MEASURING VOTE BUYING THROUGH POLLING ERROR*

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ABSTRACT

In developing democracies, vote buying and clientelism are important ways in which candidates win votes, but they are rarely, if ever, measurable. We provide a first cut at measuring last-minute vote buying, using polling errors as the basis for an estimator. Our case is Brazil, a country with high levels of polling errors and vote buying. We aim to measure the frequency of one type of vote buying in Brazil, the *boca de urna* (literally, the mouth of the voting machine), which consists in part of illegally using money to buy votes on the eve of the election. We estimate a model explaining polling errors for presidential, gubernatorial, and mayoral elections between 2002 and 2014, and for senatorial elections in 2006 and 2014. We hypothesize that polls will have higher errors for elections with larger numbers of undecided voters in which the campaigns involved have larger imbalances in financial resources. This is because, as we found from non-participant observation of campaigns in Brazil, campaigns specifically target undecided voters for vote buying, and frequently attempt to conduct vote-buying operations unless specifically unable to do so. As predicted, we find that, when about 15% of respondents are undecided the day before the election, larger financial imbalances in campaign expenses are associated with larger polling errors. Our results show the floor effect of the *boca de urna* on elections in Brazil, if not necessarily the entire effect. This analysis therefore provides a template for future studies looking to quantify vote buying.

Introduction

It was two days before the election, and the candidate had no ostensible reason to worry: he was ten points up over his nearest rival in the latest poll.[1] The candidate was confident, and was saying as much; he was already planning his first moves after taking office. Yet, after another long day of campaigning, one of his advisers was slightly drunk and very worried.

"We have a very big problem," he sighed. There was no money left. Why, he was asked, would you need more money when the election was in only two days? For the *boca de urna*, he responded.[2] Even though it was illegal to campaign immediately before the election, he explained, it was often a key time for campaigns to win over undecided voters by handing out campaign materials and money. "Good soldiers don't matter if you don't have weapons," he said. "We have good soldiers, but we're fighting with bayonets and knives."

Voting finished two days later at 5 pm. By 6 pm, it was all over. The candidate was behind by seven points with 80% of the state's results already in, and duly conceded defeat. This contest was hardly unique either—in fact, seizing on some disastrous predictions in the Northeastern state of Bahia, for instance, a joke began to circulate on Brazilian social media: "Today is October 6, so—according to IBOPE's[3] margin of error in Bahia—Merry Christmas."

We argue that this polling error can serve as a window into last-minute vote buying, often known as the "*boca de urna*" in Brazil. This is because many of its effects cannot be measured directly; this means that, when there is an imbalance in campaigns' abilities or willingness to practice it, it should affect final results in the elections, but *not* polling figures. In other words, this type of vote buying leads to predictable polling biases that are partially detectable by looking at the financial imbalances between candidates in a given race.

[1] This account comes from the non-participant observation of one of the authors during the 2014 election in Brazil, when he shadowed a variety of campaigns throughout the country.

[2] Literally "the mouth of the voting machine" in English.

[3] A major Brazilian polling firm.

In this paper, we begin by describing the *boca de urna* and its function in Brazilian political campaigns. Second, we argue that the *boca de urna* can lead to large differences between electoral polls and results. Third, we describe our data. Fourth, we provide empirical support for our argument, showing that the largest discrepancies between polls and election results were in areas with both large discrepancies in funding and large amounts of undecided voters. We then present some preliminary thoughts on future avenues of research before concluding.

The *Boca de Urna* in Brazil

What, then, is this *boca de urna*? *Boca de urna* campaigning takes place on the day of the election or the day before it and can encompass everything from handing out campaign material, such as stickers, *santinhos* (little cards with the name, number, and picture of the candidate, with a suggested slate of candidates on the reverse side), personal face-to-face appeals, money, or combinations of all of the above. Such campaigning is illegal; Brazilian electoral law explicitly prohibits it.[4]

It is well-known that such activity on the day of the election is illegal; as a result, most *boca de urna* activity is performed by someone at least two connections away from the candidate so that she can claim plausible deniability. For the simplest type of local campaign, a candidate will generally hire *cabos eleitorais*, local notables with deep ties to a given community, to run operations within that community (see Speck 2003; Desposato 2002, for example). These brokers, who are usually on the campaign's official payroll, will then distribute money and material to trusted confidants, who will in turn distribute the *santinhos* and money to voters.

The final distribution of money and material to voters generally happens in one of two ways. The first takes place on the day before the election, with confidants of the broker going on a planned route door-to-door in the early morning hours. The second takes place on the day of the election itself if the broker is confident of not being caught; the broker's

[4] According to Article 41-A of Law Number 9504 from September 30, 1997, known as the Law of Elections.

confidants will approach voters who are on their way to the polls and ask if they have already decided on whom they will vote for.[5] If they answer that they are undecided, the confidant will distribute money (usually R$50-100 [6]) and/or material to that voter on the spot.

This type of direct contact with voters, however, is most common among small-scale campaigns. For statewide elections, candidates will often win the support of local politicians, such as mayors, ex-mayors, or city councilmen, who will then hire the brokers. These brokers, in turn, arrange the buying of votes.[7] This type of sophisticated multi-layered network can make it very difficult to catch a candidate in the act of buying votes because the people actually buying them are several steps away from her.

For example, an ex-politician told one of the authors that he had once been accused of buying votes during a campaign and was brought before the state elections tribunal. He himself, however, was nowhere near any exchange of money for votes (he did not specify to the author whether he was in fact guilty). As a result, he simply asked the accuser to provide proof that he was involved. The accuser failed to do so, and the charges were promptly dropped.[8]

Before continuing, it is important to clarify some conceptual issues regarding the *boca de urna* and its relation to clientelism and vote buying. Not all of the *boca de urna* is necessarily what would commonly be seen as vote buying or clientelism—some of it simply entails illicit advertising and/or distribution of campaign material.[9] In other words, the *boca de urna* can indeed take place without money changing hands; some campaign opera-

[5]See, for instance, *Crime Eleitoral , Boca de Urna Ocorre Livremente em Porto Alegre* (2014).

