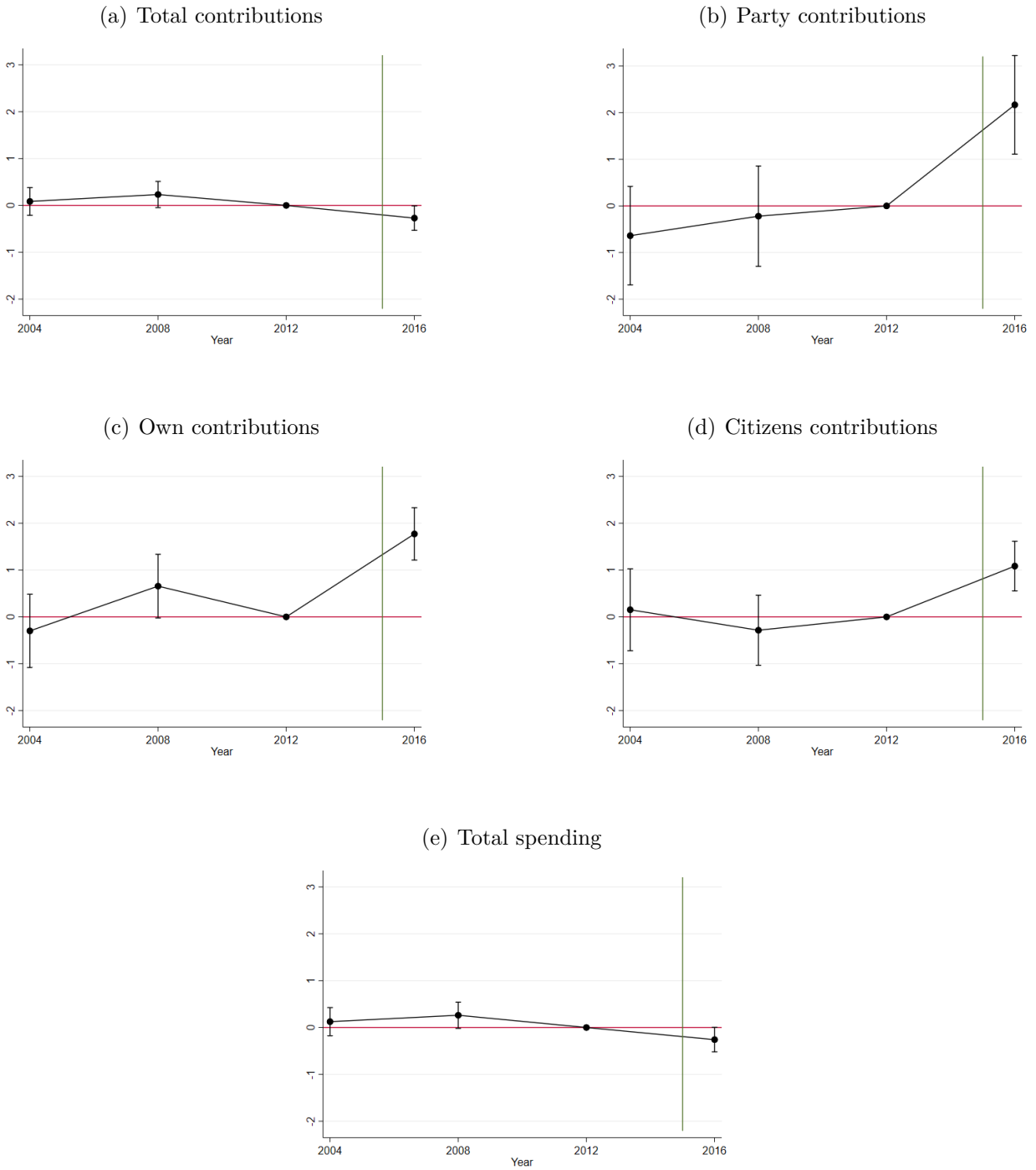
average incumbents from municipalities where candidates relied more on firms' contributions are not different in their probability of winning than others after the reform. However, all incumbents were 7% less likely to be elected for their second term in 2016 elections, which can be explained either by the economic recession, which impacts local revenues and public spending, and/or by the repercussions of the Car Wash scandal on voters' perception of incumbents. I account for heterogeneity with respect to incumbents' characteristics, by estimating a triple differences-in-differences (columns 2–6 of Table 4). Column (3) shows a

Table 2: The effects of banning firms' contributions on campaign contributions and spending.

	(1)	(2)	(3)	(4)	(5)
Panel A: All municipalities					
	Total contributions	Party contributions	Own contributions	Citizens contributions	Total spending
2016	0.155 (0.216)	4.768*** (0.901)	-1.341* (0.759)	0.194 (0.271)	0.170 (0.216)
Firms' dependence	0.032 (0.060)	-2.937*** (0.222)	-2.352*** (0.154)	-1.003*** (0.177)	0.055 (0.060)
Firms' dependence * 2016	-0.377*** (0.103)	2.450*** (0.437)	1.648*** (0.200)	1.130*** (0.214)	-0.387*** (0.103)
Constant	9.922*** (0.163)	3.545*** (0.724)	8.478*** (0.376)	8.911*** (0.240)	9.900*** (0.161)
Observations	22,282	22,282	22,282	22,282	22,108
R-squared	0.182	0.192	0.101	0.172	0.181
Panel B: Municipalities where the incumbent can re-contest					
	Total contributions	Party contributions	Own contributions	Citizens contributions	Total spending
2016	0.121 (0.219)	4.954*** (0.963)	-1.108 (0.787)	0.126 (0.278)	0.137 (0.219)
Firms' dependence	0.161** (0.071)	-2.552*** (0.252)	-2.271*** (0.186)	-0.908*** (0.217)	0.192*** (0.072)
Firms' dependence * 2016	-0.490*** (0.125)	1.887*** (0.500)	1.617*** (0.239)	1.109*** (0.262)	-0.512*** (0.126)
Constant	9.962*** (0.162)	3.353*** (0.755)	8.447*** (0.411)	8.949*** (0.241)	9.937*** (0.162)
Observations	17,040	17,040	17,040	17,040	16,889
R-squared	0.187	0.194	0.103	0.172	0.186
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					

Weighted least-squares estimates. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. Weights are calibrated using an entropy balancing method for continuous treatment (see Section 2). All variables are averaged per candidate and are expressed in constant prices and in log terms. All regressions include regions times year fixed-effects. Panel B excludes municipalities where the incumbent faces a term limit. Contributions are expressed in log terms and average per candidate.

Figure 4: Trends of contributions and spending.



The graphs show the evolution of the average treatment effects on different elections using a weighted least-squares estimates. The treatment is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. Weights are calibrated using an entropy balancing method for continuous treatment (see Section 2). All variables are averaged per candidate and are expressed in constant prices and in log terms. All regressions include regions times year fixed-effects.

Table 3: The effects of firms' contributions on candidates' entry.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: All municipalities									
	Number of candidates	Re-contesting probability of the incumbent	Number of insider challengers	Number of new candidates	Number of female candidates	Number of graduate candidates	Average wealth per candidate	Left-wing candidates	Candidates from big parties
2016	0.624** (0.310)	0.186 (0.161)	1.064*** (0.206)	-0.626 (0.389)	0.202 (0.182)	0.723** (0.321)	11.590*** (0.255)	-0.247 (0.211)	0.373 (0.235)
Firms' dependence	-0.258 (0.175)	-0.037 (0.059)	-0.114 (0.079)	-0.107 (0.116)	-0.093* (0.051)	-0.207** (0.100)	-0.541** (0.223)	-0.251** (0.117)	0.036 (0.087)
Firms' dependence * 2016	0.170 (0.310)	0.089 (0.129)	0.077 (0.194)	0.004 (0.245)	0.193 (0.130)	0.110 (0.236)	0.308 (0.368)	0.321* (0.176)	-0.158 (0.136)
Constant	2.856*** (0.209)	0.301*** (0.101)	0.153* (0.090)	2.402*** (0.244)	0.231* (0.119)	0.635*** (0.192)	0.135** (0.058)	1.479*** (0.165)	1.741*** (0.193)
Observations	19,441	19,441	19,441	19,441	19,441	19,441	19,441	19,441	19,441
R-squared	0.072	0.027	0.056	0.058	0.050	0.068	0.942	0.060	0.149
Panel B: Municipalities where the incumbent can re-contest									
	Number of candidates	Re-contesting probability of the incumbent	Number of insider challengers	Number of new candidates	Number of female candidates	Number of graduate candidates	Average wealth per candidate	Left-wing candidates	Candidates from big parties
2016	0.712** (0.342)	0.207 (0.166)	1.045*** (0.217)	-0.540 (0.383)	0.228 (0.179)	0.780** (0.336)	11.633*** (0.229)	-0.147 (0.221)	0.497** (0.219)
Firms' dependence	-0.139 (0.185)	0.024 (0.061)	-0.102 (0.086)	-0.062 (0.118)	-0.115** (0.052)	-0.080 (0.108)	-0.323 (0.217)	-0.181 (0.129)	0.116 (0.103)
Firms' dependence * 2016	-0.034 (0.352)	-0.004 (0.135)	0.038 (0.237)	-0.069 (0.256)	0.272* (0.154)	-0.163 (0.279)	0.286 (0.355)	0.293 (0.201)	-0.334** (0.162)
Constant	2.807*** (0.228)	0.312*** (0.107)	0.161* (0.096)	2.333*** (0.256)	0.210** (0.101)	0.565*** (0.190)	0.079 (0.054)	1.453*** (0.174)	1.699*** (0.165)
Observations	15,048	15,048	15,048	15,048	15,048	15,048	15,048	15,048	15,048
R-squared	0.071	0.064	0.060	0.088	0.059	0.066	0.953	0.061	0.151
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1									

Weighted least-squares estimates. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. Weights are calibrated using an entropy balancing method for continuous treatment (see Section 2). All regressions include regions times year fixed-effects. Panel B excludes municipalities where the incumbent faces a term limit. An insider challenger is defined as a candidate who ran in the previous election and who is not the incumbent. Wealth is expressed in log terms and is declared by the candidates themselves. The left-wing category is defined with the variable *Overall Left-Right Placement* of the [Kitschelt et al. \(2009\)](#) dataset and complemented with Wikipedia. A candidate is considered from a big party if she belongs to one of the five biggest political parties in Brazil.

significant disparity regarding the level of education. The reform barely affected the electoral prospects of graduate incumbents while it heavily reduced the re-election probability for low educated ones. On the contrary, there are no differential effects across gender, party wing, party size or total wealth. More generally, this result is confirmed when focusing on the characteristics of the winner candidates regardless of whether the winner is the incumbent (see Table A6).

However, it is important to mention that in municipalities where candidates relied more on firms' contributions, graduate incumbents' were more likely to re-contest after the ban, as well as wealthier incumbents (see Appendix A7).

Using the aggregated percentage of firms' contributions in the municipality as a treatment can mislead the identification of the mechanisms as it does not differentiate between municipalities where the firms' dependence is driven by the incumbents' funding or by challengers' dependence. I move to the candidate's level of analysis to tackle this issue.

### 3.2 Effects of banning firms' contributions on individual outcomes

In this section I compare individuals who were exposed by the reform using as control group candidates who didn't receive any firms' contributions the previous election. As detailed in section 2, I divide the treatment group into two categories: mid-firms' dependent candidates and high-dependent ones, defined according to whether they received below or above the median of firms' contributions. I restrict the sample to incumbents who don't face a term limit and runners-up, as around 70% of firms' funding before the reform was concentrated among the top two candidates.<sup>13</sup>

Figure 6 shows the general effects of the reform for incumbents and runners-up. Incumbents who relied on firms' funding before the reform were equally likely to re-contest compared to incumbents non-dependent on firms' contributions with similar characteristics.

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<sup>13</sup>The median is calculated using the full sample of incumbents who don't face a term limit and runners-up, conditional on firms' contributions being greater than 0. Results are robust when estimating the treatment including all challengers and when defining the median separately for incumbents and runners-up.

Table 4: Effects of banning firms' contributions on the incumbents' probability of re-election

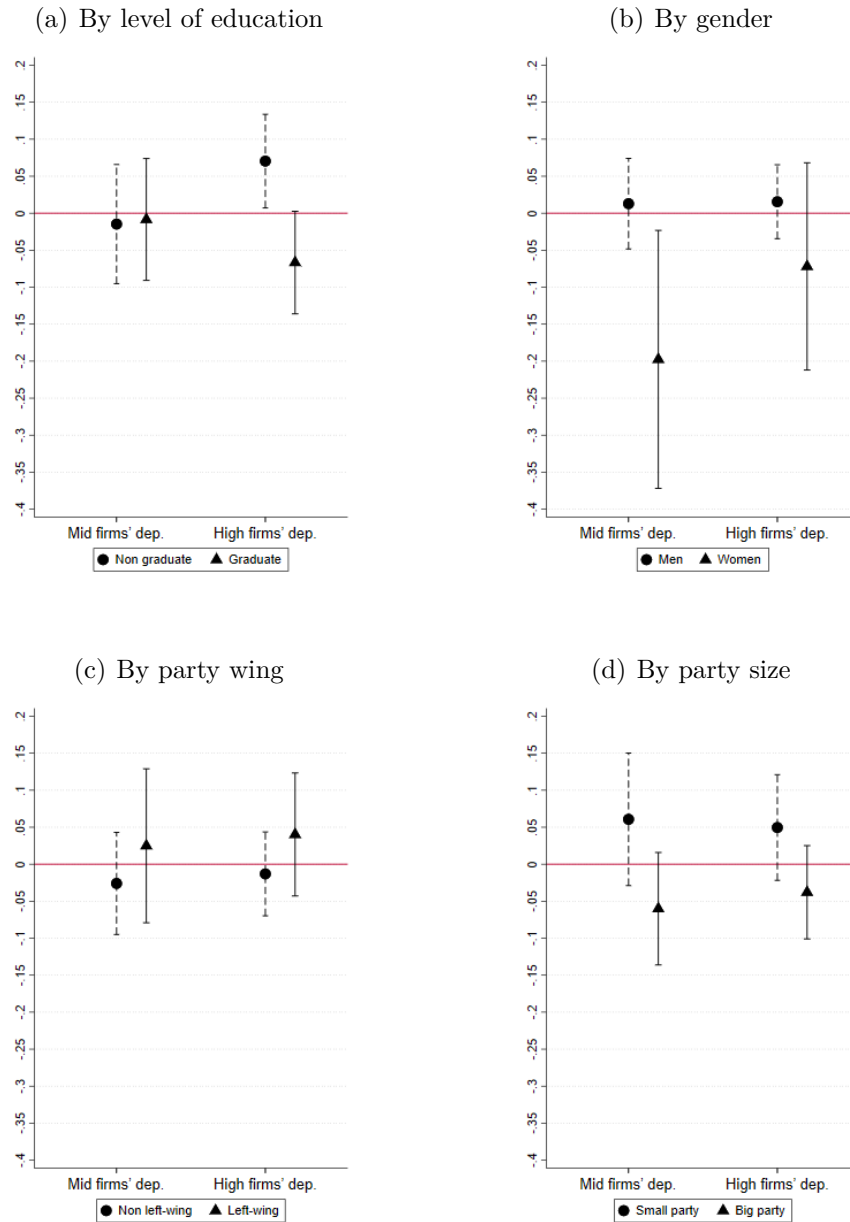
	(1)	(2) X = woman	(3) X = graduate	(4) X = Total wealth	(5) X = Left-wing	(6) X = Big party
2016	-0.070*** (0.019)	-0.064*** (0.020)	-0.058** (0.026)	-0.076*** (0.020)	-0.066*** (0.021)	-0.042 (0.029)
Firms' dependence	0.149*** (0.041)	0.132*** (0.042)	0.113** (0.056)	0.165*** (0.041)	0.185*** (0.046)	0.072 (0.072)
Incumbent*X		-0.113*** (0.032)	-0.035** (0.017)	0.001* (0.000)	0.064*** (0.020)	0.011 (0.018)
Incumbent*X*Firms' dependence		0.180 (0.173)	0.082 (0.081)	-0.003*** (0.001)	-0.156 (0.097)	0.111 (0.086)
Incumbent*X*2016		-0.008 (0.057)	-0.006 (0.034)	0.000 (0.000)	-0.021 (0.038)	-0.040 (0.035)
<b>Reform effects</b>						
Firms' dependence * 2016	-0.048 (0.083)	-0.045 (0.087)	-0.298** (0.133)	-0.011 (0.087)	0.026 (0.093)	-0.134 (0.141)
Incumbent*X*2016*Firms' dependence		-0.066 (0.302)	0.370** (0.170)	-0.003 (0.003)	-0.302 (0.196)	0.149 (0.174)
Constant	0.517*** (0.077)	0.523*** (0.077)	0.535*** (0.079)	0.515*** (0.077)	0.501*** (0.078)	0.507*** (0.078)
Observations	9,603	9,603	9,603	9,603	9,603	9,603
R-squared	0.039	0.042	0.040	0.039	0.041	0.040
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Weighted least-squares estimates. The sample is restricted to municipalities where the incumbent does not face a term limit. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. Weights are calibrated using an entropy balancing method for continuous treatment (see Section 2). All regressions include regions times year fixed-effects. In each column I interact the treatment effect with a covariate denoted by X. Wealth is expressed in log terms and is declared by the candidates themselves. The left-wing category is defined with the variable *Overall Left-Right Placement* of the [Kitschelt et al. \(2009\)](#) dataset and complemented with Wikipedia. A candidate is considered from a big party if she belongs to one of the five biggest political parties in Brazil.

Surprisingly, high firms' dependent runners-up were more likely to do so. Conditional on re-running for office, incumbents who relied on corporate funding suffered a drop in total contributions. A similar effect is found for challengers more affected by the reform. Finally, sub-figure (c) of Figure 6 displays a significant drop of around 3% in the shift of share of votes for incumbents mid-dependent on firms' contributions. In contrast, there is no change for the ones with a higher level of exposure. The non-monotonic effects for incumbents in their share of votes may be explained by the non-monotonic effects in contributions. Candidates who attracted a high level of corporate funds may have more facilities to substitute contributions and avoid an electoral penalty.

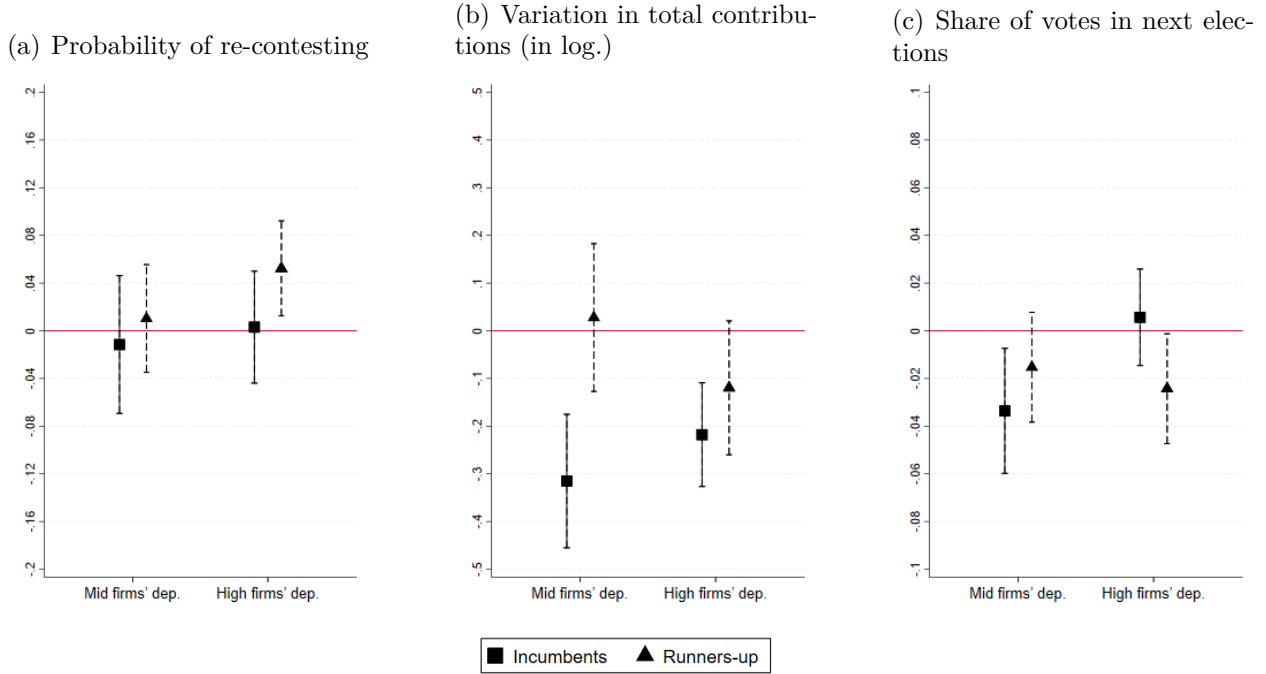
I move to the analysis of heterogeneous effects. Figure 5 displays the marginal effects

Figure 5: Heterogenous marginal effects on incumbents' probability of re-contesting for office.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure 6: Marginal effects of the reform on incumbents and runners-up.

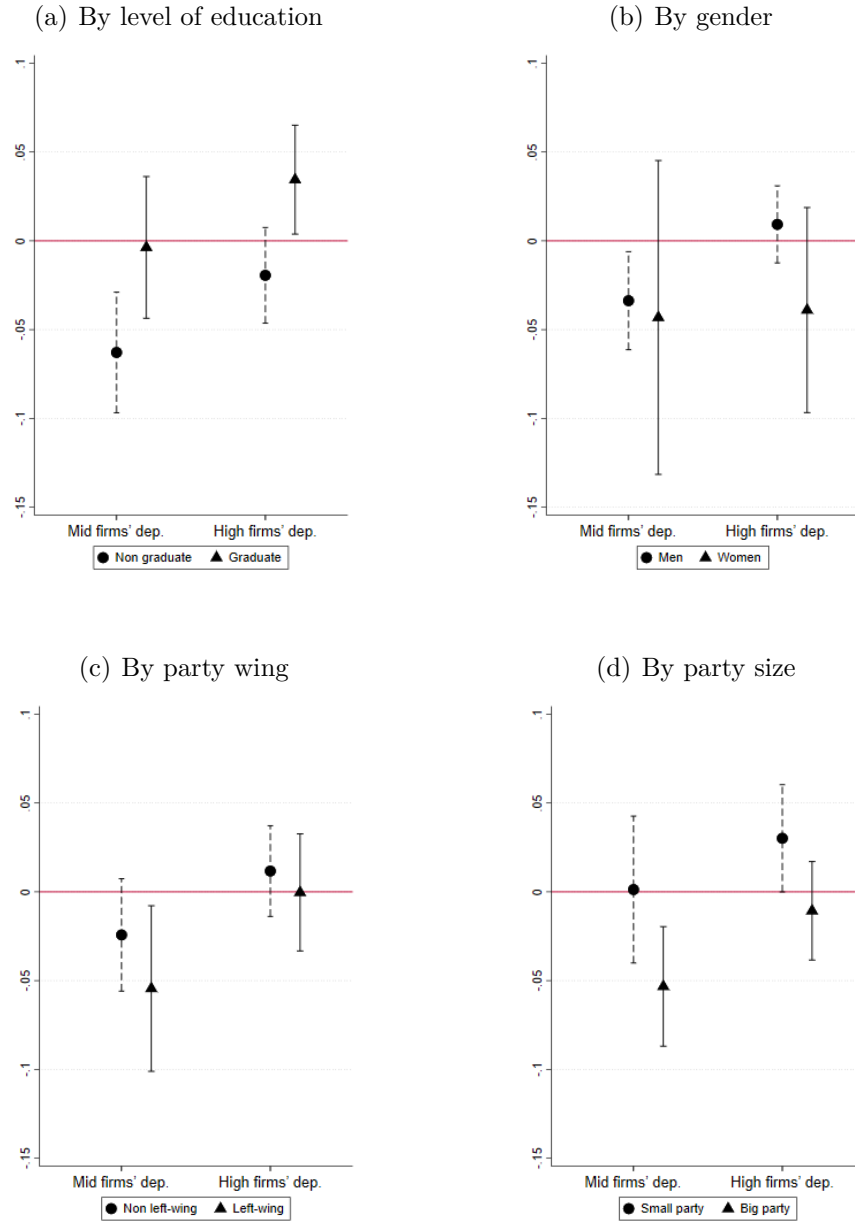


Marginal effects of the interaction between the treatment variable and a dummy for 2016 accounting for the post-reform. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects. In sub-figure (a) the dependent variable is a dummy that equals one if a candidate from previous election re-contested, in sub-figure (b) is the variation in the log. of total contributions conditional on re-contesting and in (c) is the share of votes in next elections. The weights are obtained through an entropy balance method where covariates are graduate, gender, party-wing, party size, total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

in re-contesting decisions when performing the heterogeneity across several covariates for incumbents and Appendix B2 for runners-up. The coefficients are displayed in Appendix A9. Sub-figure (a) shows that there are no differences among mid-firms' dependent incumbents between graduates and non-graduates. However, among high-dependent candidates, non-graduate incumbents were 7% more likely to re-contest and a symmetric effect is found for graduate officeholders. Sub-figure (b) plots differences in gender. Female incumbents are less likely to run for re-election after the reform and the difference is significant for mid-dependent candidates. The same discouragement is found for runners-up (Figure B2 and Table A9). While there is no heterogeneity among party-wing (sub-figure (c)), sub-figure (d) shows that among exposed incumbents, candidates from big parties were less likely to re-contest compared to candidates from small ones.