[6]The equivalent of US$13.80-27.61 on 14 May 2018.

[7]For a good illustration of how these inter-campaign networks work, see Ames (1994).

[8]In the example at the beginning of the article, one of the triggers for the author's frank talk with the adviser was this adviser's frustration over an interaction from the previous day. During this interaction, the candidate visited an ally who was an ex-mayor, only to inadvertently find out that this politician had defected to an opponent on the sly without telling him. This was not a connection that the author made at the time, but in hindsight, it is very unlikely that this maneuver was unrelated to the candidate's financial troubles.

[9]In fact, campaign material often carpets the ground outside polling stations on the day of the elections. This is done in the hope that the undecided voter will pick up the advertisement on the way to the poll and decide to vote for the candidate. It is sometimes done to such a degree that it can cause injury or death, with the elderly at particular risk of slipping on the slick surface (*Aposentada de 70 Anos Escorrega em Santinhos e Fica Ferida em São Carlos* 2014; *Idosa que Escorregou em 'Santinhos' Morre por Complicações da Queda* 2014).

tives interviewed by one of the authors opined that it could be prohibitively expensive to distribute money like this in large cities.

We argue, however, that even if this lack of precision is not ideal for us, it is not an impediment to our research. In fact, it should lead to a substantial *under*-estimation of vote buying. If vote buying only encompasses one component of the *boca de urna*, then, given that it is a more intense treatment than illegal advertising, its effect should be diluted by these less intense and less effective methods of winning votes.

When the *boca de urna* does involve the payment of money to voters, however, it *is* a specific subset (Gans-Morse, Mazzuca and Nichter 2014; Nichter 2011; Stokes 2007) of clientelism as described by Stokes (2013). In clientelism as traditionally understood, clients have long-term relationships with their patrons (see, for instance, Graziano (1976, p. 168); Hilgers (2008, p. 125); Kaufman (1974); Kitschelt (2000, p. 849); Lemarchand and Legg (1972, p. 151)). Those who sell their vote in the *boca de urna*, however, typically do not. If traditional clientelism is born from obligation and vertical power relations, vote selling at the *boca de urna* is born from electoral indifference.

The *Boca de Urna's* Effect on Polling Error

Voting is compulsory in Brazil. Anyone between the age of 18 and 69 is required to vote unless they provide a justification for not doing so (voting is optional for those who are 16 or 17, or 70 or older). The monetary fine for not voting might be small, but other punishments can be more inconvenient, such as the inability to receive government loans, take government jobs, obtain a passport or ID, and even just having to interact with a government agency to justify one's absence.[10] As a result, there is a much larger electorate in Brazil than there would be in other comparable countries without compulsory voting; in 2014, for instance, the turnout rate was 80.6% for the 1^{st} round of the general election (more than 115 million voters).

But being a voter is difficult in Brazil. For one, many of the cognitive heuristics that

[10] In Brazil, as with many countries, this can be more than just a minor inconvenience.

exist in other democracies are extremely weak in Brazil. Partisan identification, or a long-term identification with a particular political party, is rare (Samuels and Zucco 2014).[11] The party system is extremely fragmented (Ames, Baker and Renno 2009; Calvo, Guarnieri and Limongi 2015), and 28 parties won seats in the Chamber of Deputies in 2014. Parties are weak financially and organizationally, with little ability to support campaigns financially (Samuels 2007). Politicians often switch parties when it is convenient to them, with almost no ill effects (Desposato 2006).[12] This is because Brazil's open-list proportional representation electoral system gives power to politicians; voters can vote for either parties or candidates, but politicians have an incentive to cultivate a personal vote because they know that they will not be elected as long as they win fewer votes than other politicians from their coalition, even if their party wins many votes (Carey and Shugart 1995; Shugart, Valdini and Suominen 2005).

Alliances and coalitions further complicate the picture. Parties often form coalitions with agreements on which candidates will run for which posts, but these coalitions can vary wildly from state to state, rarely having anything to do with ideology. Two parties that are fierce enemies in one state (or at the national level) might be coalition partners elsewhere (Calvo, Guarnieri and Limongi 2015). Yet because parties are so weak, politicians often go to other politicians for support rather than their parties, regardless of these formal coalition agreements (see Pinto, Moritz and Schulz (2013)). A considerable amount of money can change hands between campaigns as candidates scramble to win the endorsements of others and slap them on their campaign advertisements. One politician, for instance, noted that a strong candidate for state deputy could easily command a R$250,000 fee (US$68,994.86, as of 14 May 2018[13]) in exchange for supporting a federal deputy or senate candidate. Other, weaker, state deputy candidates might "only" ask for the other campaign to pay for their campaign material or electricity bills. Off-year mayoral elections are arguably even messier, as coalitions are formed with city council candidates and vary

[11] The PT is arguably an exception, as are several very small parties on the left.

[12] This has been curtailed to some degree by the passage of a law in 2015 that forces candidates to give up their elected post if they switch parties outside a certain window of time, but a loophole allowing politicians to join new parties has greatly curtailed its effectiveness.

[13] all U.S. dollar values in this paper use exchange values from Brazilian reais as of 14 May 2018.

by city. This is complicated further by links with general election candidates—as the politicians whose ear is often closest to the ground, mayors and aspiring mayors will often get out the vote for candidates in general elections in return for reciprocal support two years later. Each candidate, of course, will not stop at supporting only one candidate; one of the authors, for instance, once followed a federal deputy candidate as he campaigned for six different state deputy candidates in one day. In short, the labyrinthine combination of personal alliances and party coalitions in Brazil far from facilitates the voter's task of keeping track of candidates and deciding their vote; in fact, it makes it more complicated.

The number of candidates is probably the biggest obstacle for voters. It is difficult to overstate the sheer number of candidates running for office in Brazil. In the first round of the 2014 elections in the state of São Paulo, for instance, every voter had to pick one from 11 presidential candidates, 9 gubernatorial candidates, 10 senatorial candidates, 1,318 federal deputy candidates, and 1,878 state deputy candidates, and somehow remember the identifying numbers of the candidates they wished to support. While not every candidate will campaign in every town within their district (in fact, many try to dominate one or two towns, hoping to pick up enough votes to win a seat from those towns alone—see Ames (2001)), the sheer number of options for one position can still be eye-watering.

What this means in practice is high levels of indifference and voter error. The number of null votes (or votes that are spoiled) and blank votes in a given Brazilian election can be astounding; for instance, 9.77% of the electorate in Rio Grande do Norte cast null votes for federal deputy in the 2014 elections while 8.53% cast blank votes. Many spoil their votes on purpose, but many others simply make mistakes (Power and Roberts 1995)—one either has to remember the numbers of all their candidates or write up a list of candidates beforehand and bring it into the voting booth.

While many of these problems are more relevant for deputy elections, in which each party runs several different candidates, they also have collateral effects on majoritarian elections. The number of candidates bombarding the electorate with advertising can cause information overload, not only when it comes to deputy elections, but also when it comes to senatorial or gubernatorial elections. After all, other elections have to compete for at-

tention with deputy elections in the first round, and only gubernatorial, presidential, and some mayoral races get the benefit of a second round with two candidates. National politics has indeed gained more visibility over the past few elections, and coattails voting indeed has had a notable impact on state-level elections (Borges and Lloyd 2016; Borges and Turgeon 2017), but the number of parties and the complexity of party alliances can still make these networks of alliances difficult for even the most motivated of voters to keep straight.

In short, voters are forced to vote in elections, but are presented with a veritable morass of candidates from a panoply of ideologically bereft parties with no long-term identities. Both candidates and parties make arrangements to support other candidates and parties, often independently from one another, which further complicates things instead of simplifying it. Of Lau and Redlawsk's five categories of cognitive heuristics for vote choice, three (endorsements, ideology and partisan identity) are often of very limited use, leaving only polls and candidate appearance as possible tools (Lau and Redlawsk 2001). In other words, cognitive heuristics that are present in other democracies are conspicuously absent in Brazil, even in elections with a more manageable number of candidates. In short, voting is no picnic in Brazil, no matter the election.

What this means, in practice, is that many voters approach the election—or even head to the polls—without a good idea of who they will vote for. These undecided voters are the targets of the *boca de urna*. As one political operative mentioned to one of the authors, "the *boca de urna* just doesn't work on those who already have a candidate. You don't convince someone with money." Yet there are so many voters who have to vote, but have no idea about who they will vote for, that the *boca de urna* can have plenty of targets anyway.

Despite relatively recent initiatives that make it easier to punish vote buying and remove practitioners from office (Nichter 2011), few things deter voters from accepting money for their votes. It is difficult to detect vote buying, and even when detected, vote sellers are very rarely punished, especially if they are running for higher offices (see Martins and Pedros (2016)). If one has no strong attachments to any candidate, and nothing

with which to distinguish candidates from one another, but has to vote in any case, why not sell one's vote? This could especially be the case if the voter in question is poor and in need of money.

Yet because these voters are undecided, money is not even strictly necessary at times to win their votes. One political operative in a well-developed, wealthy city said "there are too many people; money would never work" in his city. Besides, he added, it would be very difficult in a large urban environment to monitor if a voter was keeping up her end of the bargain once she accepted money.

What he did instead was buy the support of *convencedores* (literally, "convincers"), hiring people to stand on street corners with *santinhos* (again, little cards with candidate information) advertising their candidate on the day of the election. Each employee would have about 300 *santinhos* to give out during the day, and the operative would ask each one to win ten votes in their area ("thirty is too much," he said, "but ten isn't"). "About two out of ten (employees) will just take my money and throw the *santinhos* on the ground," he added, but there was no way he could do anything about it except to try to hire people his campaign already knew. And yet, even then—with a success rate of approximately 3.33% among the employees who actually bothered to do their job—the numbers gained from the *boca de urna* were still worth it.

Given this environment, even campaigns that are not enamored with the *boca de urna* can feel as if they have no option but to join in. In fact, as one campaign adviser mentioned to one of the authors, the *boca de urna* was more of a defensive tactic than anything. "Last election [for mayor], we thought we had done enough...and therefore did not prepare for the *boca de urna*." They lost. On the one hand, anything you "can get at the boca de urna is profit," he concluded, "which is why you try to win it during the election." On the other hand, other campaigns know that as well, and neglecting one's own territory can be more than enough to snatch defeat from the jaws of victory.

What this means is that *the boca de urna should have an effect on elections that would be undetectable by electoral polls given how late in the game it takes place*. Undecided voters should consistently be targets for *boca de urna* campaigns. This effect, though, would not always

be noticeable to pollsters or researchers because so many campaigns do it. If everyone does it to roughly the same degree, *boca de urna* campaigns could cancel each other out. Its effect, however, should be noticeable in situations in which one competitor has either a large advantage or a large disadvantage in regard to her ability to practice the *boca de urna*. In this case, the candidate would either be able to entice voters away from other candidates or would lose a disproportionate number of voters to the entreaties of her competitors.