Figure 7: Heterogenous marginal effects on incumbents' share of votes.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect. The dependent variable is the share of votes in next elections. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure 7 plots the marginal effects in the share of votes for incumbents.<sup>14</sup> Consistent with the previous section, sub-figure (a) shows great heterogeneity among educational levels. Among mid-firms' dependent candidates, where there were no differences in re-contesting decisions, low educated incumbents suffered from a drop in the share of votes of 6% while graduates incumbents remained with the same electoral support. Among high-dependent incumbents, the drop in share of votes for non-graduates is non-significant and high-educated incumbents of this category experienced an increase in the share of votes. Sub-figures (b) and (c) show non-heterogeneous effects across gender and party-wing respectively, while sub-figure (d) exhibits that incumbents from traditional parties were electorally more penalized by the reform than incumbents from small parties.

To summarize, the reform had adverse effects on the electoral prospects of non-graduate candidates and incumbents from traditional parties who were mid dependent on firms' contributions, and female candidates were less likely to re-contest. Three potential mechanisms can account for previous results: differences in candidates' abilities to substitute contributions, different spillovers for the entry of other candidates, and differences in the marginal benefits of total contributions.

### 3.2.1 Mechanisms

#### Differences in substituting contributions

Figure 8 shows the heterogeneous effects of the reform in the variation in total contributions for incumbents.<sup>15</sup> There is overall no heterogeneity in the variation of contributions for incumbents. Therefore, variations in contributions cannot account for the heterogeneous effects in the share of votes across individual characteristics. However, as said before, it can account for the non-monotonicity across levels of treatment.

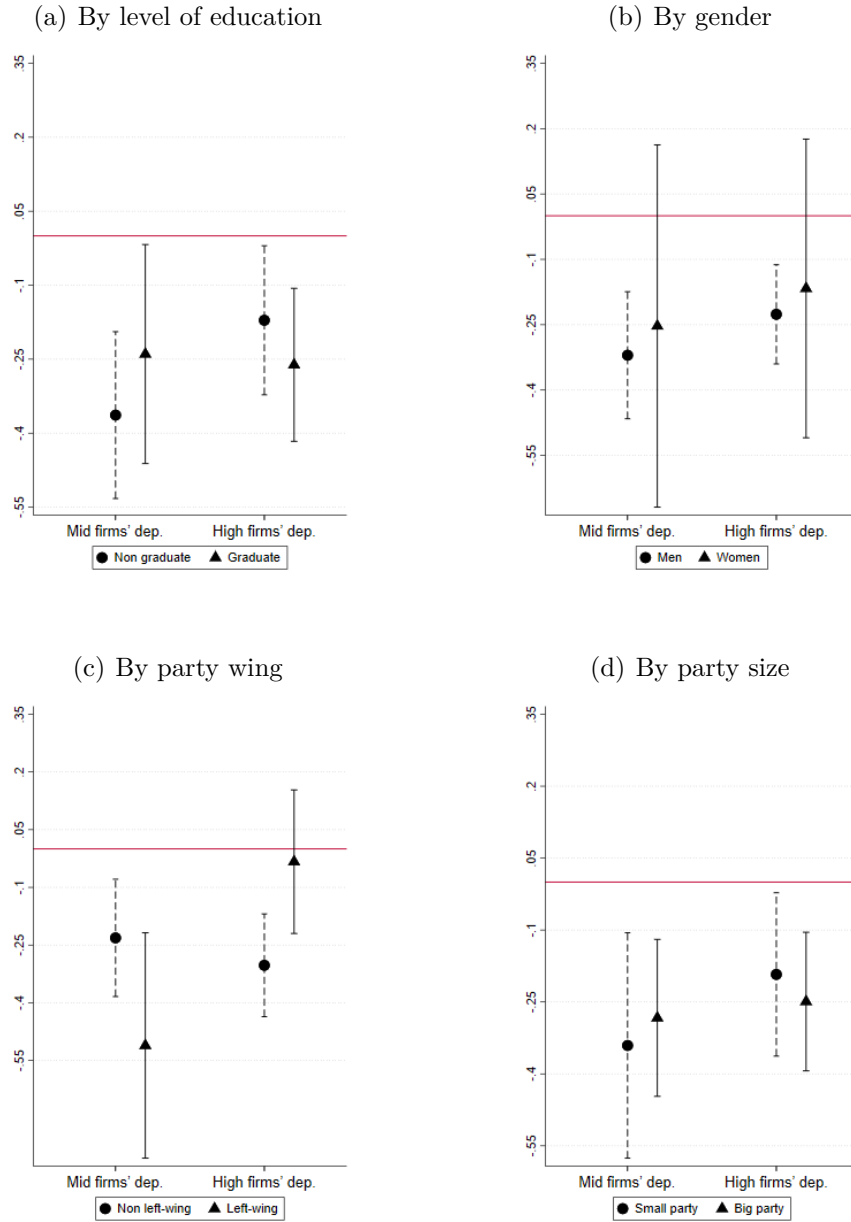
As those estimations are based on the sample of candidates who run for office, it is

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<sup>14</sup>See Figure B3 for runners-up and Table A10 for the coefficients.

<sup>15</sup>See Appendix A12 for the coefficients and Appendix B4 for runners-up's effects.

Figure 8: Heterogenous marginal effects on the variation of incumbents' contributions.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect. The dependent variable is the variation in the log of contributions. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

difficult to test if expected changes in contributions drive effects on re-contesting decisions. Yet, there is evidence that female mayors in Brazil attracted fewer campaign contributions when running for re-election (Brollo and Troiano, 2016). Thus, the higher cost in fund-raising for female politicians could be behind the discouragement of female candidates when interest groups are no longer allowed to contribute.

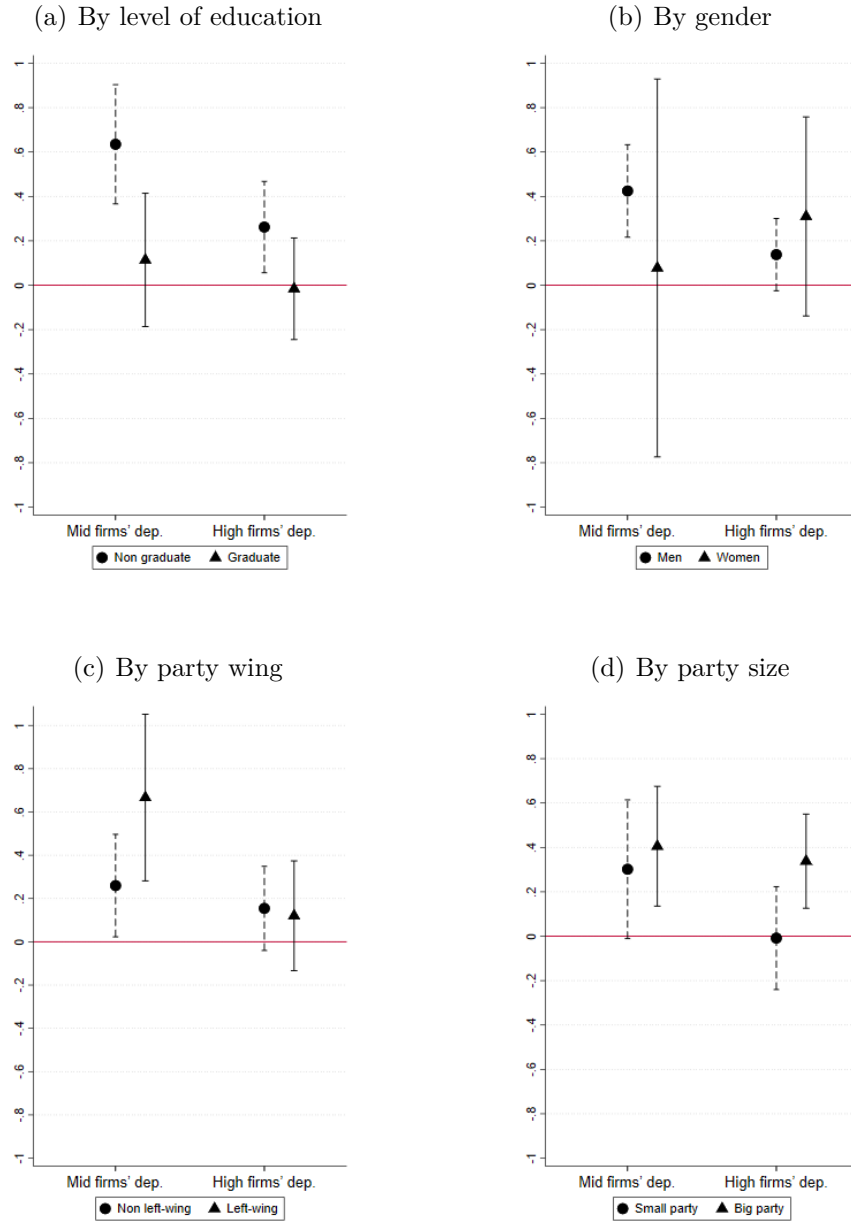
### **Entry of challengers**

Another potential mechanism is that heterogenous spillover effects on challengers' re-contesting decisions exist. Figure 9 and Appendix A12 provide evidence supporting this channel. There is an increase in the number of challengers in municipalities where the incumbent was a graduate or a candidate from a big party. When controlling for the increase of challengers and for the variation in contributions, the effects on the share of votes persist even though there are mitigated. Therefore, spillover effects can partially account for the electoral loss of low-educated and incumbents from big parties. Further, the fact that some incumbents had a higher drop in the share of votes for a given drop in contributions and a given change in candidates' entry can be driven by differences in the marginal benefits of contributions. Yet, the interpretation of the heterogeneity in these two channels is not straightforward. Differences in the quality of incumbents can be at play.

### **Quality incumbency advantage**

The interaction of a quality and a financial incumbency advantage can explain both the differences in marginal benefits of incumbents' contributions and the heterogeneity in the entry of challengers. First, low-quality incumbents may need more resources than high-quality incumbents to attract voters as they have to compensate for their bad performance while in office. If that is the case, the former will experience a higher drop in their share of votes for a given drop in contributions. Second, challengers' decisions of running for office are likely to be inversely correlated with the incumbent's expected probability of winning.

Figure 9: Heterogenous marginal effects on the entry of challengers.

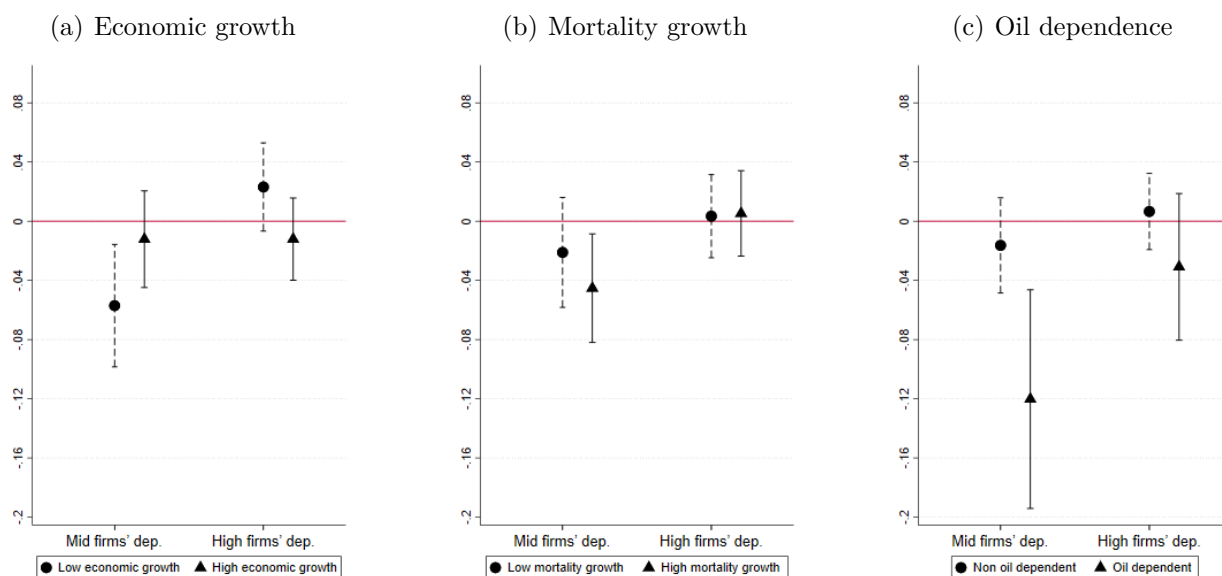


Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect. The dependent variable is the variation of challengers. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Thus, for a given shock in incumbents' contributions, they will be more encouraged to run for office if the incumbent is a low-quality type.

For the previous arguments to hold, the educational level and the size of the party have to be a sign of the incumbent's quality. The level of education has been used in the literature as a proxy of politicians' quality (see Ferraz and Finan (2009) and Galasso and Nannicini (2011), among others). On the other hand, candidates from big parties are likely to have more political connections and to provide higher levels of rents to interest groups.

Figure 10: Marginal effects of the reform for different proxies for quality.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the incumbent was above the median of local economic growth, in sub-figure (b) it is a dummy that equals one if the incumbent was above the median of local mortality growth and in sub-figure(c) a dummy that equals one if the municipality received oil royalties in 2002. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect. The dependent variable is the share of votes in next elections. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

I provide further evidence suggesting that a quality component drives previous results. First, I control by declared wealth, as the educational level may be correlated with the socio-economic status that may explain the findings. Results hold and the drop in the probability of being elected for low educated incumbents becomes stronger (see Figures B5 and B6).

Secondly, I use three proxies for incumbents’ valence: (i) a dummy to identify whether the incumbent was below or above the median on local economic growth with respect to all mayors in the same period, (ii) a similar dummy for mortality rates growth and (iii) an oil dependence dummy that equals one if the municipality received oil revenues in 2002. [Caselli and Michaels \(2013\)](#) provide evidence that oil revenues in Brazilian municipalities barely translate into an improvement in public goods or living standards. On the contrary, they document a “missing money” phenomenon and a high level of corruption in oil-dependent municipalities.

Figure 10 displays the heterogeneous effects of the reform for those dummies on the share of votes, conditional on re-contesting. As before, the effects are concentrated in mid-firms’ dependent candidates. Among incumbents of this level of exposure, candidates associated with a low economic performance suffered from a drop of 5% in their share of votes, and a similar effect is found for those associated with high mortality rates. The decline of incumbents in oil-dependent municipalities is, on average, more than double of the magnitude (-12%).

## 4 Theoretical framework

In this section I build a simple model illustrating the financial and the quality-based incumbency advantage; and the differential effects according to candidates’ ability to substitute their contributions and the spillovers effects for challengers.

I assume two type of incumbents: high-quality ones ( $H$ ) and low-quality ones ( $L$ ) Equation (2) models the probability of a candidate  $i$  being elected at an election  $t$  depending on whether she is the incumbent or a challenger. In the former case, the probability of winning is a function of her personal attributes  $X_i$ , such as gender, age, ideology; a dummy  $H$  that equals one if she was a high performant officeholder and 0 if she was from a low performant type ( $L$ ); her campaign spending; municipality covariates denoted by  $Z_m$  and

time fixed-effects ( $\delta_t$ ).

$$\mathbb{P}(E_{i,t,m}) = \begin{cases} \alpha \mathbf{X}_{i,t} + \gamma H_i + \theta_{H,L} \text{ Spending}_i + \delta_t + \mathbf{Z}_m & \text{if } i = \text{incumbent} \\ \alpha \mathbf{X}_{i,t} + \phi H_{\text{incumbent}} + \theta_c \text{ Spending}_i + \kappa \text{ Has run}_i + \delta_t + \mathbf{Z}_m & \text{if } i = \text{challenger} \end{cases} \quad (2)$$

The coefficient  $\gamma$  is assumed to be positive as everything else equal, high performant incumbents are expected to have a higher probability of winning. Performance is a valence issue as, for given covariates, any voter prefers more of it. Thus,  $\gamma$  can be interpreted as the quality-based incumbency advantage. A crucial feature of the model is the differential benefit of campaign spending according to the talent of the incumbent. I assume that  $\theta_H < \theta_L$ . Indeed, low performant incumbents need advertising to reverse the signal of their performance, while high performant politicians only use monetary resources to amplify their quality-based advantage.

The second part of equation (2) applies to challengers. As their performance is unknown, their probability of winning will inversely depend on the incumbents' quality.  $\phi < 0$  implies that a poor incumbent's performance leads voters to prefer an unknown challenger. Further, their gain of campaign contributions is assumed to be the same for all challengers  $\theta_c$  and it is likely that  $\theta_H < \theta_c$ . In other words, challengers derive a higher marginal utility from campaign spending than high performant incumbents, as their quality is unknown and they rely on spending to signal it. The comparison between  $\theta_c$  and  $\theta_L$  is ambiguous as it will depend on voters' risk-aversion to unknown challengers with respect to voters' disutility from bad incumbents.

Campaign spending is not exogenous and I modelize them as follows:

$$\text{Spending}_i = C_i = \sigma \text{Incumbent} + \sum_{\substack{D = \text{candidate,} \\ \text{party,} \\ \text{interest groups,} \\ \text{citizens}}} [\beta_1^D X_i + \beta_2^D \mathbf{1}(\text{Incumbent}) \times H_i + \beta_3^D \mathbb{E}(\mathbb{P}(E_{i,t}))] + e_i(\theta) \quad (3)$$

where is assumed that the candidate spends all her contributions. Campaign contributions



are a sum of interest groups, political party, individual citizens and the candidate's own donations. The incumbent, given his ex-ante higher probability of winning, attracts higher contributions from all donors. This is captured by  $\sigma$  which is assumed to be positive and accounts for the financial based incumbency advantage. Each donor  $D$  values differently the candidate's characteristics, his performance and his ex-ante probability of being elected, which translates into different values of  $\beta$  across donors. This assumption is key for analyzing electoral reforms in campaign funding, as it suggests that limiting one type of donors' contributions or introducing a new category, such as a public fund, may play a role in political selection.

For instance, if we believe as suggested by [Coate and Morris \(1995\)](#) that interest groups have to contribute to *bad* politicians in order to shape policies in their favor  $\beta_2^{\text{interest groups}}$  would be negative. Nonetheless, if they care about incumbents' probability of winning, given that low performant have a lower probability of being elected, it is not clear that they will contribute overall more to low performant than to high-quality ones.

By altering the probability of being elected, all reforms on campaign funding might also affect the decision of running for office. Equation (4) suggests that a candidate's probability of running for office is a function of his relative probability of winning with respect to other candidates' one and his expected raise of campaign contributions. Given the uncertainty, party and ideological considerations I do not impose that the expected probability of winning of candidate  $i$  has to be higher than every other candidate.

$$\mathbb{P}(\mathbb{R})_{i,t,m} = f \left( \frac{\mathbb{E}(\mathbb{P}(E_{i,t}))}{\mathbb{E}(\sum_{j \neq i} \mathbb{P}(E_{j,t}))}; \mathbb{E}(C_i) \right) \quad (4)$$

The former theoretical framework allows rationalizing the results previously presented. Conditional on re-contesting and for the same drop in contributions, banning interest groups' (or any other kind of donors') contributions can have a positive effect in selection given differences in the marginal benefits of contributions with respect to incumbents' quality ( $\theta$ ). This highlights an interaction between the quality and the financial-based incumbency

advantage. Nonetheless, taking into account that different candidates have different abilities to raise contributions from different donors, there is room for negative selection effects for the ones with a higher cost of fundraising. Finally, as challengers were not favored by interest groups' contributions, the reform may have encouraged them to run if they anticipate that incumbents would suffer from a drop in their probability of winning after the reform.

## 5 Robustness checks

### 5.1 Aggregate outcomes

Section 3.1 focused on weighted regressions to account for differences in observables between municipalities according to their degree of firms' dependence before the reform and potential selection into this treatment. As previously mentioned, an unrestricted and unweighted sample analysis does not validate the assumption of parallel trends (see Figure B7).

Table 5: Local firms' dependence and municipalities' characteristics before the reform

Panel A- Unrestricted sample (5,236 municipalities)										
	Percentage of firms' contributions		Contributions per candidate		Population		Number of candidates		Production per capita	
Low dependence	2.1	(1.8)	34727	(76344)	10225	(14022)	2.5	(0.8)	0.002	(0.003)
Mid dependence	10.9	(3.3)	53453.170	(89735)	18973	(30361)	2.760	(0.960)	0.001	(0.002)
High dependence	30.3	(10.8)	1.30e+05	(3.29e+05)	74854	(3.48e+05)	3.080	(1.170)	0.001	(0.002)
Panel B- Restricted sample (4,213 municipalities)										
	Percentage of firms' contributions		Contributions per candidate		Population		Number of candidates		Production per capita	
Low dependence	2.2	(1.8)	34217	(32449)	10255	(10459)	2.520	(0.770)	0.002	(0.003)
Mid dependence	10.4	(3.0)	44300	(41475)	15862	(16391)	2.760	(0.960)	0.001	(0.002)
High dependence	27.8	(10.2)	55598	(51344)	24631	(27847)	2.940	(1.050)	0.001	(0.002)

Standard deviations are reported in parenthesis. Data for elections' outcomes is taken from *Tribunal Superior Eleitoral (TSE)* and data for municipalities' characteristics is taken from *Instituto Brasileiro de Geografia e Estatística (IBGE)*. Low, medium and high dependence correspond respectively to the first, second and third tercile of the distribution of the mean percentage that firms' contributions represented between 2004 and 2012 (per candidate). Panel B restricts the sample by excluding municipalities belonging to the first and last decile of the distribution of population and of the average amount of campaign contributions per candidate in the three elections before the reform.