The full extent of the *boca de urna* might not be measurable, but one can measure the correlation of last-minute swings with the financial advantages/disadvantages of a given candidate. A robust correlation between financial imbalances between campaigns and last-minute swings would provide a strong indication that vote buying was a relevant factor in these swings. As a result, we argue that *financial imbalances in given elections should lead to greater polling errors in those elections in the presence of a large body of undecided voters*.

Data

To examine poll errors in Brazil and the effect of the *boca de urna*, we gather data from several different elections in Brazil: presidential and gubernatorial elections for 2002, 2006, 2010, and 2014, senatorial elections for 2006 and 2014, and mayoral elections for 2004, 2008, and 2012.[14] Electoral and polling data for presidential, gubernatorial, and mayoral elections were obtained from El-Dash (2010) and his website.[15] Polling data for senatorial races were obtained through the site of political blogger Fernando Rodrigues.[16] Electoral results for the 2006 senatorial elections were obtained from the *Centro de Estudos da Metrópole*,[17] while results from the 2014 elections were obtained from the Brazilian Superior Electoral Tribunal (*Tribunal Superior Eleitoral*, or TSE).[18] We also use data from the TSE to calculate

[14]While there do exist data on 2002 and 2010 Senate polling, the polls did not, to our knowledge, collect complete information involving undecided voters—namely, given that each voter to vote for two candidates for Senate that year, it was impossible to tell how many voters had chosen one candidate, but were still undecided on a second. Without that key piece of information, it was impossible to calculate the percentages of valid votes for each candidate and undecided voters. Given this situation, we opted to simply leave out these two years.

[15]`www.pollingdata.com.br`

[16]`http://noticias.uol.com.br/politica/pesquisas/`

[17]`http://www.fflch.usp.br/centrodametropole/`

[18]`http://www.tse.jus.br/`

the effective number of candidates running in each race.

Campaign finance data were obtained from the TSE. These data are only available since 2002, which is why prior elections were not considered for analysis. These data help us identify campaigns that either have much more ability or much less ability to conduct *boca de urna* campaigns than their competitors.[19]

While campaigns that are engaging in illegal campaigning might not always declare all of the assets they have, we follow Samuels (2007) in arguing that official finance records are still useful and worthy of study. Some campaign workers who were interviewed by one of the authors stated that campaigns' *boca de urna* funds would often be officially declared as income and expenses, with the actual purpose of these funds simply obfuscated.[20] As a result, we find it reasonable to expect that one of two things happens. On the one hand, as Abramo (2011) suggests, off-the-books contributions could be randomly distributed, which would make official campaign finances an unbiased estimator of total finances. On the other hand, there could be a positive correlation between publicly declared assets and total assets; in other words, campaigns that are successful at raising declared funds could also, for the most part, be good at raising undeclared funds. This would only, however, provide our argument with a tougher test by underestimating the variation in one of our key independent variables. If we find a correlation anyhow, then we can be more confident that we are indeed picking up the effect of financial imbalances on polling error.

Finally, we only considered polls that were conducted one day before the election and were conducted at the appropriate district level for the office of interest. As a result, we analyzed national polls for presidential elections, state-level polls for gubernatorial and senatorial elections, and municipal-level polls for mayoral elections.[21] We used percent-

[19]One should note that 2002 and 2004 financial records are not as complete as in other years; we have been unable to find a definite reason for this, but one possible explanation could be that the TSE allowed candidates whose home municipality did not have a branch of a major bank to not open up a TSE-registered bank account. Without this bank account, tracking expenditures would be effectively impossible. See Art. 16 of Resolução 21.609-2004 at `http://www.tse.jus.br/eleicoes/eleicoes-anteriores/eleicoes-2004/resolucao-21.609-2004`

[20]It should be noted, however, that this was a point of contention; other campaign workers insisted that *boca de urna* funds tended to remain off-the-books (known as *caixa dois* in the Brazilian context).

[21]Fifteen presidential polls, for example, were conducted the day before the election at the state level. We excluded these polls because the expected polling error for these polls would be different than the expected error for the nation as a whole.

ages of valid votes for both polling figures and electoral returns and included only candidates who polled above or received at least 3% of the vote.[22] We then measured polling error using Mosteller's third measure——the average of the absolute deviations in percentage points between predicted and actual returns for each candidate (Mosteller 1949). As a result, our unit of analysis is the poll. We analyzed 212 polls in total: 19, 85, 33, and 75 for presidential, gubernatorial, senatorial, and mayoral elections, respectively.

Table 1 presents the polling error for all four types of elections. The entries in the table show that the level of polling error is quite high, especially for senatorial and gubernatorial polls. The errors for mayoral and presidential elections are more modest, but still greater than 2 percentage points. Given that polls are taken only one day before the election, this is a considerable amount of error to account for. In the next section, we evaluate our *boca de urna* hypothesis about polling error in Brazil.

Results

As mentioned above, we expect the financial imbalances in given elections to lead to greater polling errors in those elections, particularly when there is a large body of undecided voters. Such circumstances would be indicative of *boca de urna*—last-minute vote-buying—activities. We explain the average polling error with the independent variables of interest described below in order to account for the *boca de urna* effect.

We first include a variable that measures imbalances in candidates' financial resources by taking the standard deviation of the expenses for the three candidates in a given election who spent the most. Candidates' campaign expenses are the best publicly available indicator of financial resources (through the TSE).[23] We show descriptive statistics for this variable in Table 2, broken down by election type. As one can see, there are substantial financial imbalances among the three largest campaign spenders in most elections, and the imbalances increase with the importance of the contested office. Take, for example, may-

[22] Polling figures came in percentages of total votes, so we adjusted them to reflect the percentage of valid votes.