As robustness, I first use an unweighted but restricted sample of municipalities by getting

rid of 1,023 municipalities corresponding to the ones in the first and tenth decile of the distribution of the mean contributions per candidate (averaged on the three elections before the reform), and those belonging to the first and last decile in terms of population. Panel A of Table 5 shows that cities in the last tercile of the treatment variable were bigger in terms of population and economic activity than the ones with low firms' dependence. Panel B of Table 5 shows a higher balance among municipalities' covariates in the three groups after the sample restriction. Besides, Figure C1 shows parallel trends before the reform using this approach. I replicate Tables 2, 3 and 4 using this restricted sample with municipality covariates as controls instead of weights in Appendix C (Tables C1, C2, and B13). Alternatively, I implement a two way-fixed effects in Tables C4, C5 , and C3.

Both approaches confirm the results of section 3. First, in municipalities more dependent on firms' contributions the reform reduced candidates' total amount of contributions, even though those were partially compensated by other donors' funding. Second, the reform led to an increase in left-wing candidates and to a decrease in the number of candidates from traditional parties.<sup>16</sup> Third, in both approaches the probability of being re-elected for non-graduates incumbents decrease after the reform in more exposed municipalities, while there is non-significant effect for graduates candidates.<sup>17</sup>

## 5.2 Individual outcomes

In this section, I test the robustness of the heterogeneous impact of incumbents' probabilities of re-election.

Imposing an ad-hoc sample restriction as done above is difficult at the individual level as selection is both in terms of municipality covariates and individual traits, which are mostly defined with dummy variables. I provide robustness to the sensibility of the weighting scheme by using a classic propensity score where the treatment has to be defined with a

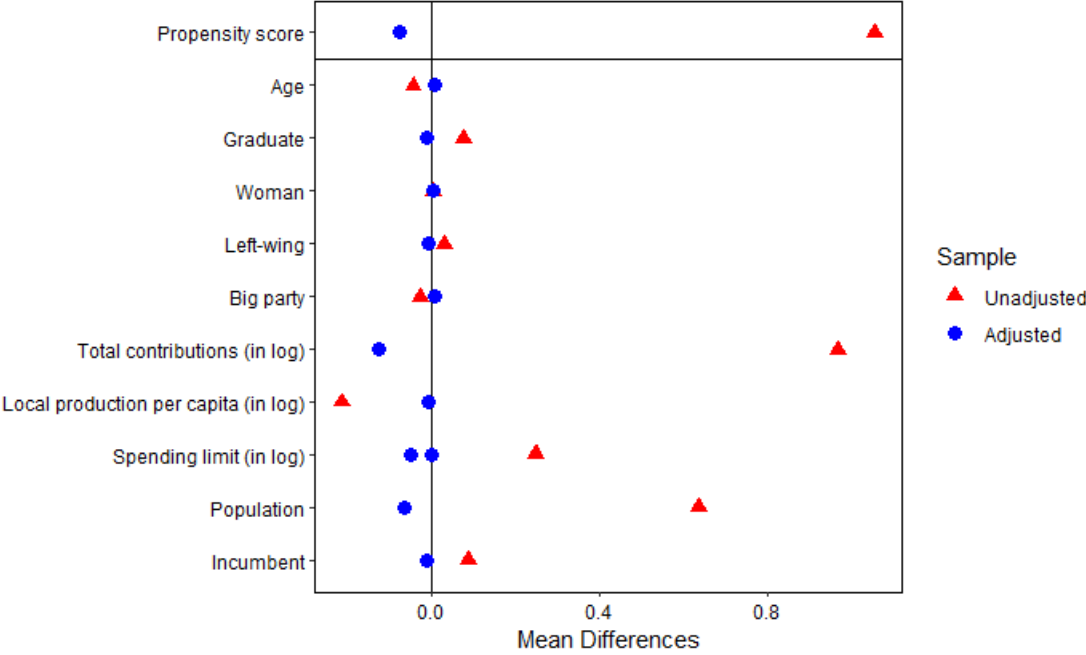
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<sup>16</sup>The increase in left-wing candidates is not statistically significant when restricting the sample of municipalities in which the incumbent does not face a term limit.

<sup>17</sup>In the two-way fixed-effects the interaction between the difference-in-difference variable and the level of education has a p-value of 0.113.

binary variable. Therefore, I define in this section treated candidates as those who were funded by firms the previous election. Figure 11 shows the bias of the selected covariates between individuals who did not receive funding from firms with the candidates who did, before and after this matching procedure.

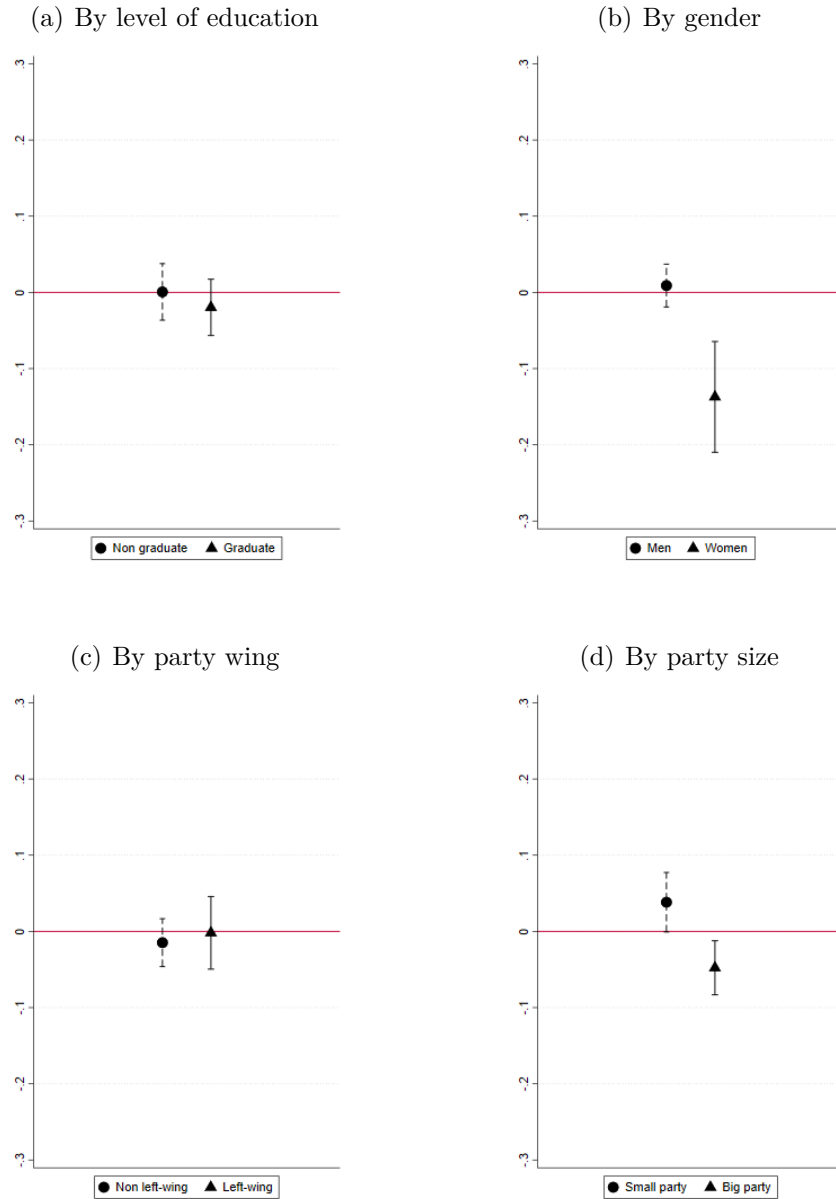
Figure 11: Covariates balance using a propensity score matching.



The figure plots the standardized bias across covariates when comparing candidates who received firms’ contributions in the previous elections with the ones who did not before and after a propensity score matching.

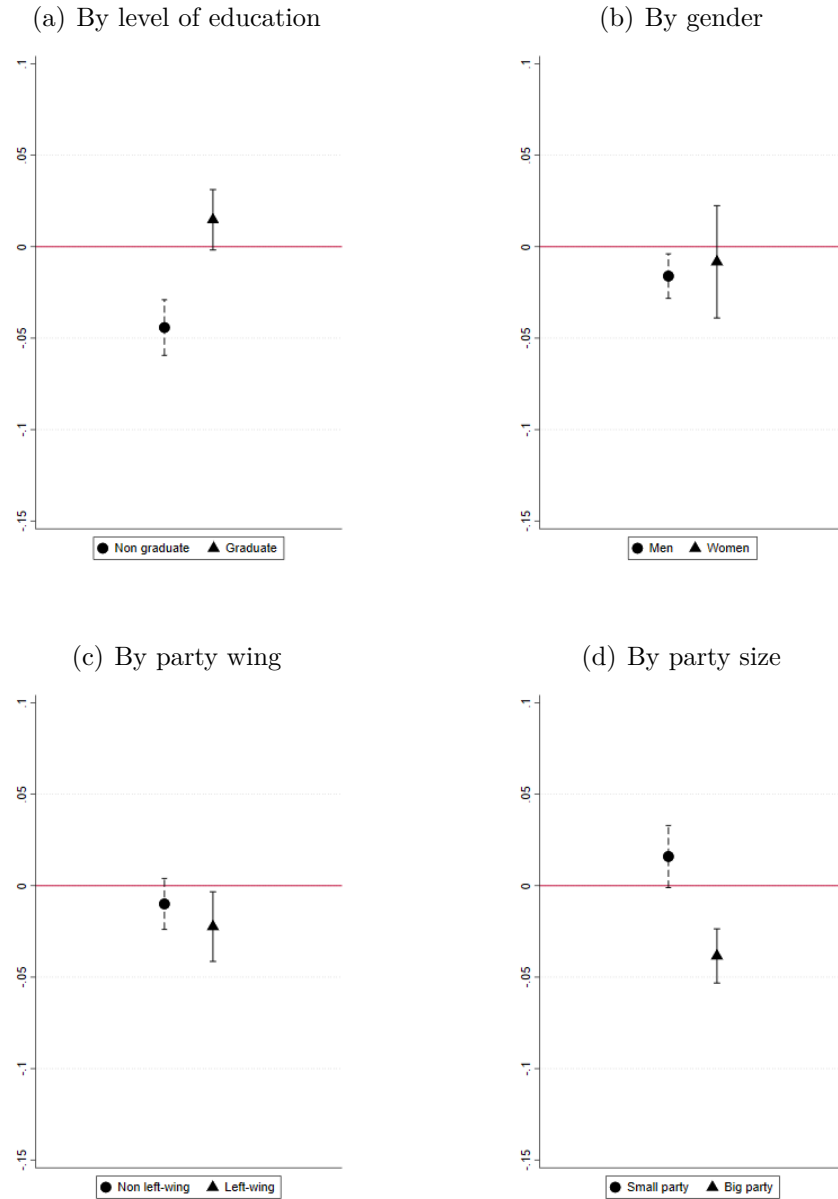
Figures 12 and 13 display the heterogeneity effects for incumbents (see Figures C2 and C3 for the heterogeneity for runners-up). With this approach, differences in the re-contesting decisions between graduates and non-graduates incumbents are no longer significant, while the effect on the loss of electoral advantage only for low educated and incumbents from big parties are persistent. Further, the drop of female incumbents in re-contesting remains statistically significant and of a similar magnitude (15%).

Figure 12: Heterogenous marginal effects on incumbents' probability of re-contesting for office using a propensity score matching.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a dummy variable that equals one if the candidate received contributions from firms in the previous elections. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect, and the log of the candidate's declared wealth. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through a propensity score method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure 13: Heterogenous marginal effects on incumbents' share of votes using a propensity score matching.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a dummy variable that equals one if the candidate received contributions from firms in the previous elections. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect, and the log of the candidate's declared wealth. The dependent variable is the share of votes in next elections. The weights are obtained through a propensity score method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

### 5.3 Car Wash implications

An alternative mechanism is that results are driven by the Car Wash affair, as the reform was a response to this big corruption scandal.

However, direct exposure is not enough to explain previous findings. Among the 297 individuals cited to declare in the framework of the Car Wash affair, 50 of them were incumbents or ex-incumbents and 6 were challengers (see Table C6). Among those 50 ex-mayors, 31 of them were incumbents when the scandal took place. Thus, it represents an extremely small proportion of the sample. Furthermore, it is the most inclusive category of exposure, as I am considering all cited politicians, disregarding whether they were prosecuted afterward.

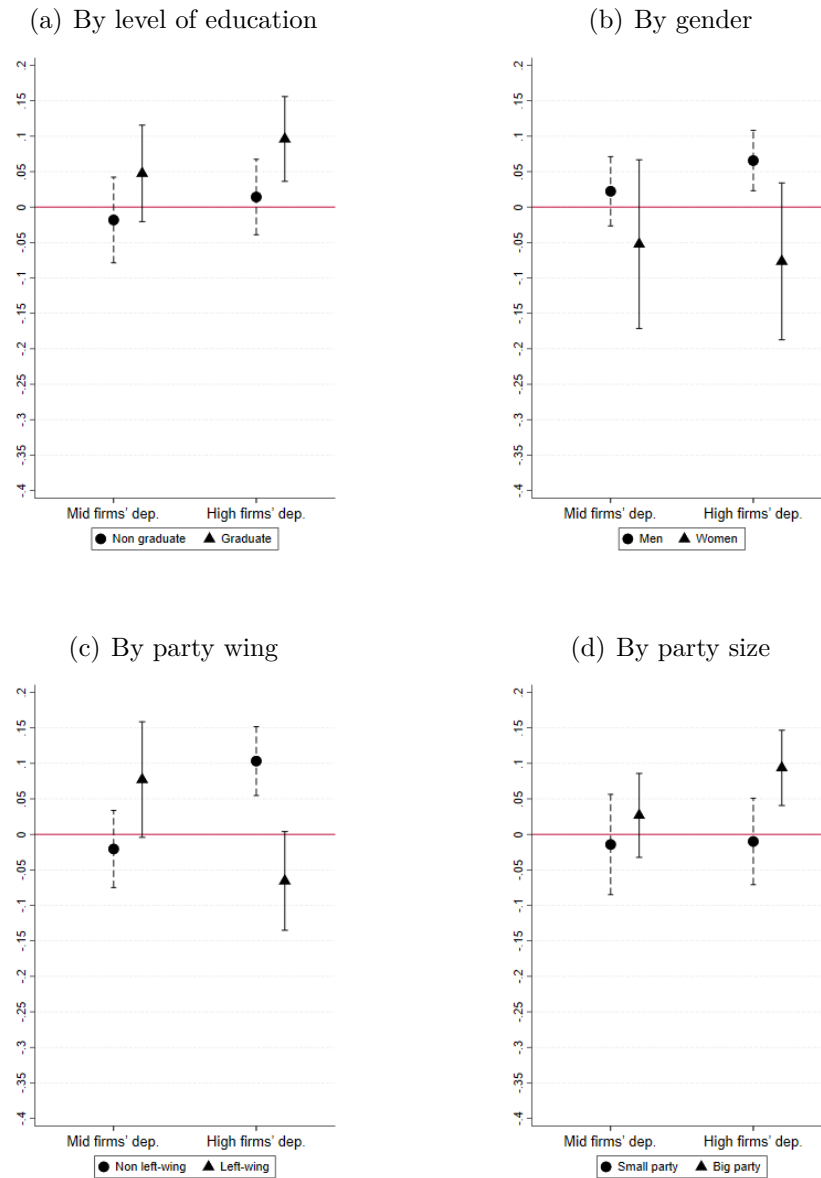
Besides, this list was published in 2017, after the elections. In the first list of names involved in the Car Wash procedure, published in 2015 no mayor or ex-mayor was named. However, even if brought to light afterward, and may have had little impact on voters' behavior, it could have changed the decision of rerunning of the involved candidates. Nevertheless, it is still interesting to mention that among the 23 exposed incumbents in 2012 that were able to rerun, 21 of them did it, despite the exposure, and among those 21, 11 were elected. Thus, even when excluding candidates who were explicitly exposed in the corruption scandal, the reform has still the effects mentioned above in the non-exposed ones as shown in Figures 14 and 15 for incumbents.<sup>18</sup> It is however plausible that the most exposed parties had a negative shock in popularity and thus it affected all candidates disregarding whether they were corrupted or not. Results are nonetheless robust when including incumbent's party times year fixed-effects.<sup>19</sup>

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<sup>18</sup>See Figure C4 for the general effects of the reform; Figures C5 and C6 for the heterogenous effects in runners-up re-contesting decisions and share of votes when excluding candidates exposed in the Car Wash scandal.

<sup>19</sup>See Figures C7 and 17 for the effects on incumbents and Figures C7 and C8 from Appendix C for runners-up.

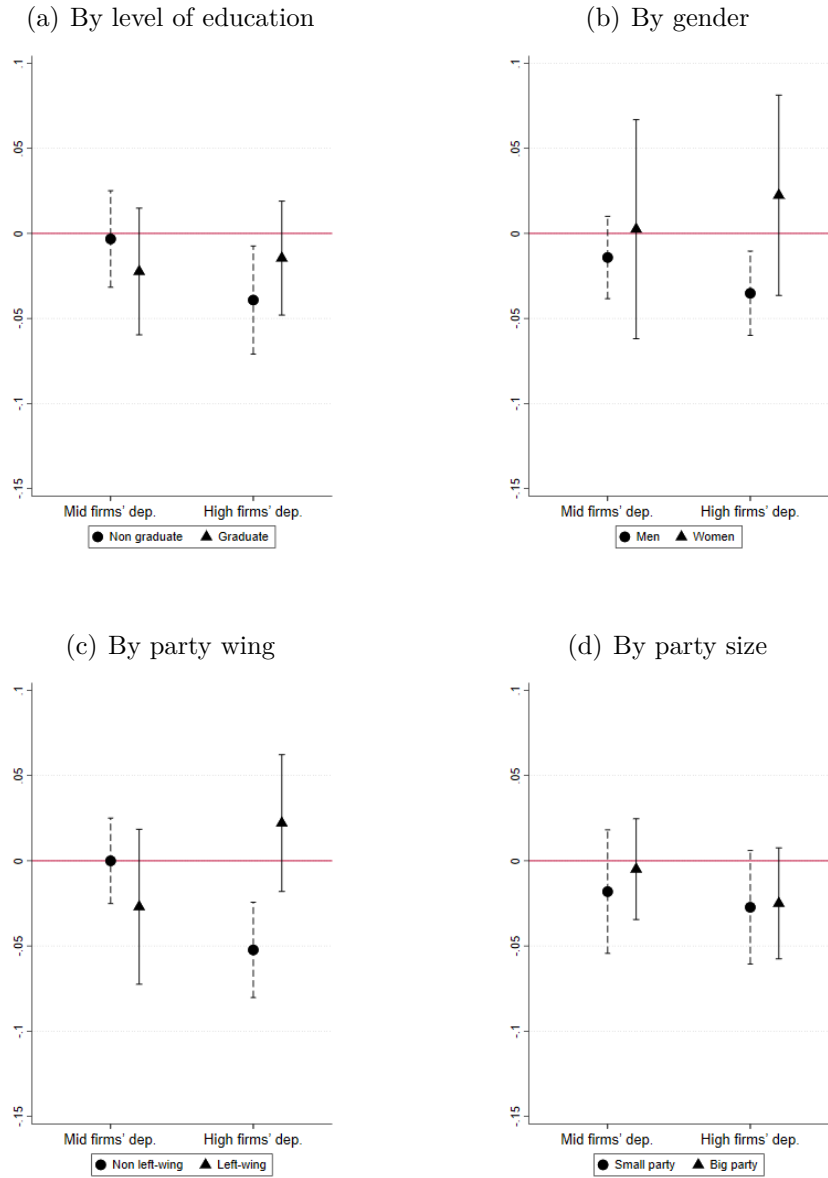
Figure 14: Heterogenous marginal effects on incumbents' probability of re-contesting for office excluding candidates involved in the Car wash scandal.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents. I exclude candidates cited to declare in the Car Wash scandal listed in Table C6.

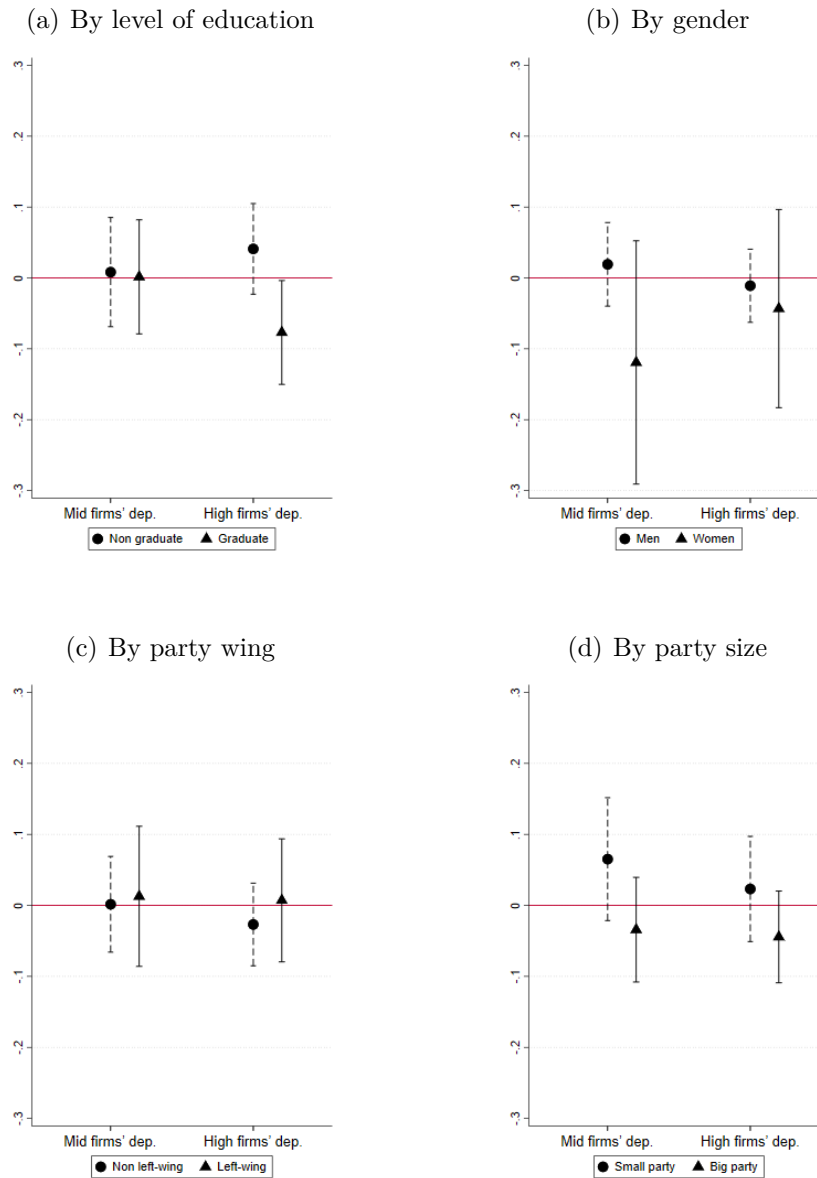


Figure 15: Heterogenous marginal effects on incumbents' share of votes excluding candidates involved in the Car wash scandal.



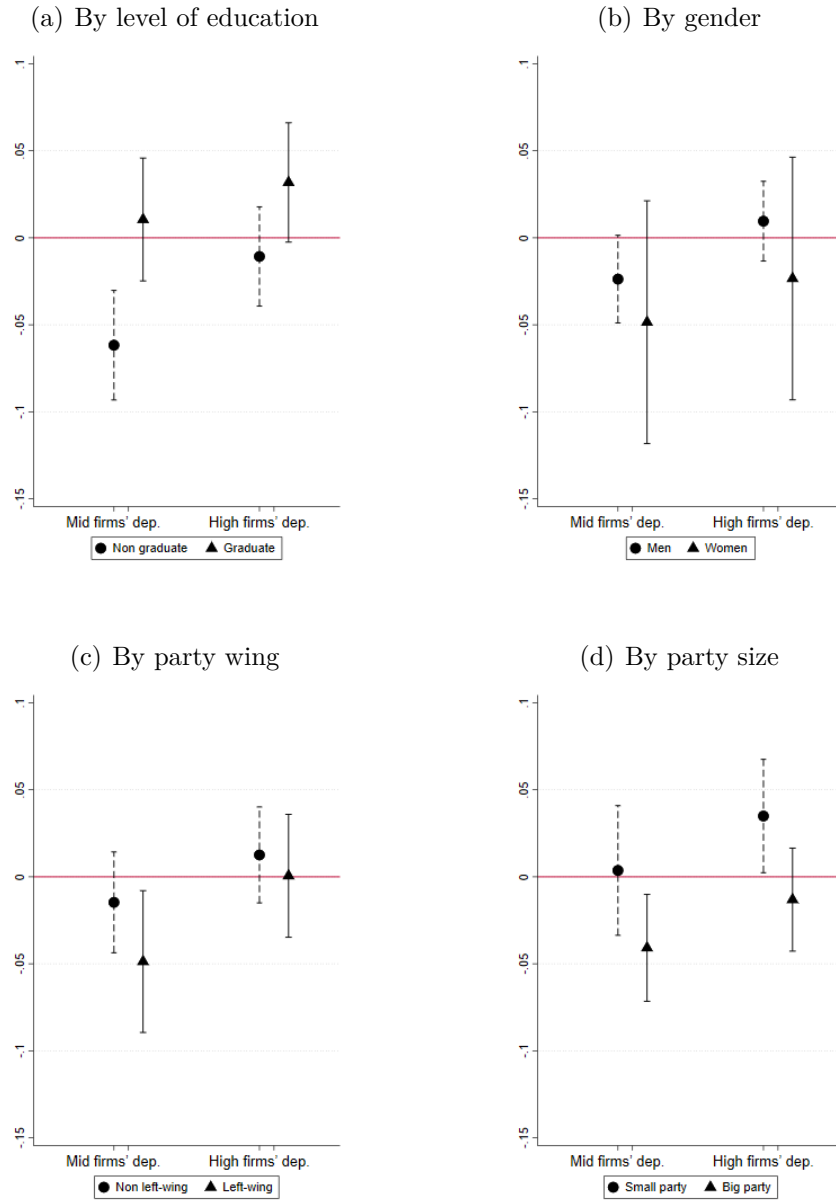
Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a dummy variable that equals one if the candidate received contributions from firms in the previous elections. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is the share of votes in next elections. The weights are obtained through a propensity score method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents. I exclude candidates cited to declare in the Car Wash scandal listed in Table C6.

Figure 16: Heterogenous marginal effects on incumbents' probability of re-contesting for office when controlling for party fixed-effects.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure 17: Heterogenous marginal effects on incumbents' share of votes when controlling for party fixed-effects.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate received contributions from firms in the previous elections. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is the share of votes in next elections. The weights are obtained through a propensity score method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

## 6 Conclusions

Interest groups' contributions have been mainly analyzed as a tool to deviate the policy agenda in their favor. A recent real-life illustration is the Brazilian *Car Wash* scandal that revealed how construction companies exchanged contributions for over-rated public contracts. This paper shows that interest groups' contributions also shape candidates' selection, amplifying the influence of money in politics.

I provided evidence that candidates' probability of running for office is dependent on the structure of campaign contributions. I find that preventing firms' contributions discouraged female candidates, who already represent a small percentage of the sample, from running for office. This result is consistent with women having greater difficulty in raising contributions ([Brollo and Troiano, 2016](#)).

There are important heterogenous effects on the incumbency advantage across incumbents' levels of education and rent-seeking behaviors. Among incumbents relying on firms' funding before the reform, incumbents who didn't have a university degree, those who were associated with a lower economic performance, or those who belonged to municipalities where rent-seeking is more plausible, were less likely to be re-elected. I interpret the results as the reform having deteriorated the electoral advantage of incumbents who mainly relied on a financial-based advantage to be re-elected rather than on a good performance while in office.

Considering that the vast majority of democracies still allow firms to contribute to political campaigns, this paper opens doors for further research and discussions on the benefits and side effects of banning corporate donations on candidates' selection.

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# Appendix

## A Supplementary tables

Table A1: Donors' contributions and candidates' characteristics.

	(1) Firms	(2) Party	(3) Citizens	(4) Own	(5) Others
Incumbent	9,011*** (2,027)	5,084 (5,229)	5,529*** (720)	8,717*** (1,185)	-1,156 (757)
Has Run	3,396** (1,529)	4,509 (3,944)	2,315*** (543)	240 (894)	1,074* (571)
Universitary degree	8,277*** (1,313)	12,692*** (3,385)	4,683*** (466)	5,184*** (767)	615 (490)
Woman	-1,467 (1,926)	-4,511 (4,968)	1,599** (684)	-5,245*** (1,126)	-313 (720)
Age	62 (425)	-633 (1,097)	-89 (151)	-573** (249)	20 (159)
Age sq.	1 (4)	7 (11)	-0 (2)	10*** (2)	-0 (2)
Big party	15,047*** (1,309)	31,445*** (3,376)	3,702*** (465)	-419 (765)	656 (489)
Left	-656 (1,345)	7,067** (3,469)	-947** (477)	-3,316*** (786)	824 (502)
Extreme party	-6,376*** (1,416)	-6,167* (3,651)	-2,097*** (502)	-629 (828)	-470 (529)
Agricultor	-715 (2,147)	-628 (5,539)	-71 (762)	5,159*** (1,255)	-174 (802)
Public official	-8,322*** (2,131)	-11,202** (5,496)	-2,922*** (756)	-4,143*** (1,246)	-293 (796)
Businessman	11,586*** (2,247)	-651 (5,796)	2,071*** (798)	15,172*** (1,314)	-219 (840)
Lawyer	-9,419*** (2,847)	-9,445 (7,344)	-3,379*** (1,011)	-2,494 (1,665)	-744 (1,064)
Initial GDP	429*** (44)	567*** (113)	151*** (16)	133*** (26)	-3 (16)
Constant	-19,249 (13,553)	-29,161 (34,958)	4,291 (4,811)	6,545 (7,924)	-491 (5,064)
Observations	38,961	38,961	38,961	38,961	38,961
Adjusted R-squared	0.192	0.195	0.119	0.042	0.000
Region FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Population	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

OLS estimates of contributions by category of donor with respect to candidates' characteristics. Sample is restricted to elections before the reform (2004, 2008 and 2012). The sample is restricted to elections before the reform (2004, 2008 and 2012). Contributions are expressed in reais at 2004 prices. Standard errors are clustered at the municipality level.



Table A2: Incumbents' contributions and candidates' characteristics.

	(1) Firms	(2) Party	(3) Citizens	(4) Own	(5) Others
Universitary degree	3,316 (2,645)	-4,919 (3,751)	3,920*** (1,033)	2,048 (1,546)	64 (76)
Woman	5,423 (4,850)	6,257 (6,877)	4,172** (1,894)	-8,799*** (2,835)	11 (139)
Age	-197 (1,111)	1 (1,576)	169 (434)	-1,038 (650)	33 (32)
Age sq.	1 (11)	-0 (15)	-3 (4)	14** (6)	-0 (0)
Big party	4,451 (2,959)	3,993 (4,195)	2,061* (1,156)	-4,594*** (1,730)	128 (85)
Left	-4,235 (3,242)	7,324 (4,597)	2,497** (1,266)	-3,678* (1,895)	144 (93)
Extreme party	-1,589 (3,095)	2,907 (4,389)	-2,163* (1,209)	1,377 (1,809)	-79 (89)
Initial local GDP	868*** (119)	893*** (169)	353*** (47)	275*** (70)	-2 (3)
Constant	-15,085 (34,137)	-40,440 (48,409)	5,912 (13,335)	26,578 (19,956)	-731 (979)
Observations	6,600	6,600	6,600	6,600	6,600
Adjusted R-squared	0.368	0.661	0.214	0.079	0.007
Region FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Population	Yes	Yes	Yes	Yes	Yes
Standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

OLS estimates of contributions by category of donor with respect to incumbents' characteristics. The sample is restricted to elections before the reform (2004, 2008 and 2012) and to incumbents who re-contest. Contributions are expressed in reais at 2004 prices. Standard errors are clustered at the municipality level.

Table A3: Economic sector of firms donors by total contributions in 2012.

Economic sector	Total
Building construction	35812071
Retail trade of motor vehicle fuels	32022123
Construction of highways and railways	19568909
Real estate developments	13833591
Multiple banks, with commercial portfolio	13804518
Retail trade in goods in general, with predominance of food products - supermarkets	11892347
Retail trade in new cars, vans and utilities	10706749
Other civil engineering works not previously specified	10571015
Road cargo transportation, except dangerous products and changes, intercity, interstate and international	8858876
Retail trade in building materials in general	7151433
Brewing and draft beers	6831261
Industrial assembly works	5517250
Engineering services	5274438
Wholesale of beer, draft beer and soda	4758757
Retail trade in goods in general, with predominance of food products - minimarkets, grocery stores and warehouses	4525236
Earthworks	4478408
Retail trade in pasta	4426066
Cleaning in buildings and homes	4419585
Construction of water supply networks, sewage collection and related constructions, except irrigation works	4135351
Wholesale of food products in general	4109862
Purchase and sale of own properties	4050303
Manufacture of cellulose and other pulp for papermaking	3995435
Rental of own properties	3993337
Holdings of non-financial institutions	3711051
Furniture retail trade	3450984
Manufacture of raw sugar	3442461
Surveillance and private security activities	3304477
Wholesale of medicines and drugs for human use	3208645
Consulting activities in business management, except specific technical consulting	3178806

Economic sector of firms' donors and total donations in reais in 2012, ranked by total donations.

Table A4: Most repeated words in firms donors' names.

Original word	Translated word	Repeated times
comercio	trade	2951
posto	office	1599
construtora/ construcoes / construcao	construction	2010
servicos	services	1232
silva	silva	1169
auto	auto	1080
industria	industry	1040
ind	ind	982
engenharia	engineering	942
comercial	business	866
grafica	printer	828
empreendimentos	enterprise	766
editora	editor	715
oliveira	oliveira	638
santos	santos	628
sa	plc	520
transportes	transport	514
souza	souza	480
brasil	brazil	471

List of most repeated words in Portuguese and in English in the list of firms' names. Each firm is counted once. Data is aggregated for 2004, 2008 and 2008 elections for mayors.

Table A5: Top expenses' categories by electoral year.

Year: 2004	
Expenditure's category	Total
advertisements and publicity	1.708e+08
fuels and lubricants	80118731
artist or animator fees	74962105
printing	67658533
acquisition, manufacture and distribution of gifts	51549441
services provided by third parties	51497800
leases of movable property	49977588
employees	37910019
miscellaneous to specify	31142470
promotional events	19656509
donations in cash made to other candidates and/or financial committees	8833575.2
food	8584802.3
leases of real estate	7505819
election polls or research	6063093.9
water, electricity and telephone	5720505.2
transport tickets and driving/travel and tolls	4721148.8
office supplies	4399508.9
social charges	2680262.6
finance charges and bank fees	1571717.6
taxes and fees	1325141.4
postal expenses	1042643.3
permanent goods and materials	932851.18
election fines	276089.98

Year: 2008	
estimated donations in kind	3.005e+08
advertising by printed materials	1.633e+08
employees	1.268e+08
fuels and lubricants	92208305
production of radio, television or video programs	88501276
services provided by third parties	86240197
advertising by signs, banners and banners	50807616
advertising by sound cars	45708378
vehicle lease	38168530
miscellaneous to specify	30837230
financial donations to other candidates and/or financial committees	24145636
rallies	13657719
production of jingles, vignettes and slogans	11970544
newspaper and magazine advertising	11923406
lease/assignment of movable property	11467610
election polls or research	10314219
food	10266488
transportation or travel expenses	8527527
lease/assignment of real estate	6929583.3
social charges	6396437.6
candidacy promotion events	5065018.3
office supplies	4409015.1
telemarketing advertising	4247006.1
telephone	4072089.7
taxes, contributions and fees	3817877.9
creation and inclusion of pages on the internet	2447433.6
postal expenses	1998023
finance charges and bank fees	1687757.9
candidate campaign committee physical pre-installation	1558881.7
electricity	981155.62
permanent assets	928155.63
election fines	916034.81
water	579697.42
reimbursements of expenses incurred by voters	118081.32

Continued on next page. See notes on page 55.

Table A5: Expenses' categories by electoral year. (continued).

donations of permanent assets made to candidates/financial committees	49360.288
Year: 2012	
employees	2.407e+08
advertising by printed materials	2.228e+08
services provided by third parties	1.652e+08
production of radio, television or video programs	1.509e+08
fuels and lubricants	1.052e+08
advertising by signs, banners and banners	90918212
estimated donations in kind - car lease or lease	85820861
advertising by sound cars	65217940
vehicle lease	61597514
financial donations to other candidates/financial committees/party	45539378
estimated donations in kind - services provided by third parties	44014413
estimated donations in kind - advertising by Printed Materials	43929159
miscellaneous to specify	40696272
estimated donations in kind - production of radio, television or video programs	33000517
rallies	22939255
lease/assignment of movable property	17639587
election polls or research	16926121
production of jingles, vignettes and slogans	16750029
estimated donations in kind - advertising by sound cars	15806279
estimated donations in kind - fuels and lubricants	14981037
estimated donations in kind - personnel expenses	14810107
estimated donations in kind - advertising by signs, banners and banners	14787529
newspaper and magazine advertising	14012880
food	13926053
lease/assignment of real estate	12057088
estimated donations in kind - miscellaneous to specify	11364064
estimated donations in kind - lease/assignment of movable property	10745698
estimated donations in kind - lease/assignment of real estate	10362119
transportation or travel expenses	8089035.2
telemarketing advertising	7895098.7
creation and inclusion of pages on the internet	7102946.1
estimated donations in kind - rallies	6708441
candidacy promotion events	6492201
estimated donations in kind - production of jingles, vignettes and slogans	6052747.9
office supplies	4222685.9
estimated donations in kind - advertising by newspapers and magazines	3355788.9
estimated donations in kind - polls or electoral researchs	3019399.8
correspondence and postal expenses	2239861.8
telephone	2213597.5
estimated donations in kind - transportation or travel expenses	1974767
social charges	1890730
estimated donations in kind - food	1824474.6
taxes, contributions and fees	1717355.1
candidate campaign committee physical pre-installation	1487892
estimated donations in kind - candidacy promotion events	1480487.8
financial charges, bank fees and/or op. credit card	1351994.1
water	1229767.7
permanent assets	1082165.5
estimated donations in kind - creation and inclusion of pages on the internet	1054478.1
estimated donations in kind - telemarketing advertising	1026247.9
electricity	969163.88
election fines	763008.25
estimated donations in kind - office supplies	711049.54
estimated donations in kind - phone	551734.98
drop of estimates - candidate campaign committee physical pre-installation	361564.11
estimated donations in kind - social charges	296028.48
estimated donations in kind - correspondence and postal expenses	214557.66
estimated donations in kind - water	155154.65
reimbursements of expenses incurred by voters	146001.51
low estimate - electric power	143144.27
estimated donations in kind - estimated cash resources	109450.08

Continued on next page. See notes on page 55.

Table A5: Expenses' categories by electoral year. (continued).

estimated donations in kind - electoral fines	91232.809
estimated donations in kind - taxes, contributions and fees	57768.736
estimated donations in kind - finance charges, bank fees and/or op. credit card	24372.619
estimated donations in kind - reimbursements of expenses incurred by voters	5414.6355
financial donations to other candidates/financial committees/party	45539378
estimated donations in kind - services provided by third parties	44014413
estimated donations in kind - advertising by Printed Materials	43929159
miscellaneous to specify	40696272
rallies	22939255
lease/assignment of movable property	17639587
election polls or research	16926121
production of jingles, vignettes and slogans	16750029
estimated donations in kind - advertising by sound cars	15806279
estimated donations in kind - fuels and lubricants	14981037
estimated donations in kind - personnel expenses	14810107
estimated donations in kind - advertising by signs, banners and banners	14787529
newspaper and magazine advertising	14012880
food	13926053
lease/assignment of real estate	12057088
estimated donations in kind - miscellaneous to specify	11364064
estimated donations in kind - lease/assignment of movable property	10745698
estimated donations in kind - lease/assignment of real estate	10362119
transportation or travel expenses	8089035.2
telemarketing advertising	7895098.7
creation and inclusion of pages on the internet	7102946.1
estimated donations in kind - rallies	6708441
candidacy promotion events	6492201
estimated donations in kind - production of jingles, vignettes and slogans	6052747.9
office supplies	4222685.9
estimated donations in kind - advertising by newspapers and magazines	3355788.9
estimated donations in kind - polls or electoral researchs	3019399.8
correspondence and postal expenses	2239861.8
telephone	2213597.5
estimated donations in kind - transportation or travel expenses	1974767
social charges	1890730
estimated donations in kind - food	1824474.6
taxes, contributions and fees	1717355.1
candidate campaign committee physical pre-installation	1487892
estimated donations in kind - candidacy promotion events	1480487.8
financial charges, bank fees and/or op. credit card	1351994.1
water	1229767.7
permanent assets	1082165.5
estimated donations in kind - creation and inclusion of pages on the internet	1054478.1
estimated donations in kind - telemarketing advertising	1026247.9
electricity	969163.88
election fines	763008.25
estimated donations in kind - office supplies	711049.54
estimated donations in kind - phone	551734.98
drop of estimates - candidate campaign committee physical pre-installation	361564.11
estimated donations in kind - social charges	296028.48
estimated donations in kind - correspondence and postal expenses	214557.66
estimated donations in kind - water	155154.65
reimbursements of expenses incurred by voters	146001.51
low estimate - electric power	143144.27
estimated donations in kind - estimated cash resources	109450.08
estimated donations in kind - electoral fines	91232.809
estimated donations in kind - taxes, contributions and fees	57768.736
estimated donations in kind - finance charges, bank fees and/or op. credit card	24372.619
estimated donations in kind - reimbursements of expenses incurred by voters	5414.6355

Year: 2016

advertising by printed materials	1.333e+08
production of radio, television or video programs	94136992
services provided by third parties	85280864

Continued on next page. See notes on page 55.

Table A5: Expenses' categories by electoral year. (continued).

employees	68459472
fuels and lubricants	56180833
advertising by stickers	47491821
militancy and street mobilization activities	44540245
write-off of estimated - car lease or lease	35826677
advertising by sound cars	33916897
rallies	33296054
miscellaneous to specify	25785843
car lease or lease	25542119
estimated donations in kind - militancy and street mobilization activities	13495782
estimated donations in kind - services provided by third parties	13275028
production of jingles, vignettes and slogans	12695607
financial donations to other candidates/parties	12688105
own services provided by third parties	10193697
election polls or tests	8394420.6
lease/assignment of real estate	8342681.5
newspaper and magazine advertising	7835315.5
estimated donations in kind - Advertising by Printed Materials	7290680.5
lease/assignment of movable property (except vehicles)	6939475.9
food	6473441.7
estimated donations in kind - personnel expenses	6323569.5
estimated donations in kind - Advertising by Sound Cars	5799354.4
estimated donations in kind - own services provided by third parties	5365859.6
estimated donations in kind - lease/assignment of real estate	5159863.2
candidacy promotion events	4584391.9
transportation or travel expenses	4342410
creation and inclusion of pages on the internet	3861636.6
estimated donations in kind - production of radio, television or video programs	3262763
estimated donations in kind - miscellaneous to specify	2970096.2
estimated donations in kind - advertising by stickers	2653356.5
office supplies	2133421.2
estimated donations in kind - lease/assignment of movable property (except vehicles)	1728759.2
estimated donations in kind - production of jingles, vignettes and slogans	1538933.4
estimated donations in kind - rallies	1456129.3
correspondence and postal expenses	1228070.1
estimated donations in kind - fuels and lubricants	1225913.3
physical pre-installation of campaign committee	1136876.7
financial charges, bank fees and/or op. credit card	999973.26
Water	808606.52
taxes, contributions and fees	568429.04
electricity	480523.79
social charges	402361.95
hosting expenses	377902.93
estimated donations in kind - transportation or travel expenses	360831.28
estimated donations in kind - polls or electoral tests	327780.7
acquisition/donation of movable or immovable property	305627.19
estimated donations in kind - advertising by newspapers and magazines	263424.38
election fines	188095.74
telephone	183510.27
estimated donations in kind - candidacy promotion events	176389.96
estimated donations in kind - creation and inclusion of pages on the internet	169893.11
estimated donations in kind - physical pre-installation of campaign committee	121751.75
estimated donations in kind - food	106526.49
low estimate - phone	79897.05
reimbursements of expenses incurred by voters	63798.951
estimated donations in kind - office supplies	57314.195
low estimate - electric power	22305.389
estimated donations in kind - correspondence and postal expenses	21204.155
low estimate - hosting expenses	19925.724
estimated donations in kind - water	11009.551
estimated donations in kind - social charges	8371.6339
estimated donations in kind - finance charges, bank fees and/or op. credit card	1739.3516
estimated donations in kind - reimbursements of expenses incurred by voters	1565.4597
estimated donations in kind - taxes, contributions and fees	1366.2669

Continued on next page. See notes on page 55.

Table A5: Expenses' categories by electoral year. (continued).

estimated donations in kind - electoral fines

54.80936

Expenses categories for each electoral year provided by the *Tribunal Superior Eleitoral*. The second column is the total of the expense's category for all candidates running for mayors, valued in Reais at 2004 prices.

Table A6: The effects of banning firms' contributions on winners' characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Insider challenger wins	New candidate wins	Woman wins	Graduate wins	Total wealth of winner	Left-wing wins	Big party wins
2016	0.081*** (0.016)	-0.009 (0.016)	0.048*** (0.011)	0.116*** (0.019)	0.468*** (0.057)	0.036** (0.016)	-0.150*** (0.018)
Firms' dependence	-0.114*** (0.030)	-0.058* (0.032)	-0.051** (0.021)	0.059 (0.043)	-0.343** (0.147)	-0.050 (0.038)	0.158*** (0.040)
Firms' dependence * 2016	0.099 (0.067)	-0.077 (0.063)	0.002 (0.046)	0.148* (0.078)	0.295 (0.241)	-0.105 (0.066)	0.027 (0.078)
Constant	0.252*** (0.067)	0.223*** (0.058)	0.034 (0.035)	0.221*** (0.075)	12.023*** (0.208)	0.410*** (0.080)	0.861*** (0.060)
Observations	9,586	9,586	9,586	9,586	6,975	9,586	9,586
R-squared	0.027	0.020	0.021	0.031	0.059	0.032	0.074
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1							

Weighted least-squares estimates. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. Weights are calibrated using an entropy balancing method for continuous treatment (see Section 2). All regressions include regions times year fixed-effects. The dependent variables correspond to covariates of the winner candidate. Wealth is expressed in log terms and is declared by the candidates themselves. The left-wing category is defined with the variable *Overall Left-Right Placement* of the [Kitschelt et al. \(2009\)](#) dataset and complemented with Wikipedia. A candidate is considered from a big party if she belongs to one of the five biggest political parties in Brazil.