[23] Note as well that all expense data were deflated to account for differences in the value of the Brazilian *real* between different elections

Table 1: Polling error in percentage points for polls conducted one day prior to election† by type and round of election

Office	1^{st} round	2^{nd} round	Total
Mayor	2.61	2.69	2.63
	(53)	(22)	(75)
Senator	6.28	—	6.28
	(33)		(33)
Governor	4.21	1.67	3.23
	(52)	(33)	(85)
President	3.35	1.35	2.19
	(8)	(11)	(19)
All	4.05	1.96	3.40
	(146)	(66)	(212)

Note: Entries are in percentages and the number of observations for each entry is in parentheses.
†Measured as the average of the absolute deviations in percentage points between predicted and actual returns for each candidate (Mosteller 3).

oral elections. The mean of the standard deviation of the expenses for the three candidates in a given election who spent the most is a little more than 2 million *reais*. For presidential elections, that mean is a whopping 64.5 million *reais*. We include the logarithm of this variable in our regression equation.

Second, we account for the percentage of undecided voters in a given poll. As can be seen in Figure 1, there is quite a bit of variance in the percentage of undecided voters in our sample. The mean percentage of undecided voters on the day before the election is substantial at 12.77% (with a standard deviation of 5.93). More importantly, we interact candidates' financial imbalances with the number of undecided voters to capture the *boca de urna* effect. We expect our interaction term to exhibit a positive sign, indicating that polling error will increase in races with greater financial imbalances and more undecided voters.

Table 2: Descriptive statistics of financial imbalances in candidates' resources by type of election

Office	n	Min.	Max.	Mean	s.d.
Mayor	74	21.06	16,476.08	2,067.18	3,823.47
Senator	32	4.48	7,600.29	2,128.27	2,047.40
Governor	80	34.39	26,698.31	5,590.06	5,143.93
President	17	5,787.36	154,138.50	64,457.38	51,350.49
All	203	4.48	154,138.50	8,689.93	22,661.94

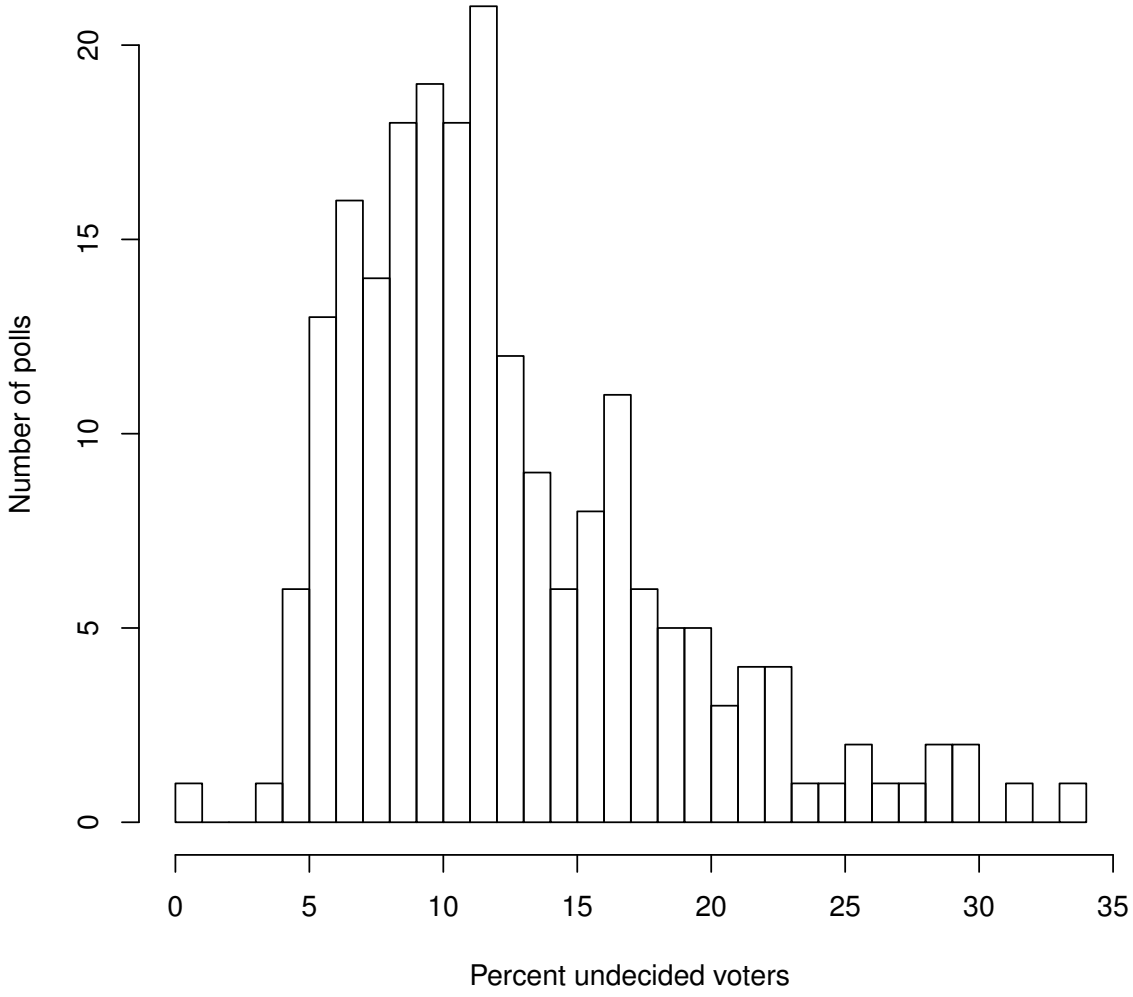
Note: Entries are the mean of the standard deviation of the expenses for the three candidates in a given election who spent the most, calculated in thousands of *reais* as of 2014. Values are for candidates running in elections for which we have polls that were conducted one day prior to election. The number of observations here is different than that in Table 1 because financial data are missing for 9 polls conducted the day before the election.