Table A7: Effects of banning firms' contributions on the incumbents' probability of re-contesting

	(1)	(2) X = woman	(3) X = graduate	(4) X = Total wealth	(5) X = Left-wing	(6) X = Big party
2016	0.181*** (0.014)	0.165*** (0.014)	0.094*** (0.016)	0.161*** (0.014)	0.120*** (0.015)	0.172*** (0.015)
Firms' dependence	0.022 (0.031)	0.043 (0.031)	0.011 (0.035)	0.034 (0.032)	0.030 (0.033)	-0.054 (0.035)
Incumbent*X		0.465*** (0.010)	0.578*** (0.008)	0.004*** (0.001)	0.482*** (0.008)	0.685*** (0.007)
Incumbent*X*Firms' dependence		-0.115** (0.050)	-0.031 (0.036)	-0.005 (0.004)	0.011 (0.038)	0.023 (0.036)
Incumbent*X*2016		-0.010 (0.016)	0.022 (0.016)	-0.002** (0.001)	0.032** (0.015)	-0.066*** (0.016)
<b>Reform effects</b>						
Firms' dependence * 2016	0.002 (0.063)	-0.011 (0.065)	-0.102 (0.077)	-0.018 (0.066)	0.035 (0.068)	-0.002 (0.077)
Incumbent*X*2016*Firms' dependence		0.107 (0.079)	0.139* (0.078)	0.014** (0.006)	-0.039 (0.071)	0.030 (0.078)
Constant	0.406*** (0.056)	0.398*** (0.055)	0.382*** (0.052)	0.413*** (0.056)	0.262*** (0.044)	0.203*** (0.042)
Observations	17,307	17,307	17,307	17,307	17,307	17,307
R-squared	0.053	0.089	0.312	0.074	0.168	0.451

Weighted least-squares estimates. The sample is restricted to municipalities where the incumbent does not face a term limit. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. The dependent variable is a dully that equals one if the incumbent runs for re-election. Weights are calibrated using an entropy balancing method for continuous treatment (see Section 2). All regressions include regions times year fixed-effects. In each column I interact the treatment effect with a covariate denoted by X. Wealth is expressed in log terms and is declared by the candidates themselves. The left-wing category is defined with the variable *Overall Left-Right Placement* of the [Kitschelt et al. \(2009\)](#) dataset and complemented with Wikipedia. A candidate is considered from a big party if she belongs to one of the five biggest political parties in Brazil.



Table A8: Effects of the reform at the individual level

	(1) Probability of re-contesting	(2) Variation in contributions	(3) Share of votes in next elections
<b>Panel A: Incumbents</b>			
2016	-0.093*** (0.019)	-0.416*** (0.048)	-0.055*** (0.008)
Mid firms' dependence	0.008 (0.018)	0.008 (0.051)	-0.012 (0.008)
High firms dependence	0.010 (0.014)	0.054 (0.040)	-0.020*** (0.006)
Mid firms' dependence * 2016	-0.012 (0.035)	-0.315*** (0.085)	-0.034* (0.016)
High firms' dependence * 2016	0.003 (0.029)	-0.218*** (0.066)	0.006 (0.012)
Observations	7598	4736	4814
R-squared	0.022	0.071	0.063
<b>Panel B: Runners-up</b>			
2016	0.017 (0.014)	-0.371*** (0.058)	0.051*** (0.008)
Mid firms' dependence	0.036** (0.016)	-0.008 (0.063)	0.009 (0.008)
High firms dependence	0.018 (0.013)	-0.037 (0.052)	0.015** (0.007)
Mid firms' dependence * 2016	0.010 (0.027)	0.028 (0.094)	-0.015 (0.014)
High firms' dependence * 2016	0.052** (0.024)	-0.120 (0.085)	-0.024* (0.014)
Observations	10827	3598	3660
R-squared	0.023	0.062	0.050
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Weighted least-squares estimates. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Weights are calibrated using an entropy balancing method for categorical treatment (see Section 2). The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Table A9: Heterogenous effects on re-contesting decisions.

	(1) <b>X =</b> graduate	(2) <b>X =</b> woman	(3) <b>X =</b> left-wing	(4) <b>X =</b> big party
Panel A: Incumbents				
Mid firms' dependence * 2016	-0.015 (0.049)	0.013 (0.037)	-0.026 (0.042)	0.061 (0.054)
High firms' dependence * 2016	0.070* (0.038)	0.016 (0.030)	-0.013 (0.034)	0.050 (0.043)
Mid firms' dependence * 2016 * <b>X</b>	0.006 (0.070)	-0.210* (0.112)	0.051 (0.076)	-0.121* (0.071)
High firms' dependence * 2016 * <b>X</b>	-0.137** (0.057)	-0.087 (0.090)	0.053 (0.061)	-0.088 (0.058)
Observations	7598	7598	7598	7598
R-squared	0.026	0.023	0.027	0.023
Panel B: Runners-up				
Mid firms' dependence * 2016	-0.020 (0.037)	0.022 (0.030)	-0.021 (0.033)	-0.016 (0.043)
High firms' dependence * 2016	0.015 (0.032)	0.067** (0.026)	0.105*** (0.030)	-0.009 (0.037)
Mid firms' dependence * 2016 * <b>X</b>	0.068 (0.055)	-0.074 (0.078)	0.098* (0.059)	0.043 (0.056)
High firms' dependence * 2016 * <b>X</b>	0.082* (0.049)	-0.143** (0.072)	-0.171*** (0.052)	0.104** (0.049)
Observations	10827	10827	10827	10827
R-squared	0.026	0.025	0.027	0.024
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Weighted least-squares estimates. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Weights are calibrated using an entropy balancing method for categorical treatment (see Section 2). Each column corresponds to a triple differences-in-differences with respect to the variable denoted as the column name. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Table A10: Heterogenous effects on share of votes.

	(1) <b>X =</b> graduate	(2) <b>X =</b> woman	(3) <b>X =</b> left-wing	(4) <b>X =</b> big party
Panel A: Incumbents				
Mid firms' dependence * 2016	-0.063** (0.021)	-0.034* (0.017)	-0.024 (0.019)	0.001 (0.025)
High firms' dependence * 2016	-0.019 (0.016)	0.009 (0.013)	0.012 (0.016)	0.030+ (0.018)
Mid firms' dependence * 2016 * <b>X</b>	0.059* (0.032)	-0.009 (0.056)	-0.030 (0.034)	-0.055* (0.032)
High firms' dependence * 2016 * <b>X</b>	0.054** (0.025)	-0.048 (0.038)	-0.012 (0.025)	-0.041+ (0.025)
Observations	4814	4814	4814	4814
R-squared	0.065	0.064	0.065	0.065
Panel B: Runners-up				
Mid firms' dependence * 2016	-0.017 (0.020)	-0.018 (0.016)	-0.013 (0.017)	-0.022 (0.024)
High firms' dependence * 2016	-0.037** (0.017)	-0.031** (0.014)	-0.052*** (0.015)	-0.014 (0.019)
Mid firms' dependence * 2016 * <b>X</b>	-0.001 (0.031)	-0.007 (0.044)	-0.005 (0.034)	0.010 (0.031)
High firms' dependence * 2016 * <b>X</b>	0.030 (0.026)	0.055 (0.037)	0.084** (0.028)	-0.019 (0.026)
Observations	3674	3674	3674	3674
R-squared	0.056	0.052	0.057	0.051
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Weighted least-squares estimates. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Weights are calibrated using an entropy balancing method for categorical treatment (see Section 2). Each column corresponds to a triple differences-in-differences with respect to the variable denoted as the column name. The dependent variable is the share of votes in next elections. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Table A11: Heterogenous effects on contributions.

	(1) <b>X =</b> graduate	(2) <b>X =</b> woman	(3) <b>X =</b> left-wing	(4) <b>X =</b> big party
Panel A: Incumbents				
Mid firms' dependence * 2016	-0.363*** (0.103)	-0.320*** (0.089)	-0.231** (0.093)	-0.341** (0.143)
High firms' dependence * 2016	-0.171* (0.092)	-0.226** (0.069)	-0.303*** (0.081)	-0.193* (0.104)
Mid firms' dependence * 2016 * <b>X</b>	0.124 (0.169)	0.067 (0.267)	-0.280 (0.200)	0.058 (0.174)
High firms' dependence * 2016 * <b>X</b>	-0.090 (0.132)	0.059 (0.220)	0.269* (0.139)	-0.057 (0.137)
Observations	4736	4736	4736	4736
R-squared	0.073	0.071	0.075	0.072
Panel B: Runners-up				
Mid firms' dependence * 2016	-0.067 (0.135)	-0.207** (0.105)	-0.143 (0.120)	-0.093 (0.148)
High firms' dependence * 2016	0.074 (0.104)	0.008 (0.083)	0.111 (0.097)	-0.049 (0.122)
Mid firms' dependence * 2016 * <b>X</b>	-0.342* (0.201)	-0.142 (0.353)	-0.264 (0.217)	-0.217 (0.200)
High firms' dependence * 2016 * <b>X</b>	-0.279* (0.162)	-0.577** (0.279)	-0.479** (0.174)	-0.004 (0.162)
Observations	3616	3616	3616	3616
R-squared	0.069	0.069	0.070	0.067
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Weighted least-squares estimates. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Weights are calibrated using an entropy balancing method for categorical treatment (see Section 2). Each column corresponds to a triple differences-in-differences with respect to the variable denoted as the column name. The dependent variable is the variation in the log of contributions between two consecutive elections. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

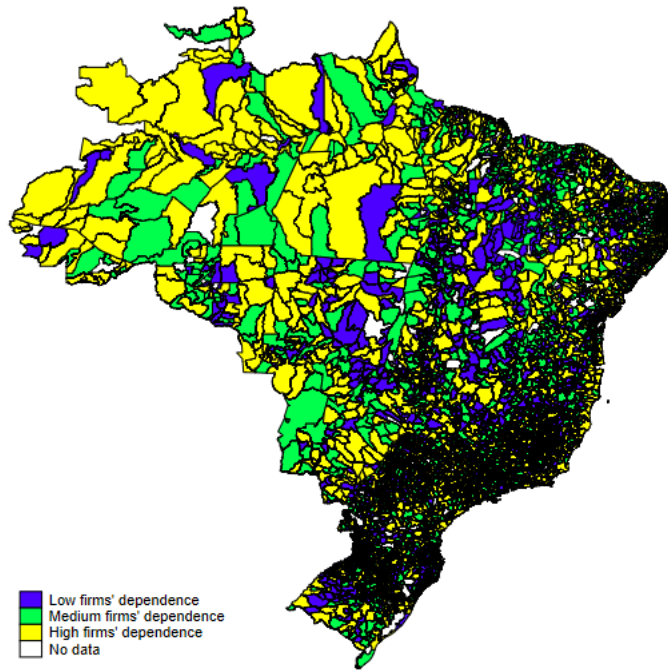
Table A12: Heterogenous effects on challengers' entry with respect to incumbents' firms' dependence.

	(1) <b>X =</b> graduate	(2) <b>X =</b> woman	(3) <b>X =</b> left-wing	(4) <b>X =</b> big party
Mid firms' dependence * 2016	0.635*** (0.163)	0.425*** (0.127)	0.260* (0.144)	0.302 (0.190)
High firms' dependence * 2016	0.262** (0.125)	0.138 (0.099)	0.154 (0.118)	-0.009 (0.141)
Mid firms' dependence * 2016 * <b>X</b>	-0.521** (0.245)	-0.347 (0.532)	0.407 (0.275)	0.104 (0.251)
High firms' dependence * 2016 * <b>X</b>	-0.278 (0.188)	0.172 (0.289)	-0.034 (0.194)	0.347* (0.190)
Observations	4824	4824	4824	4824
R-squared	0.083	0.080	0.080	0.082
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Weighted least-squares estimates. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Weights are calibrated using an entropy balancing method for categorical treatment (see Section 2). Each column corresponds to a triple differences-in-differences with respect to the variable denoted as the column name. The dependent variable is the variation of challengers. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

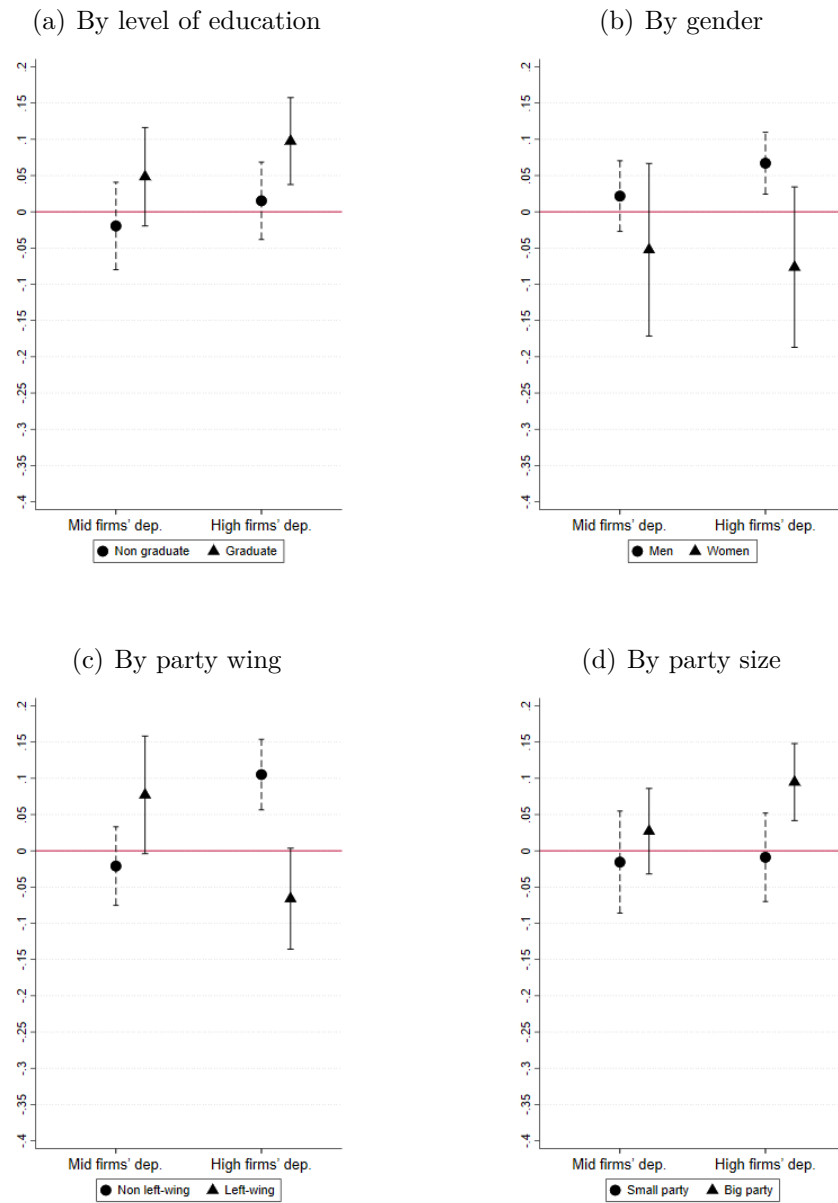
## B Supplementary figures

Figure B1: Degree of local firms' dependence.



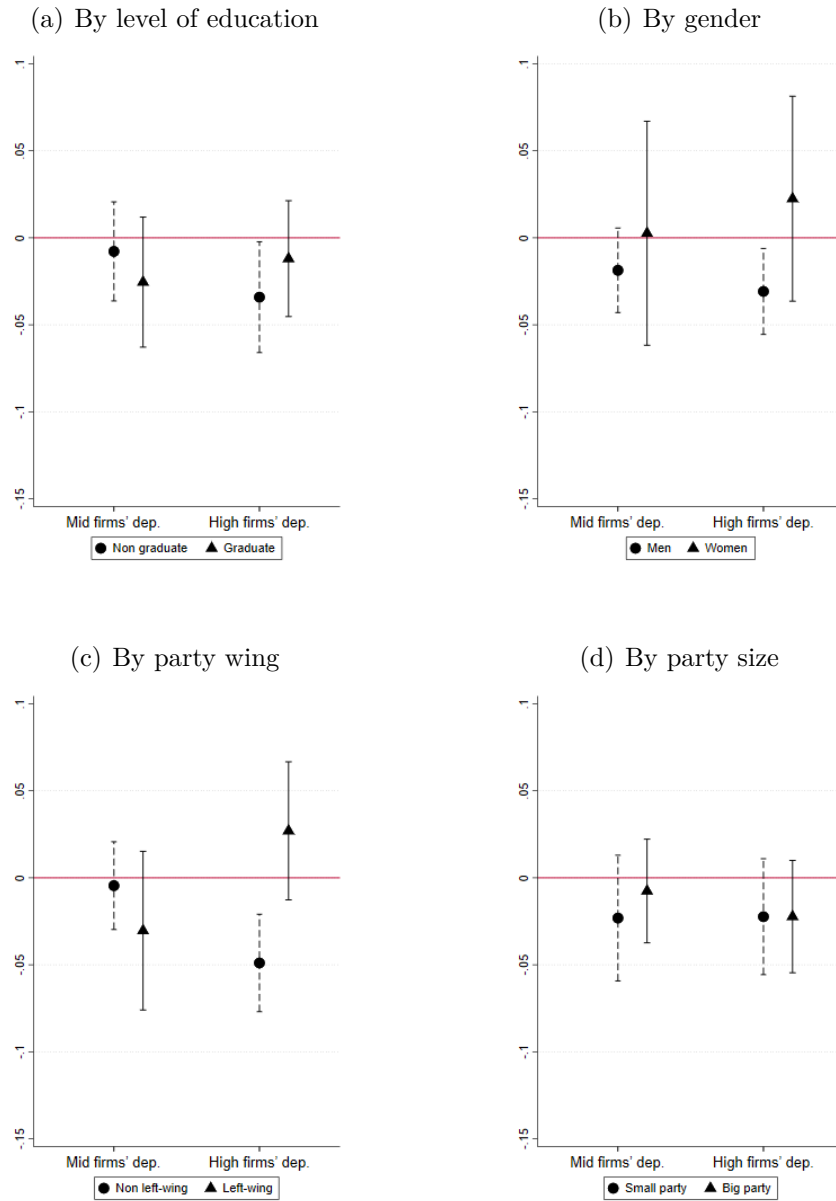
Low, medium and high firms' dependence correspond respectively to the first, second and third tercile of the distribution of the mean percentage that firms' contributions represented between 2004 and 20winner02 (per candidate).

Figure B2: Heterogenous marginal effects on runners-up' probability of re-contesting for office.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect. The dependent variable is a dummy that equald one if the candidate re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

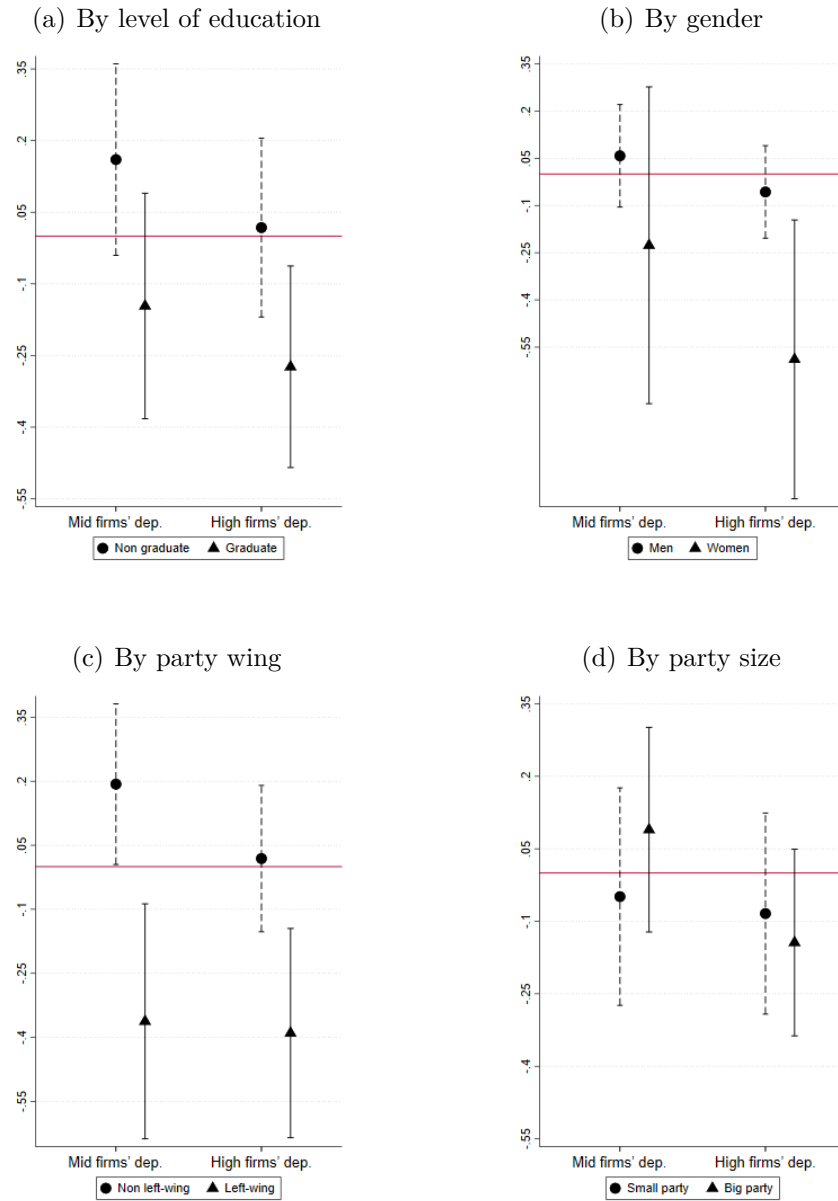
Figure B3: Heterogenous marginal effects on runners-up' share of votes.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect. The dependent variable is the share of votes in next elections. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

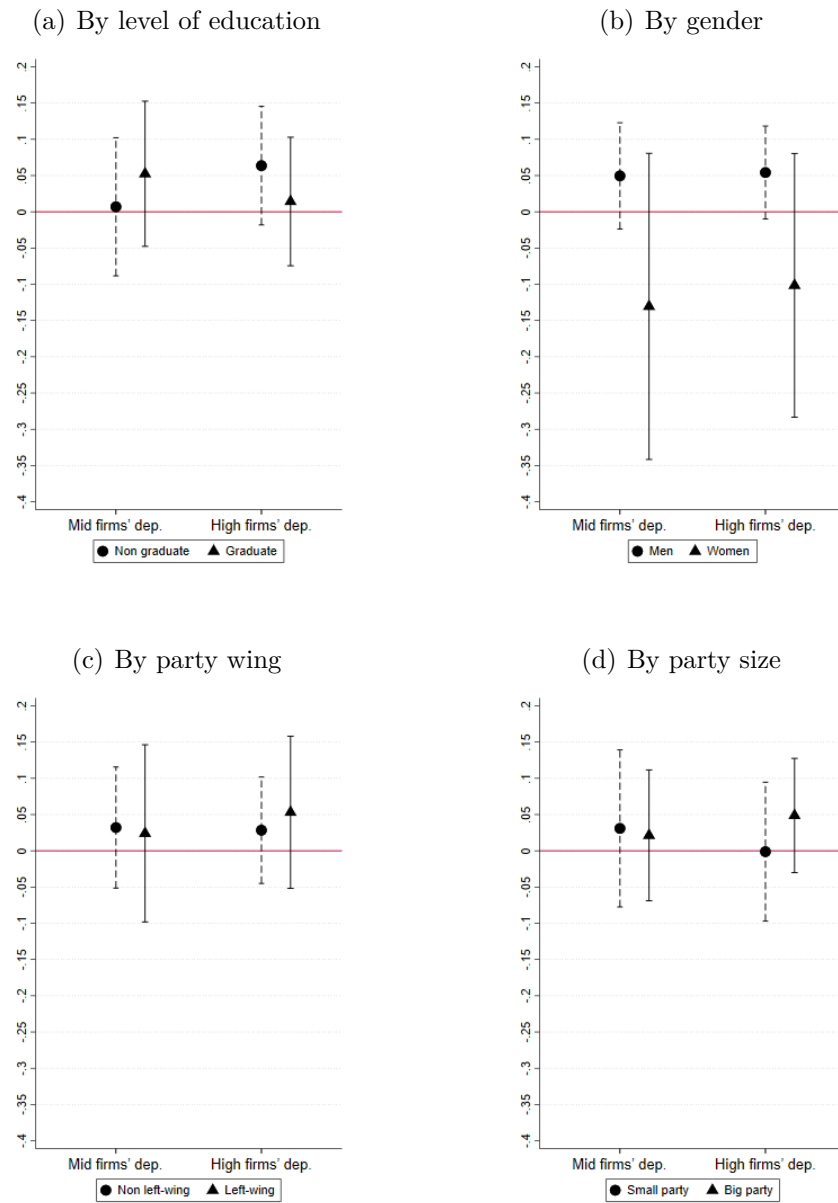


Figure B4: Heterogenous marginal effects on the variation of runners-up' contributions.



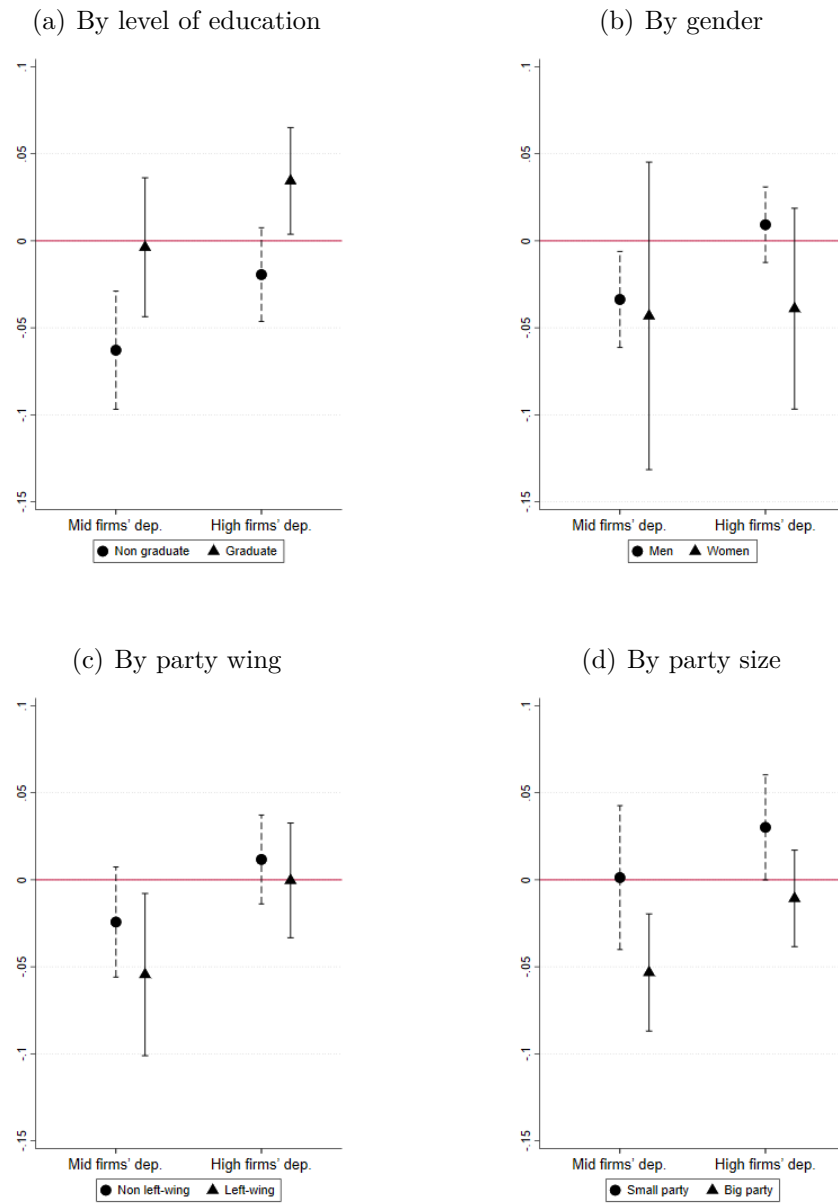
Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect. The dependent variable is the variation in the log of contributions. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure B5: Heterogenous marginal effects on incumbents' probability of re-contesting for office controlling for declared wealth.



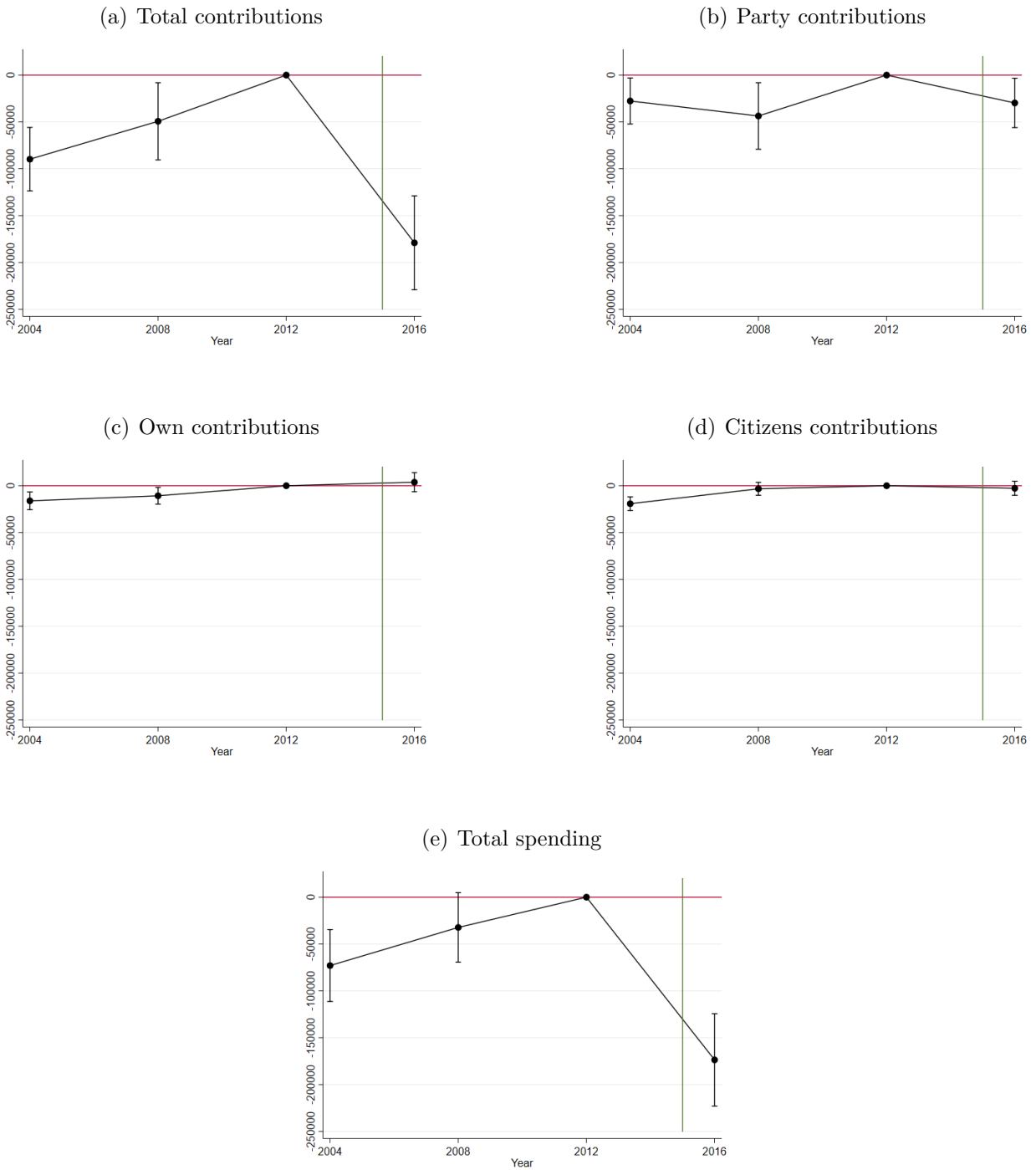
Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect, and the log of the candidate's declared wealth. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure B6: Heterogenous marginal effects on incumbents' share of votes controlling for declared wealth.



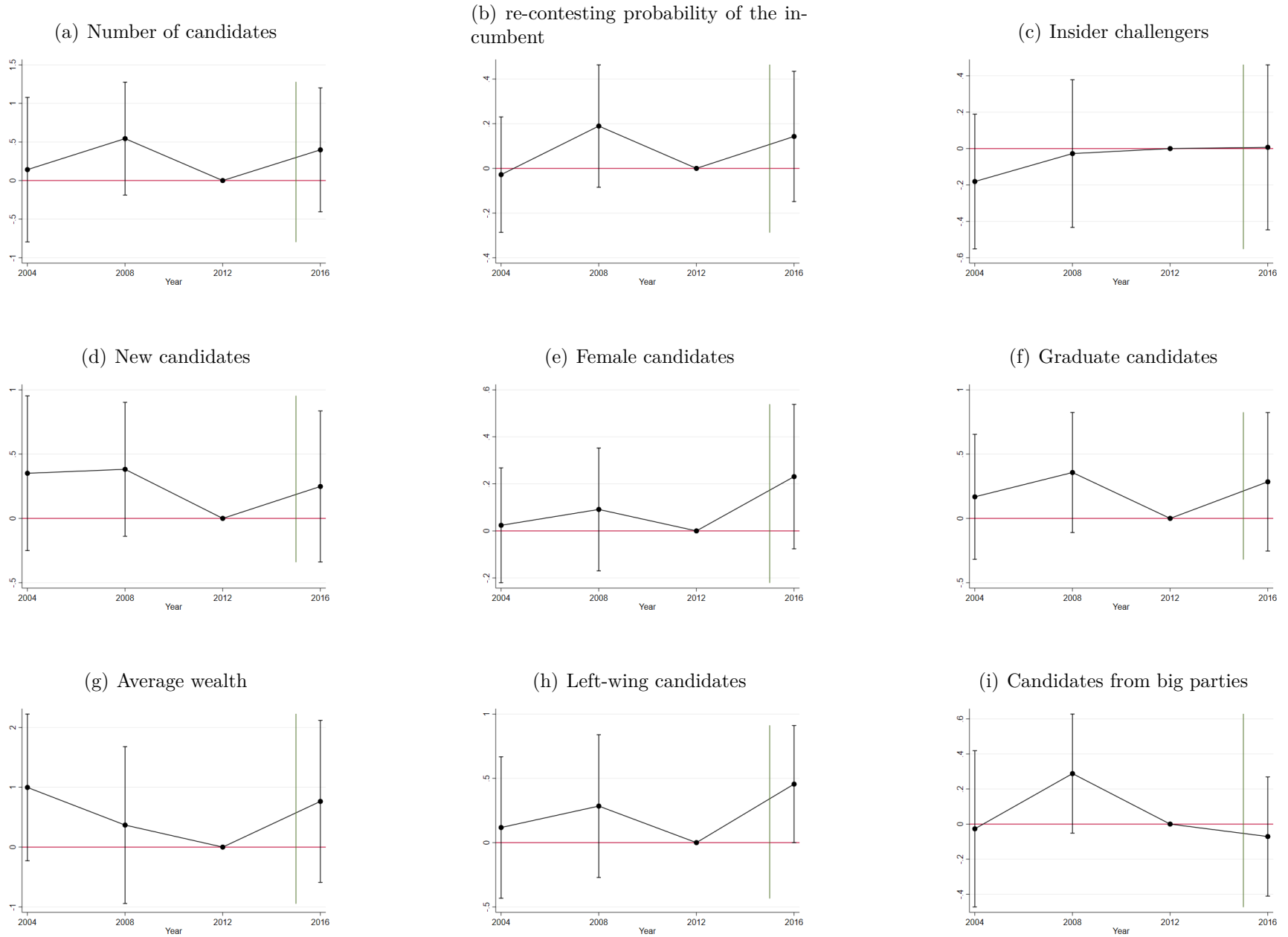
Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for incumbents. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effect, and the log of the candidate's declared wealth. The dependent variable is the share of votes in next elections. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure B7: Violation of parallel trends under unweighted and unrestricted sample.



The graphs show the evolution of the average treatment effects on different elections. All variables are average per candidate expressed in reais at 2004 prices. All the estimations include as controls population, local GDP per capita, the spending limit introduced in 2016, latitude, longitude, and regions times year fixed-effects.

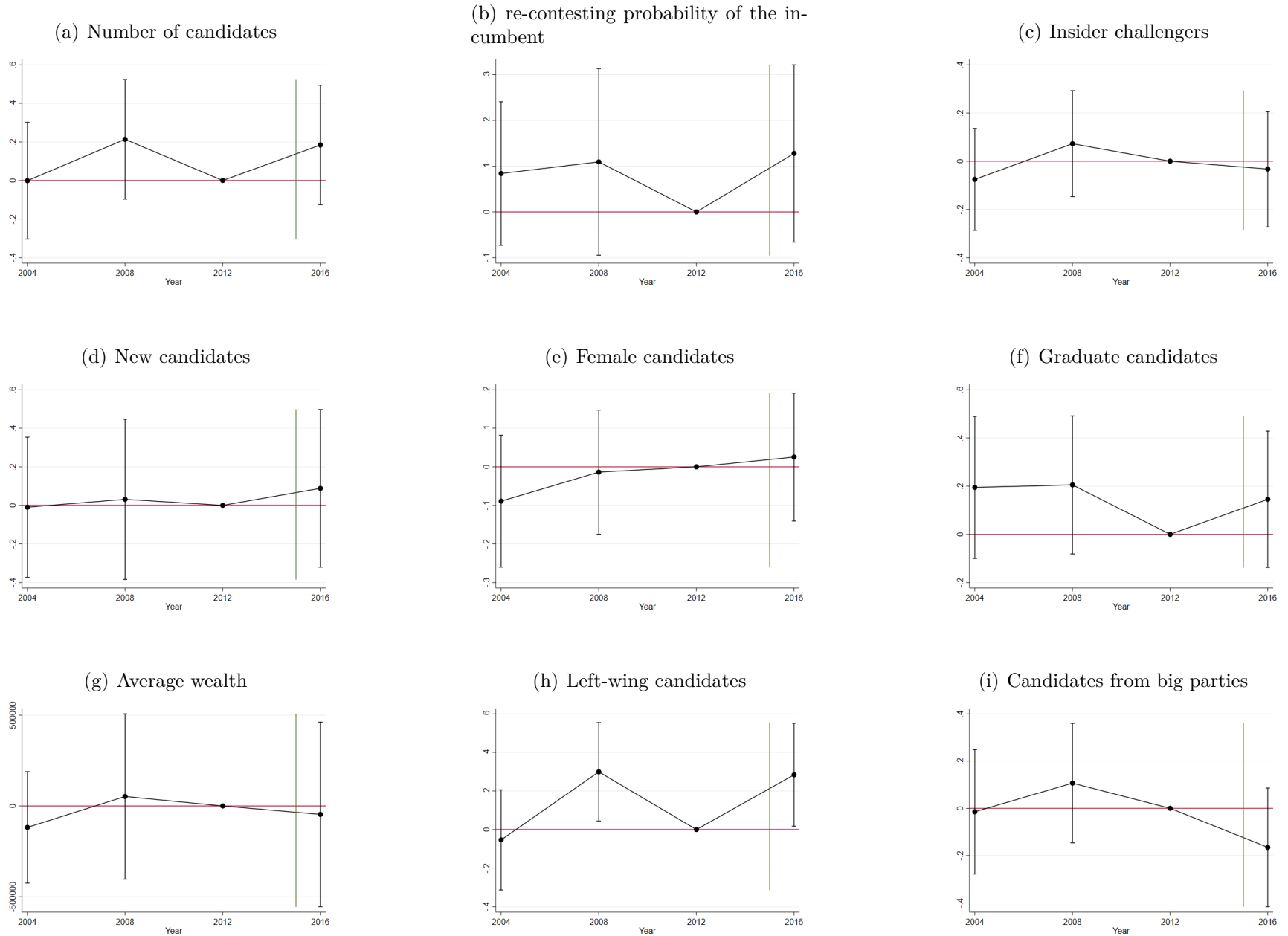
Figure B8: Trends of the pool of candidates using WLS.



The graphs show the evolution of the average treatment effects on different elections on the pool of candidates. Weighted least squares with weights calibrated using an entropy balancing method for categorical treatment. Contributions, population, the spending limit and the local production per capita are in log terms. All the estimations include regions and year fixed-effects.

Figure B9: Trends of the pool of candidates using a restricted sample of municipalities.

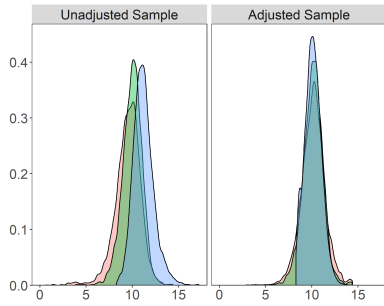
70



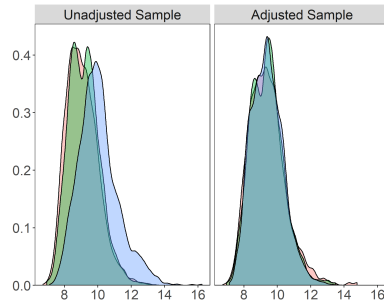
The graphs show the evolution of the average treatment effects on different elections on the pool of candidates. I exclude municipalities corresponding to the ones in the first and tenth decile of the distribution of the mean contributions per candidate on the three elections before the reform, and the ones in the first and tenth decile of the distribution of total population. All the estimations include as controls population, local GDP per capita, the spending limit introduced in 2016, latitude, longitude, and regions times year fixed-effects.

Figure B10: Distributional balancing of selected covariates at the individual level.

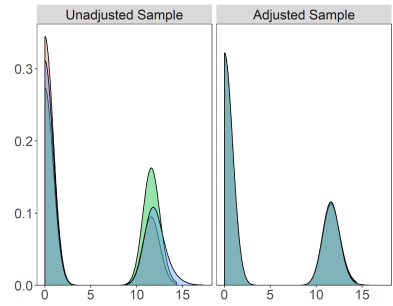
(a) Individual total contributions



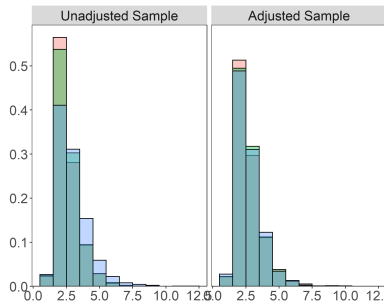
(b) Local population



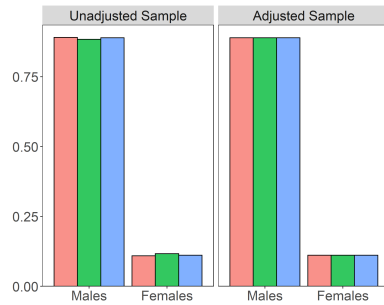
(c) Local spending limit



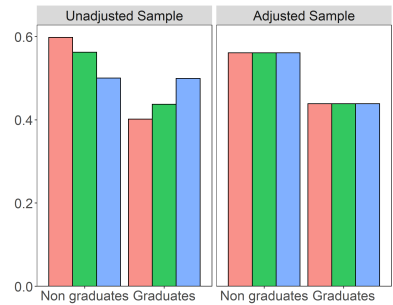
(d) Local number of candidates



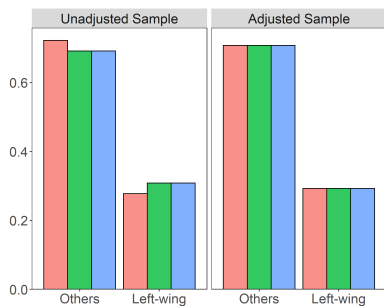
(e) Proportion of female candidates



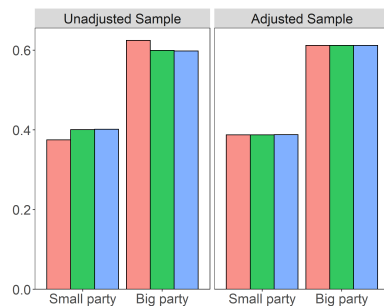
(f) Proportion of graduate candidates



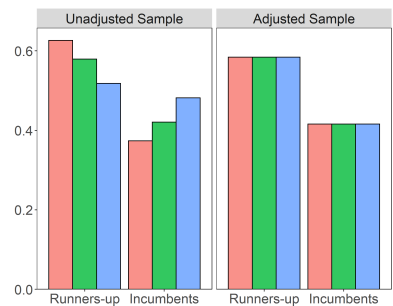
(g) Proportion of left-wing candidates



(h) Proportion of candidates from big parties



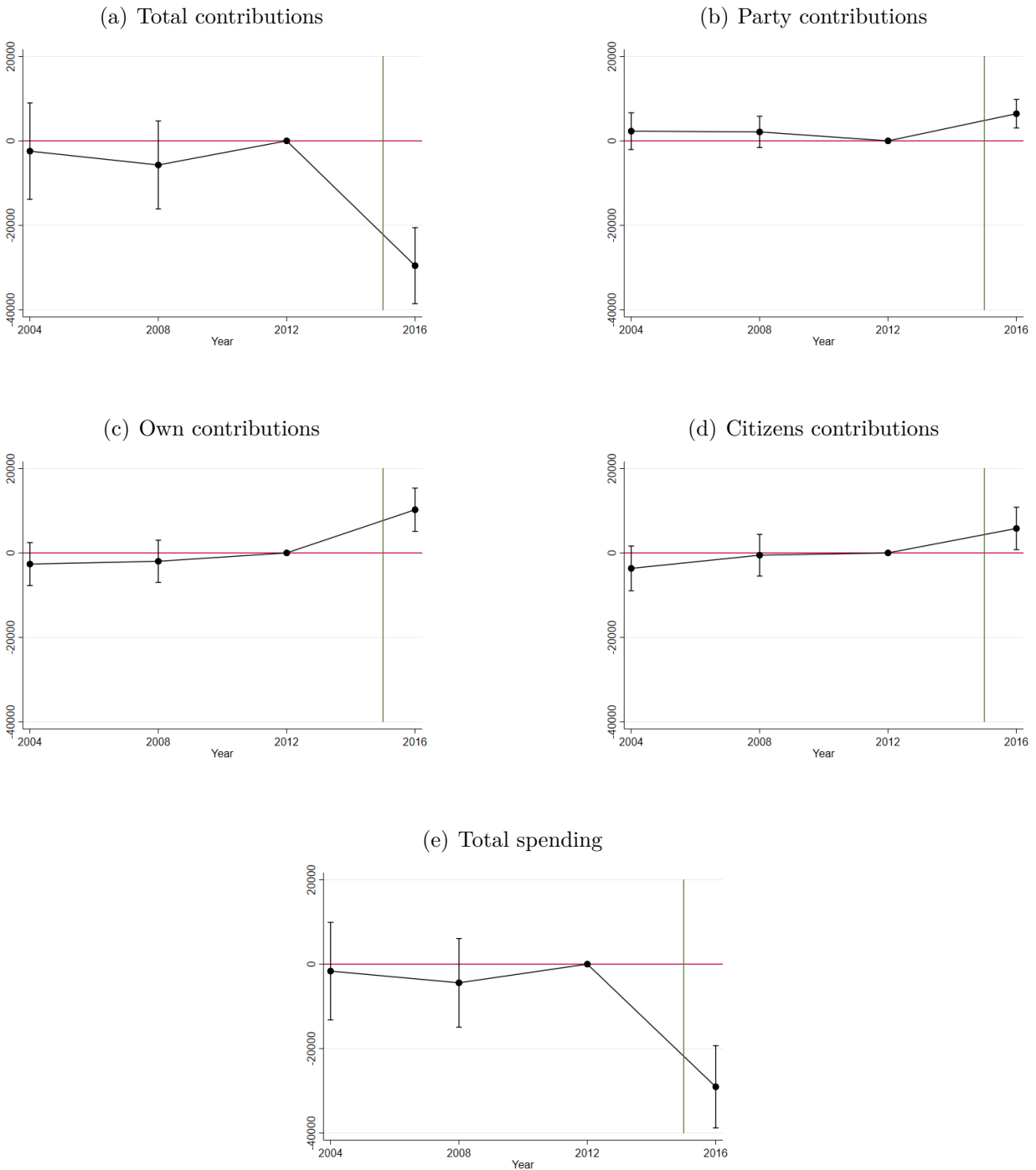
(i) Proportion of incumbents



The red distribution corresponds to the control group at the individual level, i.e. candidates who did not receive funds from firms on the previous election, the green (blue) to candidates below (above) the median of the distribution of firms' contributions, conditional on receiving firms' contributions. The y-axis measures the proportion of each level of the covariate (measured by the x-axis) for each level of treatment. The adjusted sample corresponds to the weighted sample where weights are calibrated using an entropy balancing method for categorical treatment. Contributions, population, spending limit and the local production per capita are in log terms.