Finally, we include, as control variables, a dichotomous variable indicating whether the poll was for the second round, a dichotomous variable indicating whether an incumbent ran,[24] a variable measuring the effective number of candidates in the election using the measure proposed by Laakso and Taagepera (1979), a measure of electoral competitiveness (as measured by the difference between the vote percentages for the candidate who won the most votes in the election and the one who won the second-most), and, lastly, dummies to account for office (governor, senator, and mayor, with president as the reference category), major polling firms (Ibope and Datafolha) and regions (North, Northeast, South, and Central-West, with Southeast as the reference category).[25] We expect polling error to be higher in first-round elections, the greater the effective number of candidates contesting the election, the more competitive the election, and when there is an incumbent

[24]Incumbents were included because being the current office-holder could affect last-minute voter recall without involving the *boca de urna*. As such, we coded as incumbents candidates who had held the same office for at least the previous year; this excluded interim office-holders who assumed the office after the incumbent vacated it to run for a separate office.

[25]We also tried to include the number of respondents and the margin of error of each poll, but this information was only inconsistently available for polls, and so we excluded it from our analysis.

Figure 1: Distribution of undecided voters by poll, one day before the election



in the race.[26]

Table 3 presents the OLS coefficient estimates for our independent variables, along with their respective standard errors. The findings in Table 3 are interesting in many regards. First, as expected, there is a positive sign for the interaction term between the financial im-

[26]Note that we decided not to include election year controls because we have no theoretical reason to believe that polling error should be larger or smaller in any given year, while election years are also highly correlated with election types (in 2004, 2008, and 2012 we *only* have polls for mayoral elections and in the other years *only* polls for the presidential, gubernatorial, or senatorial elections). In any case, Table A1 in the Appendix shows that the inclusion of election-year dummies does not affect the coefficient estimates of the variables of interest.

balances and the percentage of undecided voters. The interaction term is statistically significant at .05 (two-tailed). This suggests that the *boca de urna* has an influence on polling error. Of the other independent variables, only one additional variable of interest has a statistically significant effect on polling error, with second-round elections having significantly less polling error than first-round elections, as expected.[27]

To better visualize the effect of financial imbalances on polling error, we plotted this effect in Figure 2 against the percentage of undecided voters. The figure shows, as expected, that financial imbalances exert a positive and statistically significant effect on absolute polling error in races for which the percentage of undecided voters is approximately 15% or more (here, representing 64 of the 212 observations—or 30.2% of the sample).

To further illustrate our results, we show in Figure 3 the effect on the absolute polling error of changing our financial imbalances measure from its 25^{th} to 75^{th} percentile, with the percentage of undecided voters on the x-axis. To illustrate this simulation, we can think of the first round of the mayoral election in Campinas, São Paulo in 2004. The wealthiest candidate spent R$ 2,121,737.40 (US$ 585,687.34) while the second-wealthiest spent R$ 1,491,531.50 (US$ 411,706.84), and the third-wealthiest spent R$ 158,070.20 (US$ 43,634.11). This race represents a difference equivalent to the 25^{th} percentile of our financial imbalances measure. The election that corresponds to the 75^{th} percentile, on the other hand, is the second round of the presidential election in 2006, in which the wealthiest candidate spent R$ 91,490,670.71 (US$ 25,254,273.26) and the second-wealthiest spent R$ 79,206,150.77 (US$ 21,863,363.34). In the end, increasing the disparity in financial imbalances from the level of the 2004 Campinas mayoral election (25^{th}) to that of the second round of the 2006 presidential election (75^{th}) with 16% of the electorate undecided results in an increase of about 0.75 percentage points in absolute polling error. Doing so with 20%, 24%, and 28% undecided voters results in increases of approximately 1.25, 1.75, and 2.25 percentage points, respectively.

[27]One should note that a Breusch-Pagan test rejects the null hypothesis of homoskedasticity, which suggests the presence of heteroskedasticity in this model. We estimated Eicker-Huber-White robust standard errors (HC2) and find that the results do not affect our conclusion or our coefficient of interest—the interaction of financial imbalances with undecided voters—which remains statistically significant, as shown in Table A2 in the Appendix.

Table 3: Explaining polling error, one day before the election

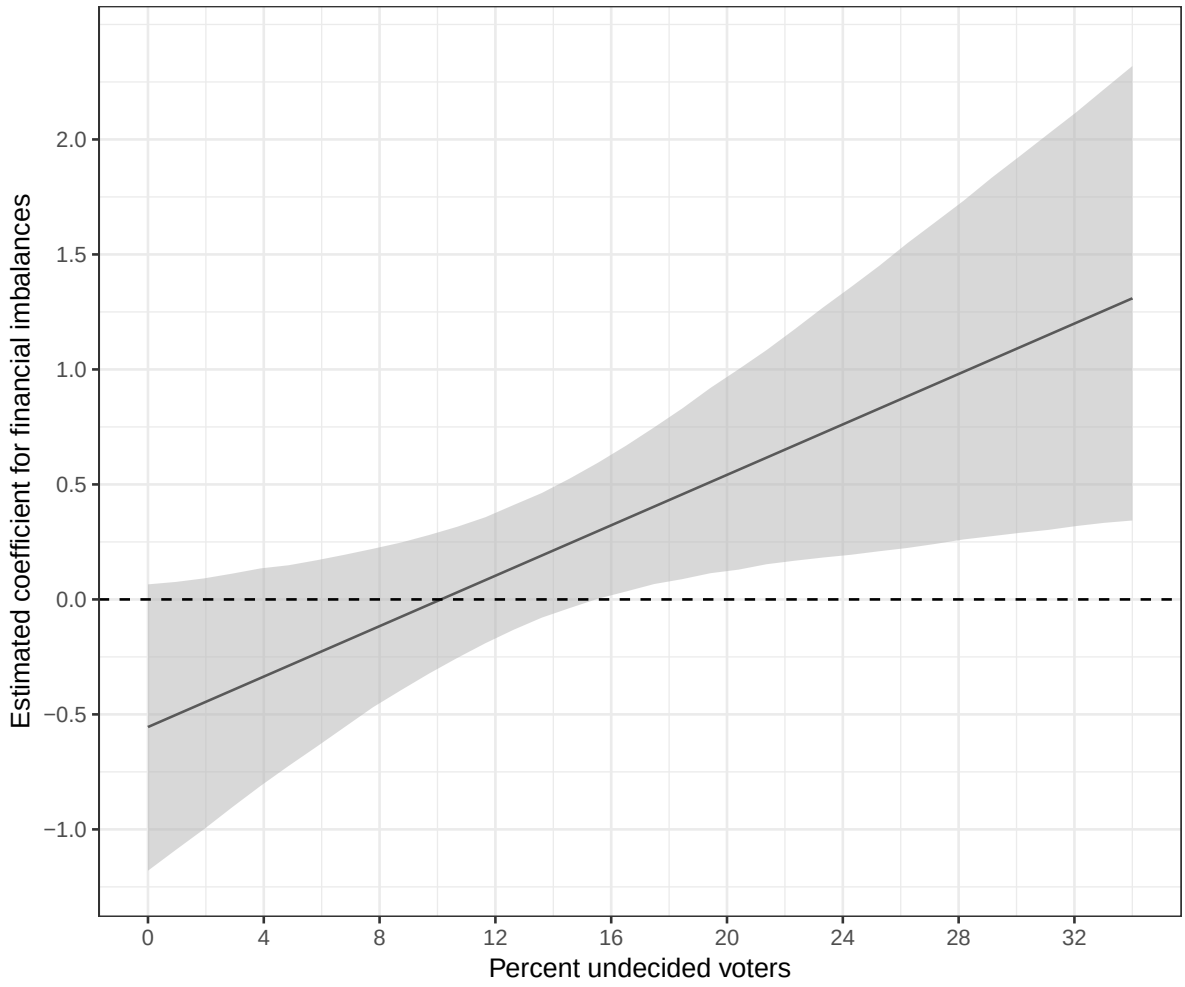
	Dependent variable:
	Polling Error
$2^{nd} round$	-1.391**
	(0.495)
Effective number of candidates	-0.102
	(0.311)
Electoral competitiveness	-0.019
	(0.012)
Incumbency	-0.363
	(0.353)
Undecided voters	-0.647
	(0.330)
Financial imbalances	-0.545
	(0.315)
Financial imbalances*Undecided voters	0.054*
	(0.022)
Constant	10.690*
	(4.614)
Observations	203
R^2	0.423
Adjusted R^2	0.373
F Statistic	8.507*** (df = 16; 186)

*p<.05; **p<.01 (two-tailed)

Note: Entries are OLS coefficient estimates with standard errors in parentheses. Model also includes dummies for office (governor, senator, and mayor, with president as the default), major polling firms (Ibope and Datafolha) and regions (North, Northeast, South, and Central-West, with Southeast as the reference category). Only the dummy variables for senatorial elections and Northeast are statistically significant. Both have a positive effect on polling error. We excluded these coefficients from our table for the purposes of clarity.

To verify the robustness of our model, we also used an alternate measure for financial imbalances within campaigns: the average differences in expenses between the three

Figure 2: Estimated coefficient for financial imbalances by the percentage of undecided voters, one day before the election



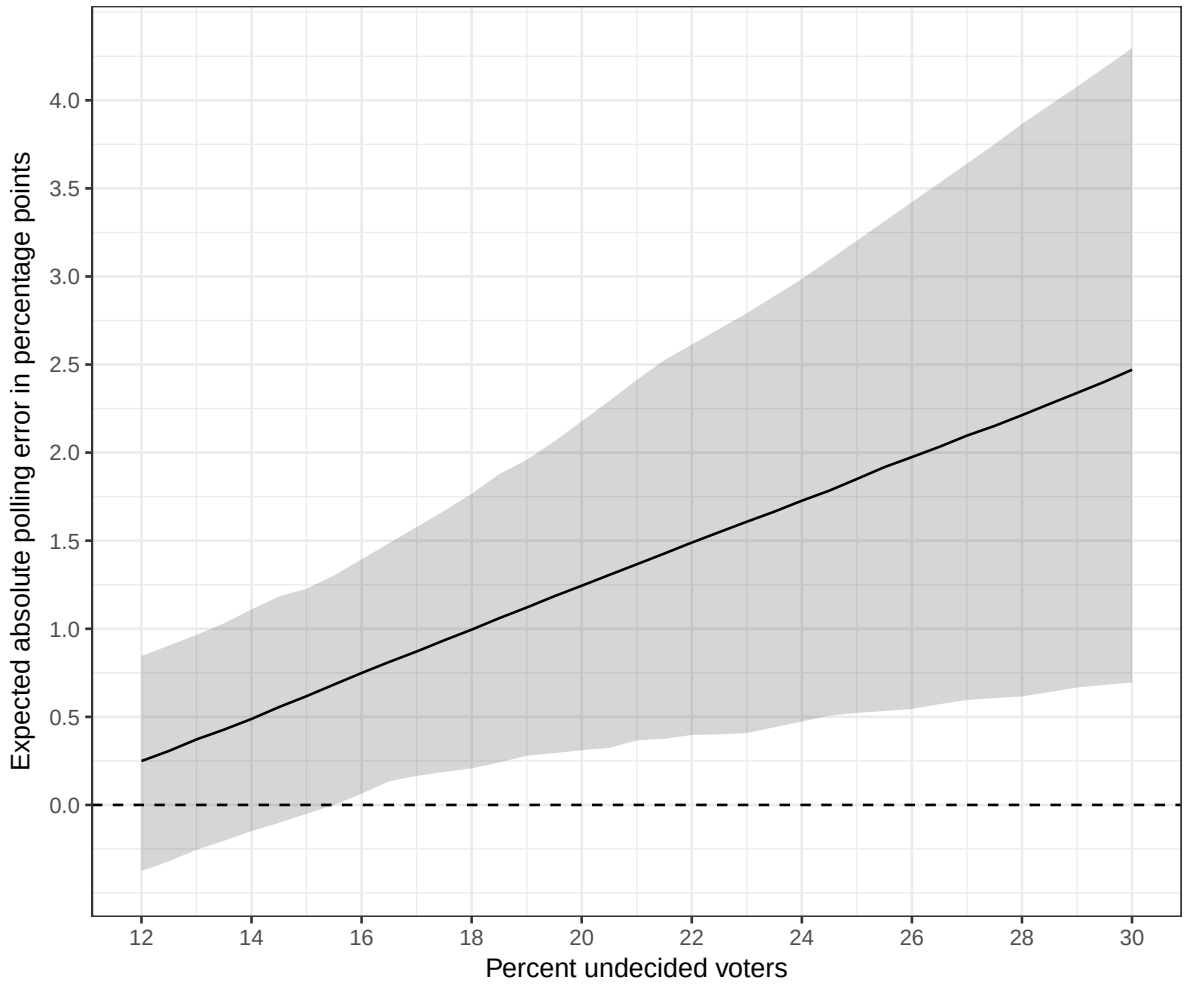
Note: The bandwidth illustrates the 95% confidence interval.