## C Robustness

Figure C1: Trends of contributions and spending using a restricted sample of municipalities.



The graphs show the evolution of the average treatment effects on different elections. All variables are average per candidate and expressed in reais at 2004 prices. I exclude municipalities corresponding to the ones in the first and tenth decile of the distribution of the mean contributions per candidate on the three elections before the reform, and the ones in the first and tenth decile of the distribution of total population. All the estimations include as controls population, local GDP per capita, the spending limit introduced in 2016, latitude, longitude, and regions times year fixed-effects.



Table C1: The effects of banning firms' contributions on campaign contributions and spending using a restricted sample of municipalities.

	(1)	(2)	(3)	(4)	(5)
Panel A: All municipalities					
	Total contributions	Party contributions	Own contributions	Citizens contributions	Total spending
2016	-7,703 (6,739)	9,990*** (2,178)	-10,628*** (2,247)	-11,705*** (2,768)	-6,026 (5,498)
Firms' dependence	38,275*** (3,771)	-6,450*** (1,064)	-15,376*** (1,358)	-2,791* (1,445)	32,764*** (3,172)
Firms' dependence * 2016	-32,406*** (5,317)	5,923*** (1,201)	13,118*** (2,161)	8,621*** (2,168)	-28,685*** (4,218)
Constant	-12,394 (16,764)	-1,810 (4,626)	-4,779 (7,337)	10,006 (6,519)	-2,824 (13,292)
Observations	15,163	15,163	15,163	15,163	15,023
R-squared	0.172	0.163	0.041	0.178	0.071
Panel B: Municipalities where the incumbent can re-contest					
	Total contributions	Party contributions	Own contributions	Citizens contributions	Total spending
2016	-15,451** (7,406)	8,781*** (1,748)	-12,321*** (1,834)	-12,573*** (3,026)	-12,905** (5,377)
Firms' dependence	35,893*** (4,017)	-6,267*** (1,142)	-15,854*** (1,550)	-3,740** (1,561)	31,545*** (3,446)
Firms' dependence * 2016	-29,305*** (6,017)	5,861*** (1,377)	13,574*** (2,261)	9,843*** (2,480)	-27,357*** (3,973)
Constant	-18,727 (17,822)	-4,291 (5,058)	-4,223 (8,246)	10,748 (7,109)	-9,275 (14,257)
Observations	11,684	11,684	11,684	11,684	11,566
R-squared	0.374	0.149	0.118	0.176	0.305
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					

OLS estimates. Standard errors are clustered at the municipality level. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. I exclude municipalities in the first and last deciles in the distribution of mean contributions per candidate, as well as municipalities in the first and last decile in the distribution of population. All regressions include regions times year fixed-effects, local production per capita, population times year fixed effects, the spending limit introduced in 2016, latitude and longitude. Panel B excludes municipalities where incumbents face a term limit.

Table C2: The effects of firms' contributions on candidates' entry using a restricted sample of municipalities.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: All municipalities									
	Number of candidates	re-contesting probability of the incumbent	Number of insider challengers	Number of new candidates	Number of female candidates	Number of graduate candidates	Average wealth per candidate	Left-wing candidates	Candidates from big parties
2016	0.394 (0.256)	0.031 (0.160)	1.075*** (0.186)	-0.712** (0.349)	0.363** (0.160)	0.644** (0.315)	-152,866.358** (71,955.852)	-0.275 (0.245)	0.491** (0.220)
Firms' dependence	0.136* (0.075)	-0.025 (0.030)	0.074 (0.047)	0.087 (0.069)	-0.005 (0.046)	-0.102 (0.083)	150,460.496 (175,258.938)	0.028 (0.064)	0.005 (0.068)
Firms' dependence * 2016	0.113 (0.126)	0.063 (0.075)	-0.031 (0.100)	0.081 (0.157)	0.060 (0.076)	0.012 (0.124)	-65,220.312 (275,146.300)	0.236** (0.109)	-0.196* (0.107)
Observations	15,644	15,644	15,644	15,644	15,644	15,644	11,736	15,644	15,644
R-squared	0.154	0.027	0.069	0.097	0.054	0.146	0.015	0.112	0.171
Panel B: Municipalities where the incumbent can re-contest									
	Number of candidates	re-contesting probability of the incumbent	Number of insider challengers	Number of new candidates	Number of female candidates	Number of graduate candidates	Average wealth per candidate	Left-wing candidates	Candidates from big parties
2016	0.442 (0.274)	0.099 (0.171)	1.110*** (0.204)	-0.767** (0.358)	0.374** (0.178)	0.714** (0.349)	-206,728.486** (86,699.648)	-0.119 (0.247)	0.523** (0.238)
Firms' dependence	0.102 (0.083)	-0.021 (0.043)	0.078 (0.053)	0.045 (0.084)	-0.034 (0.049)	-0.053 (0.091)	210,070.220 (250,798.210)	0.055 (0.072)	-0.009 (0.076)
Firms' dependence * 2016	0.045 (0.147)	-0.012 (0.086)	-0.011 (0.113)	0.067 (0.170)	0.067 (0.092)	-0.173 (0.147)	-318,544.201 (271,132.191)	0.190 (0.126)	-0.268** (0.127)
Observations	12,050	12,050	12,050	12,050	12,050	12,050	8,332	12,050	12,050
R-squared	0.150	0.065	0.075	0.134	0.060	0.141	0.042	0.115	0.176
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1									

OLS estimates. Standard errors are clustered at the municipality level. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. I exclude municipalities in the first and last deciles in the distribution of mean contributions per candidate, as well as municipalities in the first and last decile in the distribution of population. All regressions include regions times year fixed-effects, local production per capita, population times year fixed effects, the spending limit introduced in 2016, latitude and longitude. Panel B excludes municipalities where the incumbent faces a term limit. An insider challenger is defined as a candidate who ran in the previous election and who is not the incumbent. Wealth is expressed in log terms and is declared by the candidates themselves. The left-wing category is defined with the variable *Overall Left-Right Placement* of the [Kitschelt et al. \(2009\)](#) dataset and complemented with Wikipedia. A candidate is considered from a big party if she belongs to one of the five biggest political parties in Brazil.

Table B13: Heterogeneity effects of banning firms' contributions on the incumbents' probability of re-election using a restricted sample of municipalities.

	(1)	(2) <b>X =</b> woman	(3) <b>X =</b> graduate	(4) <b>X =</b> Total wealth	(5) <b>X =</b> Left-wing	(6) <b>X =</b> Big party
2016	-0.623*** (0.193)	-0.616*** (0.193)	-0.575*** (0.201)	-0.615*** (0.191)	-0.597*** (0.193)	-0.631*** (0.194)
Incumbent*X		-0.066* (0.039)	-0.001 (0.021)	0.0001 (0.000)	0.038 (0.025)	-0.003 (0.022)
Firms' dependence	0.031 (0.055)	0.029 (0.057)	0.061 (0.072)	0.032 (0.057)	0.052 (0.062)	-0.028 (0.087)
Incumbent X*Firms' dependence		-0.010 (0.215)	-0.071 (0.106)	-0.000 (0.002)	-0.086 (0.122)	0.093 (0.108)
Incumbent X*2016		-0.077 (0.068)	-0.044 (0.042)	0.003 (0.002)	-0.053 (0.048)	0.021 (0.043)
<b>Reform effects</b>						
Firms' dependence * 2016	-0.015 (0.117)	-0.045 (0.122)	-0.282* (0.155)	-0.027 (0.134)	-0.022 (0.137)	0.049 (0.168)
Incumbent X*Firms' dependence*2016		0.296 (0.349)	0.519** (0.211)	0.003 (0.010)	0.046 (0.233)	-0.098 (0.216)
Constant	0.596** (0.302)	0.592** (0.302)	0.587* (0.302)	0.609** (0.302)	0.579* (0.303)	0.600** (0.301)
Observations	6,619	6,619	6,619	6,619	6,619	6,619
R-squared	0.052	0.055	0.053	0.055	0.053	0.053
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

OLS estimates. Standard errors are clustered at the municipality level. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. I exclude municipalities in the first and last deciles in the distribution of mean contributions per candidate, and municipalities where incumbents face a term limit. All regressions include regions times year fixed-effects, local production per capita, population and the spending limit introduced in 2016.

Table C4: The effects of banning firms' contributions on campaign contributions - TWFE.

	(1)	(2)	(3)	(4)	(5)
Panel A: All municipalities					
	Total contributions	Party contributions	Own contributions	Citizens contributions	Total spending
2016	0.105 (0.524)	13.670*** (3.197)	-1.856 (1.706)	-0.581 (1.487)	0.101 (0.527)
Firms' dependence * 2016	-0.478*** (0.085)	1.373*** (0.504)	1.913*** (0.289)	0.540** (0.271)	-0.489*** (0.085)
Constant	9.989*** (0.012)	3.039*** (0.059)	7.903*** (0.040)	7.481*** (0.047)	9.986*** (0.012)
Observations	15,450	15,450	15,450	15,450	15,310
R-squared	0.589	0.486	0.396	0.431	0.590
Panel B: Municipalities where the incumbent can re-contest					
	Total contributions	Party contributions	Own contributions	Citizens contributions	Total spending
2016	0.912*** (0.310)	9.619*** (1.451)	-1.564 (1.127)	-0.100 (0.805)	0.670** (0.323)
Firms' dependence * 2016	-0.563*** (0.088)	2.403*** (0.495)	1.963*** (0.301)	0.015 (0.295)	-0.587*** (0.089)
Constant	10.028*** (0.010)	3.365*** (0.051)	7.888*** (0.034)	7.390*** (0.040)	10.024*** (0.011)
Observations	16,722	16,722	16,722	16,722	16,558
R-squared	0.770	0.567	0.481	0.535	0.773
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					

OLS estimates with year and municipalities fixed-effects. Standard errors are clustered at the municipality level. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. All regressions include regions times year fixed-effects and the spending limit introduced in 2016. Panel B excludes municipalities where incumbents face a term limit.

Table C5: The effects of firms' contributions on candidates' entry - TWFE.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Number of candidates	re-contesting probability of the incumbent	Number of insider challengers	Number of new candidates	Number of female candidates	Number of graduate candidates	Average wealth per candidate	Left-wing candidates	Candidates from big parties
2016	-0.271 (0.970)	-0.291 (0.496)	0.873 (0.676)	-0.854 (1.113)	-0.260 (0.521)	-0.001 (0.848)	10.494*** (1.034)	-0.769 (0.790)	0.258 (0.721)
Firms' dependence * 2016	0.258** (0.123)	0.077 (0.075)	-0.025 (0.097)	0.206 (0.156)	0.063 (0.073)	0.093 (0.120)	0.259 (0.190)	0.260** (0.111)	-0.199* (0.105)
Constant	2.689*** (0.013)	0.374*** (0.008)	0.455*** (0.009)	1.860*** (0.016)	0.260*** (0.008)	1.071*** (0.012)	0.003 (0.014)	0.886*** (0.011)	1.621*** (0.012)
Observations	15,650	15,650	15,650	15,650	15,650	15,650	15,650	15,650	15,650
R-squared	0.451	0.189	0.333	0.300	0.436	0.532	0.965	0.443	0.483
Panel B: Municipalities where the incumbent can re-contest									
	Number of candidates	re-contesting probability of the incumbent	Number of insider challengers	Number of new candidates	Number of female candidates	Number of graduate candidates	Average wealth per candidate	Left-wing candidates	Candidates from big parties
2016	0.400 (0.277)	0.135 (0.171)	1.038*** (0.200)	-0.772** (0.364)	0.401** (0.168)	0.625* (0.324)	11.650*** (0.201)	-0.177 (0.267)	0.493** (0.226)
Firms' dependence * 2016	0.195 (0.143)	-0.035 (0.087)	-0.014 (0.113)	0.244 (0.174)	0.040 (0.086)	0.002 (0.140)	0.223 (0.213)	0.179 (0.129)	-0.238* (0.128)
Constant	2.706*** (0.014)	0.362*** (0.008)	0.460*** (0.010)	1.884*** (0.016)	0.265*** (0.008)	1.079*** (0.012)	0.010 (0.016)	0.894*** (0.012)	1.625*** (0.012)
Observations	12,050	12,050	12,050	12,050	12,050	12,050	12,050	12,050	12,050
R-squared	0.512	0.401	0.402	0.433	0.505	0.594	0.974	0.506	0.547
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1									

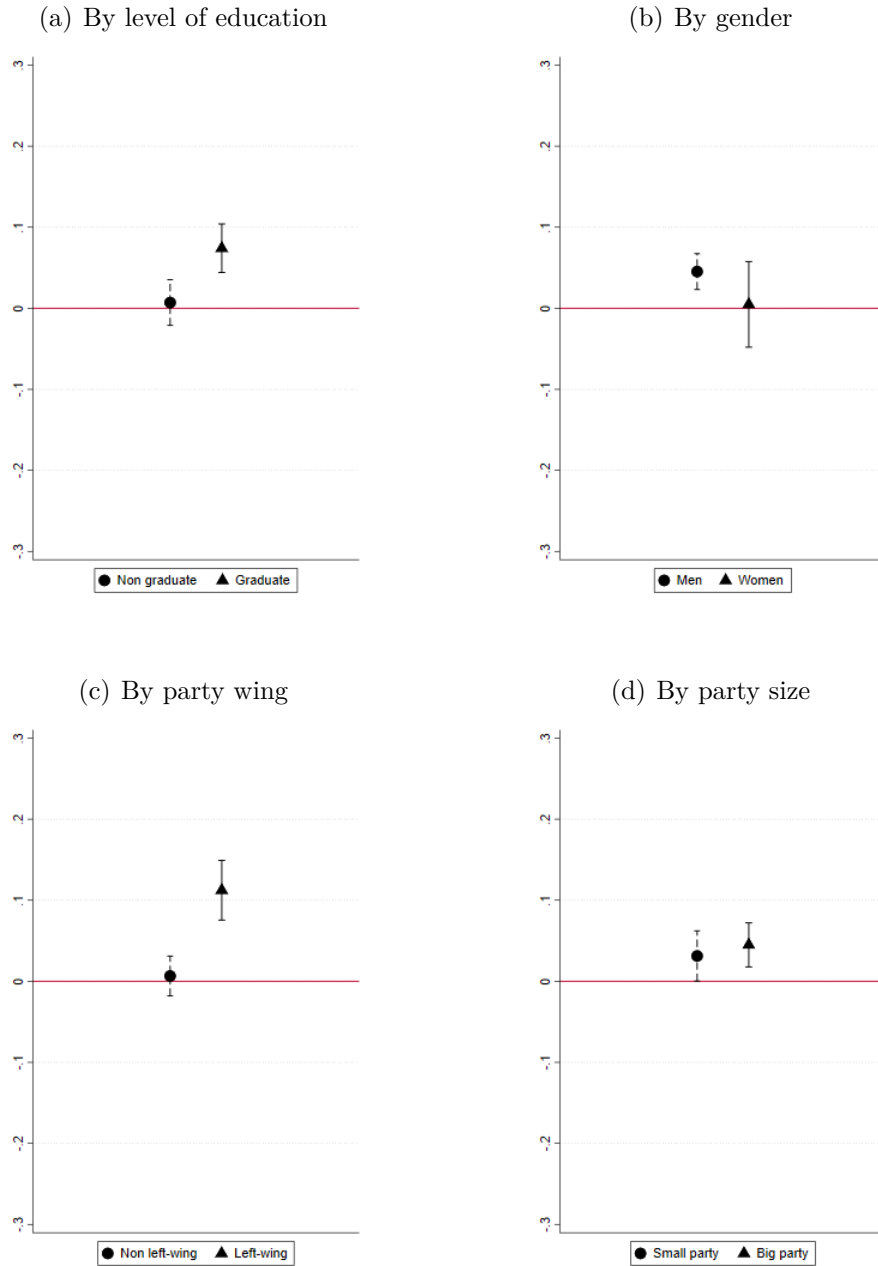
OLS estimates. Standard errors are clustered at the municipality level. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. I exclude municipalities in the first and last deciles in the distribution of mean contributions per candidate, as well as municipalities in the first and last decile in the distribution of population. All regressions include municipalities fixed-effects, year fixed-effects, regions times year fixed-effects and the spending limit introduced in 2016.

Table C3: Effects of banning firms' contributions on the incumbents' probability of re-election - TWFE

	(1)	(2) X = woman	(3) X = graduate	(4) X = Total wealth	(5) X = Left-wing	(6) X = Big party
2016	-1.132 (1.018)	-0.983 (0.997)	-0.956 (0.972)	-1.221 (0.986)	-1.126 (0.986)	-0.042 (0.029)
Incumbent*X		-0.094 (0.069)	0.030 (0.040)	0.000 (0.001)	0.023 (0.044)	0.040 (0.039)
Incumbent*X*Firms' dependence		0.368 (0.396)	-0.247 (0.215)	0.000 (0.004)	0.184 (0.241)	-0.059 (0.211)
Incumbent*X*2016		-0.030 (0.119)	-0.053 (0.069)	0.004 (0.004)	0.009 (0.079)	-0.067 (0.071)
<b>Reform effects</b>						
Firms' dependence * 2016	-0.023 (0.165)	-0.050 (0.173)	-0.335 (0.232)	-0.071 (0.194)	0.091 (0.196)	-0.208 (0.277)
Incumbent*X*2016*Firms' dependence		-0.135 (0.630)	0.553 (0.349)	0.003 (0.015)	-0.516 (0.408)	0.270 (0.379)
Constant	0.599*** (0.008)	0.463*** (0.019)	0.463*** (0.021)	0.461*** (0.018)	0.451*** (0.019)	0.438*** (0.025)
Observations	6,640	6,640	6,640	6,640	6,640	6,640
R-squared	0.520	0.538	0.538	0.540	0.538	0.538

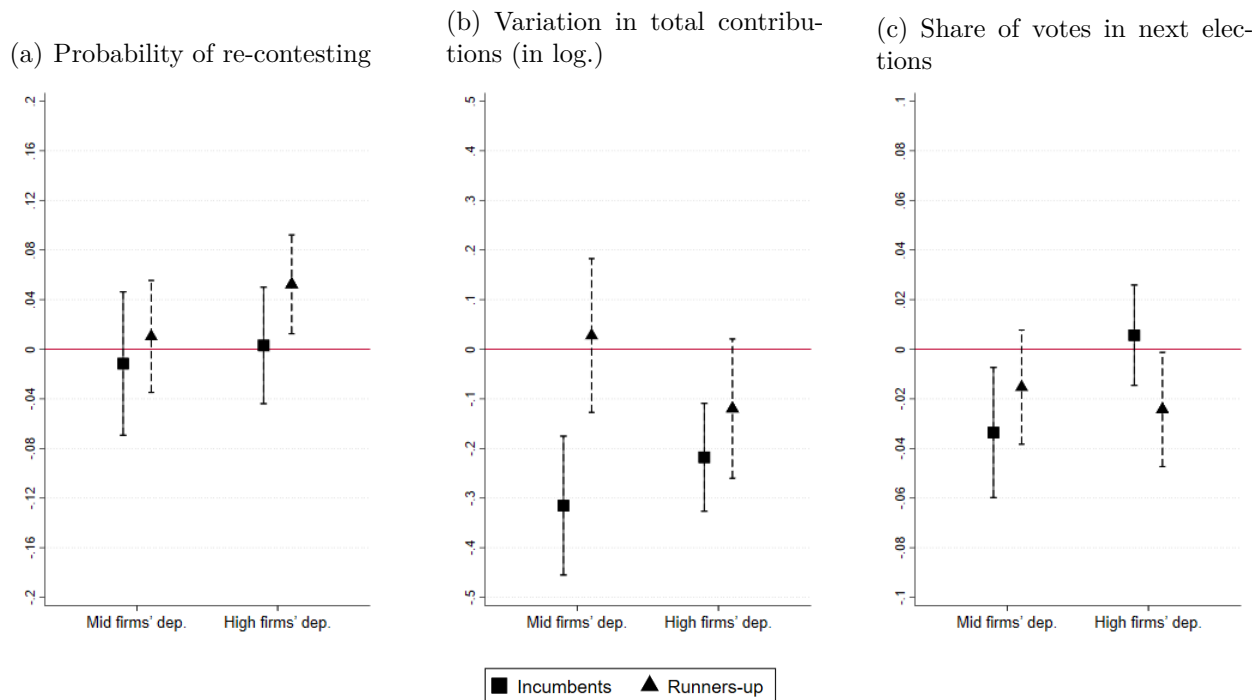
Weighted least-squares estimates. The sample is restricted to municipalities where the incumbent does not face a term limit. Firms' dependence is a continuous index that varies from 0 to 1 according to the percentage that firms' contributions represented in the total contributions of candidates running for mayor in a given municipality in the three years before the reform. Weights are calibrated using an entropy balancing method for continuous treatment (see Section 2). All regressions include municipalities, year, and regions times year fixed-effects. In each column I interact the treatment effect with a covariate denoted by X. Wealth is expressed in log terms and is declared by the candidates themselves. The left-wing category is defined with the variable *Overall Left-Right Placement* of the [Kitschelt et al. \(2009\)](#) dataset and complemented with Wikipedia. A candidate is considered from a big party if she belongs to one of the five biggest political parties in Brazil.

Figure C2: Heterogenous marginal effects on runners-up' probability of re-contesting for office using propensity score.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure C4: Marginal effects of the reform on incumbents and runners-up excluding candidates involved in the Car wash scandal.



Marginal effects of the interaction between the treatment variable and a dummy for 2016 accounting for the post-reform. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects. In sub-figure (a) the dependent variable is a dummy that equals one if a candidate from previous election re-contested, in sub-figure (b) is the variation in the log. of total contributions conditional on re-contesting and in (c) is the share of votes in next elections. The weights are obtained through an entropy balance method where covariates are graduate, gender, party-wing, party size, total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents. I exclude candidates cited to declare in the Car Wash scandal listed in Table C6.

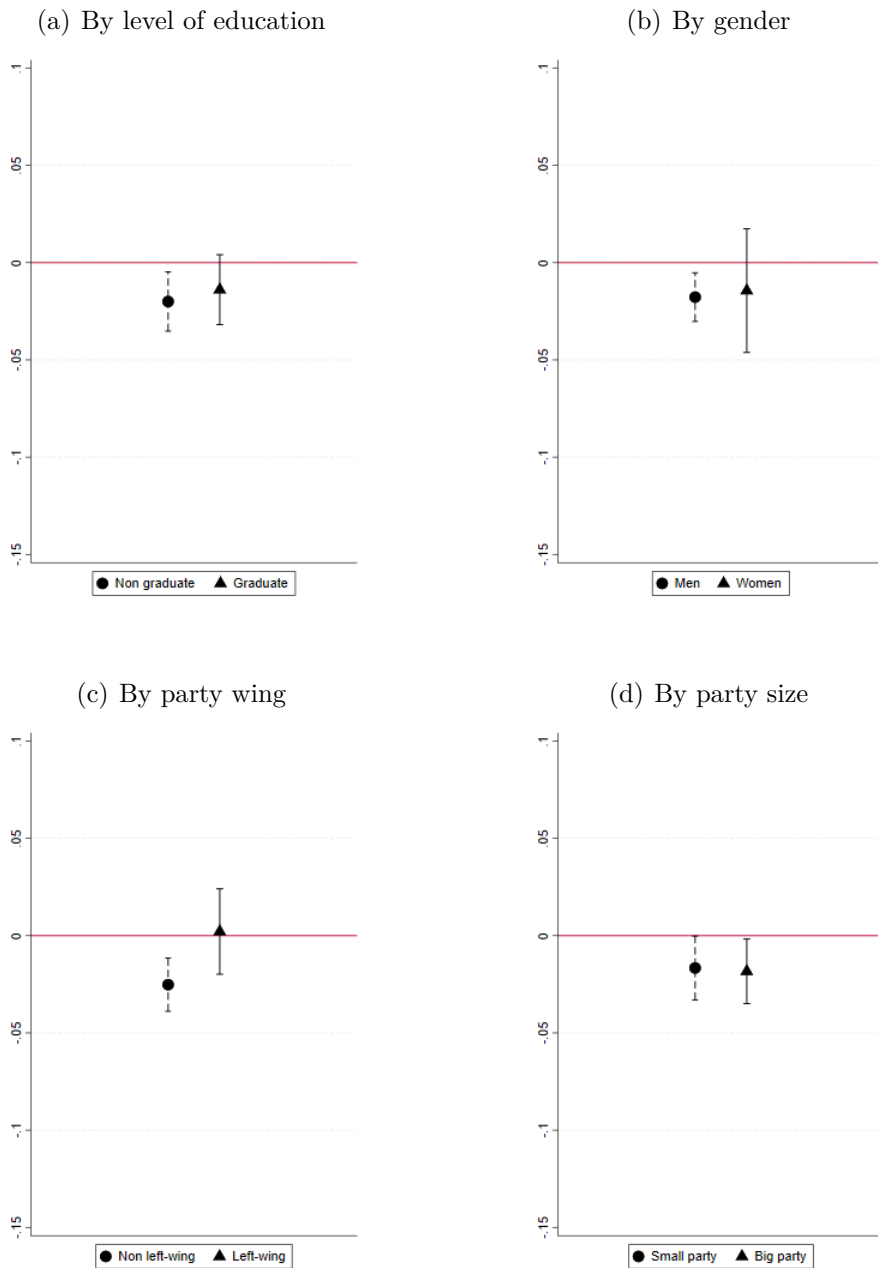


Table C6: Candidates involved in Car Wash scandal

Candidate name	Municipality name
ARTHUR VIRGILIO DO CARMO RIBEIRO NETO	MANAUS
CLECIO LUIS VILHENA VIEIRA	MACAPÁ
ANTONIO CARLOS PEIXOTO DE MAGALHÃES NETO	SALVADOR
VALMIR QUEIROZ MARIANO	PARAUPEBAS
CARLO BUSATTO JUNIOR	ITAGUAI
CARLOS ALBERTO GRANA	SANTO ANDRÉ
CARLOS JOSÉ DE ALMEIDA	SÃO JOSE DOS CAMPOS
CARLOS ROBERTO CASTEGLIONE DIAS	CACHOEIRO DE ITAPEMIRIM
CESAR EPITACIO MAIA	RIO DE JANEIRO
COLBERT MARTINS DA SILVA FILHO	FEIRA DE SANTANA
CRISTINA CONCEIÇÃO BREDDA CARRARA	SUMARE
EDSON ANTONIO EDINHO DA SILVA	ARARAQUARA
EDUARDO DA COSTA PAES	RIO DE JANEIRO
ELISEU DANIEL DOS SANTOS	LIMEIRA
ERONIDES TEIXEIRA DE QUEIROZ	TAGUATINGA
FERNANDO HADDAD	SÃO PAULO
FIRMINO DA SILVEIRA SOARES FILHO	TERESINA
HELIL BARRETO CARDOZO	ITABORAÍ
ILSON MAURO DA SILVA BRUM	URUGUAIANA
IRIS REZENDE MACHADO	GOIANIA
JAIRO JORGE DA SILVA	CANOAS
JAISON CARDOSO DE SOUZA	IMBITUBA
JOSE IVALDO GOMES	CABO DE SANTO AGOSTINHO
LAZARO NOE DA SILVA	SANTA GERTRUDES
LAUREZ DA ROCHA MOREIRA	GURUPI
LUCIANO SANTOS REZENDE	VITÓRIA
LUIZ AUGUSTO FUHRMANN SCHNEIDER	URUGUAIANA
LUIZ MARINHO	SÃO BERNARDO DO CAMPO
MARCIO ARAUJO DE LACERDA	BELO HORIZONTE
MARIO DE MELLO KERTESZ	SALVADOR
NAPOLEÃO BERNARDES NETO	BLUMENAU
DONISETE PEREIRA BRAGA	MAUÁ
PALMINIO ALTIMARI FILHO	RIO CLARO
PAULO CEZAR JUNQUEIRA HADICH	LIMEIRA
PAULO EDUARDO DE BARROS	MOGI GUAÇU
PAULO ROBERTO ALTOMANI	SÃO CARLOS
RENATA ANCHÃO BRAGA	PORTO FERREIRA
RICARDO FORTUNATO DE OLIVEIRA	TRINDADE
RIVERTON MUSSI RAMOS	MACAÉ
DERMEVAL DA FONSECA NEVOEIRO JUNIOR	RIO CLARO
ROBERTO CARLOS DE SOUZA	NAVEGANTES
RONALDO DIMAS NOGUEIRA PEREIRA	ARAGUAÍNA
RONNIE PETERSON COLPO MELLO	URUGUAIANA
ROSALBA CIARLINI ROSADO	MOSSORO
RUBENS MERGUIZO FILHO	MAIRINQUE
SALDANHA LEIVAS COUGO	PORTO FERREIRA
SEBASTIAO ALVES DE ALMEIDA	GUARULHOS
ZEILA AIRES ANTUNES RIBEIRO	TAGUATINGA
VALTIMIR RIBEIRÃO	SANTA GERTRUDES

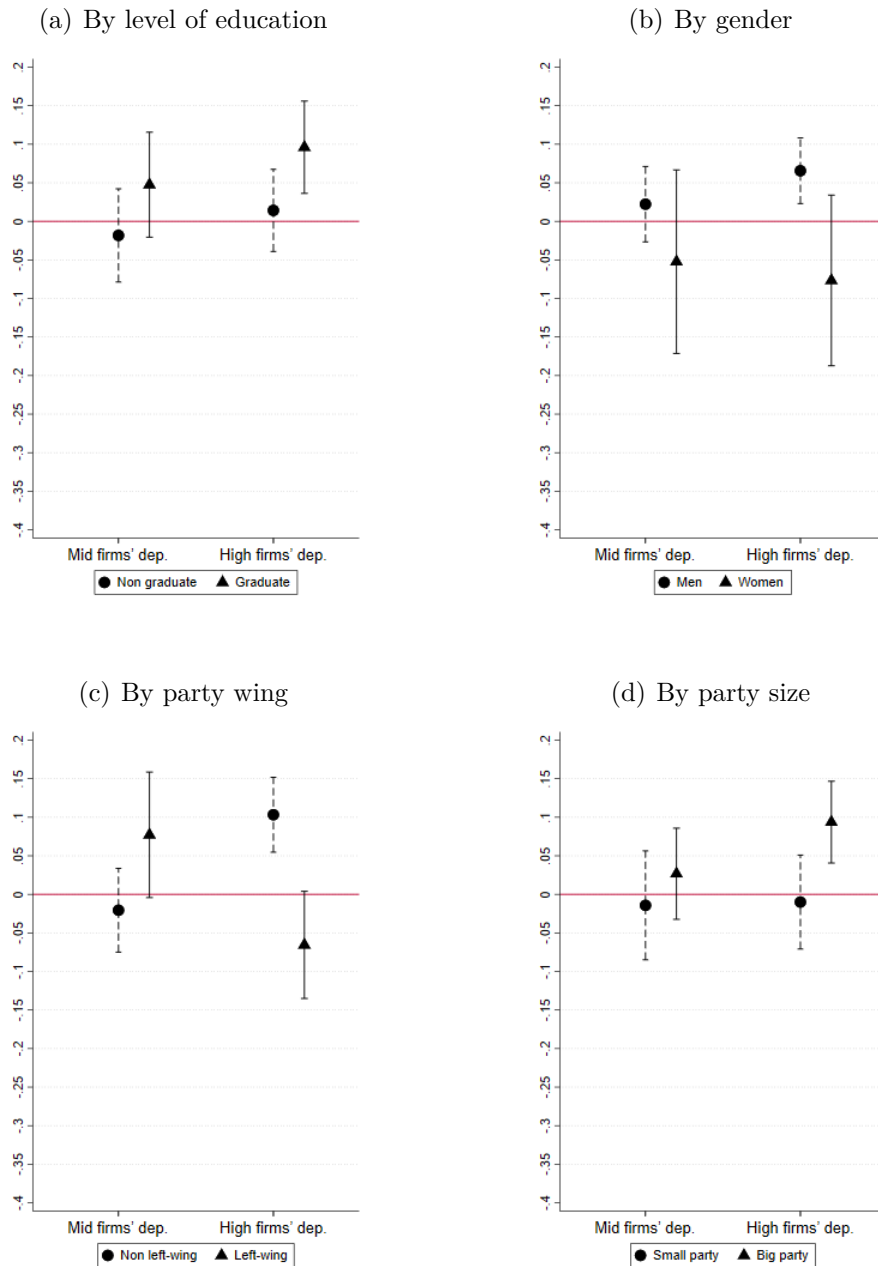
Candidates cited to declare in the Car Wash scandal judgment. Source: <https://complemento.veja.abril.com.br/brasil/lista-de-fachin/>

Figure C3: Heterogenous marginal effects on runners-up' share of votes using propensity score.



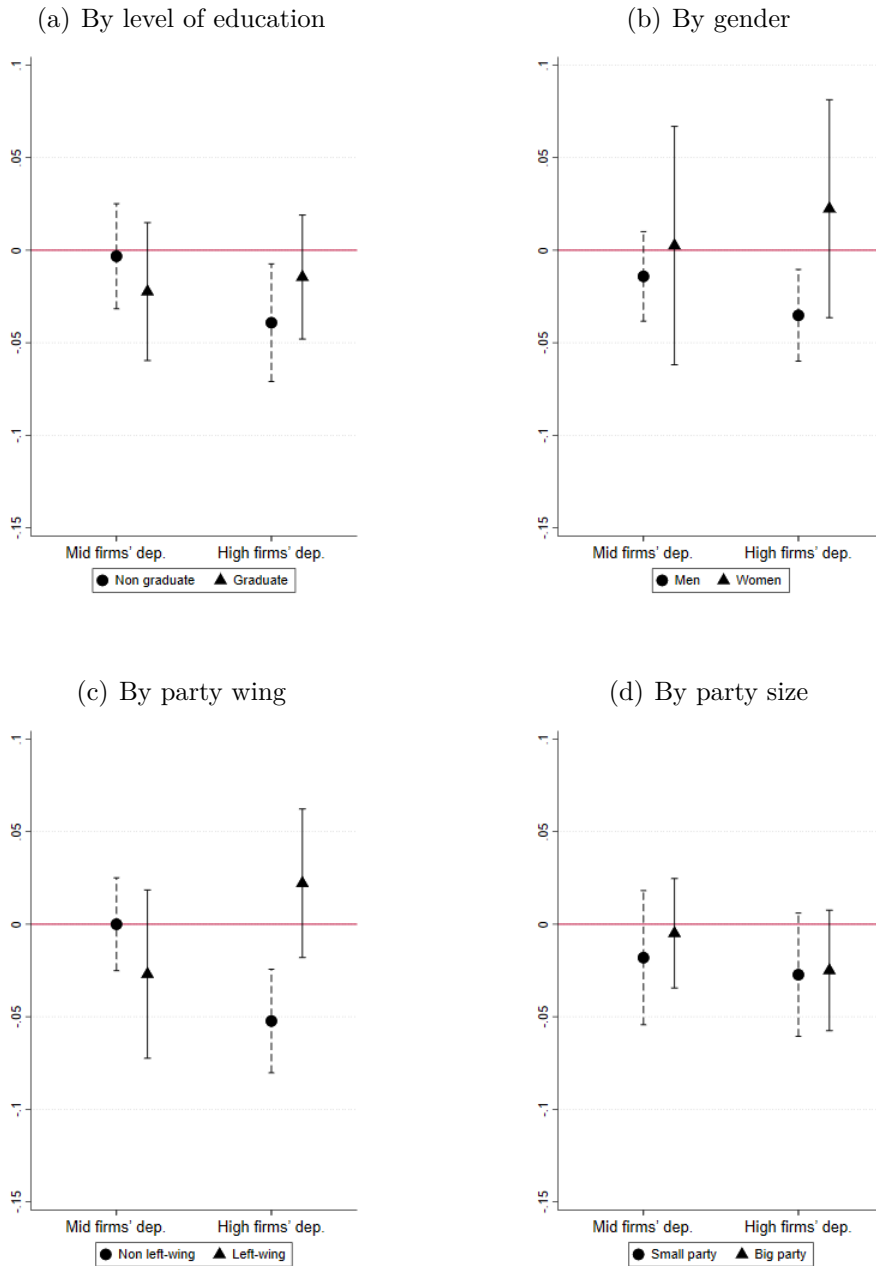
Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a dummy variable that equals one if the candidate received contributions from firms in the previous elections. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is the share of votes in next elections. The weights are obtained through a propensity score method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure C5: Heterogenous marginal effects on runners-up' probability of re-contesting for office excluding candidates involved in the Car wash scandal.



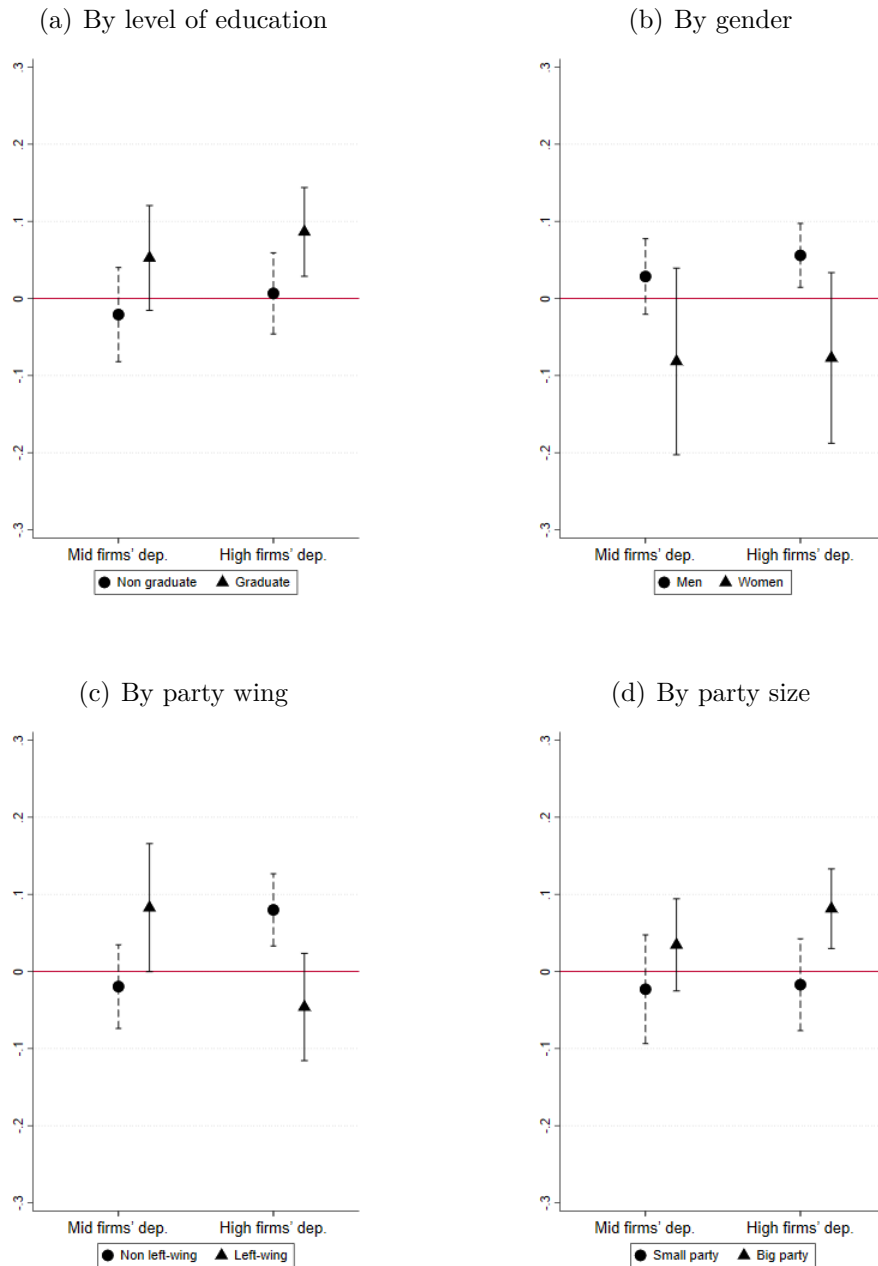
Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents. I exclude candidates cited to declare in the Car Wash scandal listed in Table C6.

Figure C6: Heterogenous marginal effects on runners-up' share of votes excluding candidates involved in the Car wash scandal.



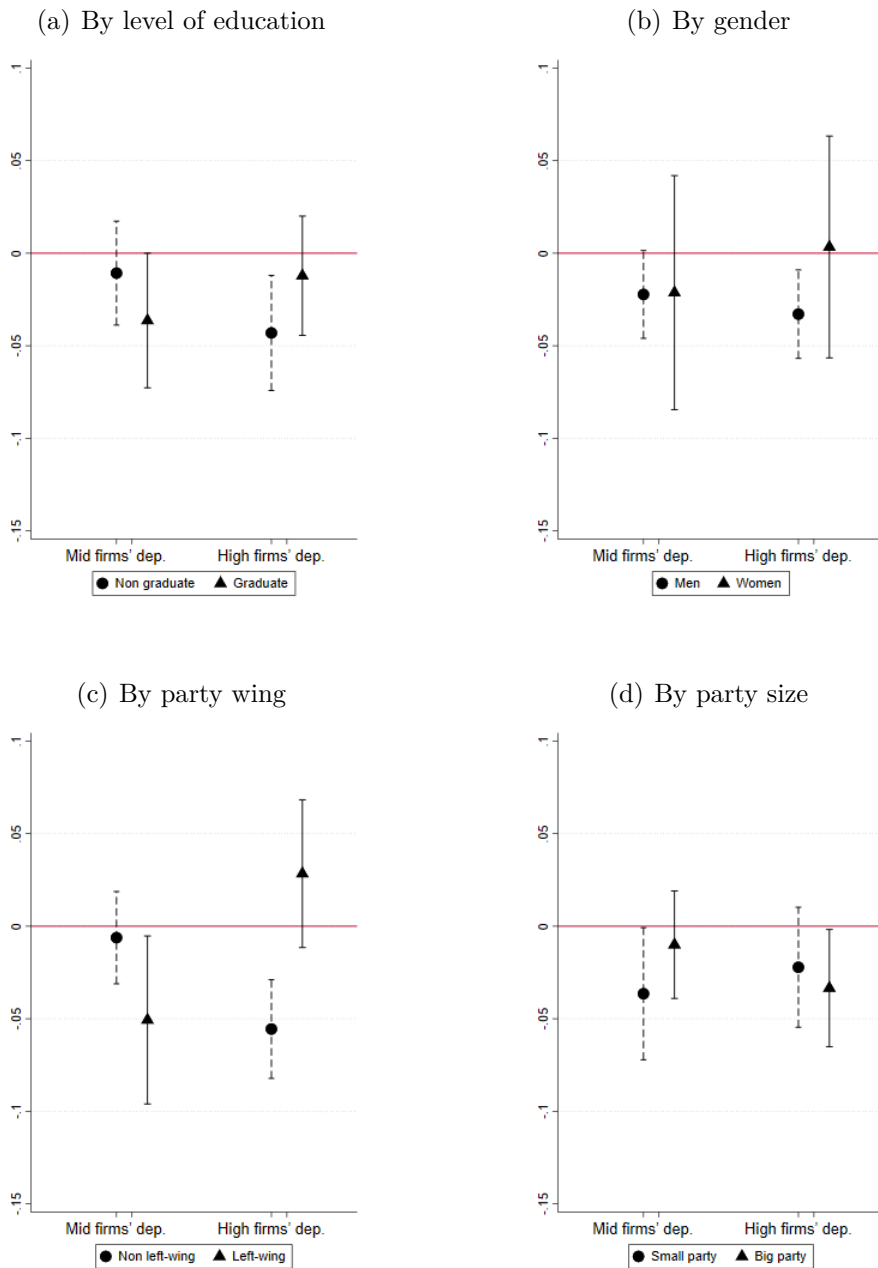
Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a dummy variable that equals one if the candidate received contributions from firms in the previous elections. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is the share of votes in next elections. The weights are obtained through a propensity score method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents. I exclude candidates cited to declare in the Car Wash scandal listed in Table C6.

Figure C7: Heterogenous marginal effects on runners-up probability of re-contesting for office when controlling for party fixed-effects.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a categorical variable with three levels: *no firms' dependent* if the candidate didn't receive contributions from firms in the previous elections, *mid firms' dependent* if she received a sum of firms' contributions below the sample median and *high firms' dependent* if she received a sum of firms' contributions above the median. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is a dummy that equals one if a candidate from the previous election re-contested. The weights are obtained through an entropy balance method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.

Figure C8: Heterogenous marginal effects on runners-up' share of votes when controlling for party fixed-effects.



Marginal effects of the triple interaction between the treatment variable, a dummy for 2016 accounting for the post-reform period and different covariates for runners-up. In sub-figure (a) the covariate is a dummy that equals one if the candidate is a graduate, in sub-figure (b) it is a dummy for women, in sub-figure(c) a dummy for left-wing candidates and in sub-figure(d) a dummy that equals one if the candidate is from one of the five biggest parties. The treatment variable is a dummy variable that equals one if the candidate received contributions from firms in the previous elections. Those are post-estimations of a weighted-least square with robust standard errors controlling for year and regions fixed-effects and party  $\times$  year fixed-effects. The dependent variable is the share of votes in next elections. The weights are obtained through a propensity score method where covariates are all the covariates used in the heterogeneity, as well as total contributions, the population of the municipality, the spending limit introduced in 2016, the total number of candidates and a dummy for incumbents.