biggest-spending campaigns.[28] This alternate measure makes no substantial difference to our results, which remain statistically significant (see Figure A1 in the Appendix). Moreover, we also re-estimated our model removing, in turn, each election type to show that our findings are not driven by any specific election type. In all four cases, we find a positive effect for financial imbalances, given moderately high levels of undecided voters, on the absolute polling error (see Figure A2 in the Appendix).

This analysis establishes a floor effect for last-minute vote buying on elections in Brazil. This is because, first of all, candidates' true financial imbalances might have wider vari-

[28] In other words, the average between the difference in expenses between the top-spending and second-top-spending campaign, the difference between the top-spending and third-top-spending campaign, and the difference between the second-top-spending and third-top-spending campaign.

Figure 3: Effect of financial imbalances by the percentage of undecided voters on the expected absolute polling error, one day before the election



Note: The bandwidth illustrates the 95% confidence interval.

ation than their official expenses show. Second, as mentioned above, much of the *boca de urna* effect might not show up in poll figures because so many candidates practice it—as a consequence, the effect could often be canceled out. In short, our theory suggests that the true effect of clientelist voting is much larger than shown in our results. The results presented here indicate the bare minimum of the effect that the *boca de urna* has on elections in Brazil.

Discussion

Admittedly, pollsters can always make mistakes, and accurate polling is difficult enough to conduct even when all major motivators of vote choice are legal and above-board. Indeed, polls in Brazil do have well-known problems, such as accusations of bias, a lack of transparency in regards to sampling methods (Biroli, Miguel and Mota 2011), and a reliance on quotas (El-Dash 2010), all of which could make them more likely to commit larger errors. Luckily, in the U.S. and elsewhere in the democratic world, polling has become an important part of modern political campaigns (Hillygus 2011), and with it, polling error. As a result, we looked into polling errors in other countries to see if there were similar patterns, even when there is not any (or as much) vote buying. These results are summarized below in Table 4.

Table 4 also includes information about the country's score for vote buying on Herbert Kitschelt's Democratic Accountability Linkages Project (DALP). The DALP is a cross-national survey that was administered in 2008 and 2009 to country experts about the degree to which democratic accountability and clientelist practices are prevalent in given countries. Eighty-eight countries from six continents are included in the dataset, with questions about specific clientelist practices, such as monitoring votes and offering consumer goods to voters in exchange for votes (Kitschelt 2013). As a rough proxy, we included results for the question below:

> *Consider whether candidates and parties give or promise to give citizens consumer goods (e.g., food or liquor, clothes, cookware, appliances, medicines, building materials etc.) as inducement to obtain their votes. How much effort do candidates and parties expend to attract voters by providing consumer goods? (p. 23)*

If an expert responded 1, it indicated that parties in the country made "a negligible effort or none at all." A score of 2 indicated "a minor effort," while 3, in turn, indicated "a moderate effort" and 4 "a major effort." In Table 4, we use the average score per country.

Of course, the results in Table 4 are not perfectly comparable; indeed, different countries conduct polls differently and the particular characteristics of polls, such as sample size,

Table 4: Average Polling Errors in National Elections in Various Countries

Country	Average Polling Error (MM3) (source)	DALP Score
U.S.	1.9% (Traugott (2005))	1.31
U.K.	2.0% (Sanders (2003))	1.16
Germany	2.0-3.0% (Schnell and Noack (2014))	1.09
Italy	3.0-4.0% (Callegaro and Gasperoni (2008))	1.81
New Zealand	1.3% (Wright, Farrar and Russell (2013))	1.40
Portugal	2.4% (Magalhães (2005))	1.74
France	2.0% (Durand, Blais and Larochelle (2004))	1.35
Brazil	**4.96%**† (**our own calculations**)	**2.76**

†For polls up to 30 days before the election for mayoral, senatorial, gubernatorial, and presidential races to increase comparison with the other countries (n = 2028).

days before the election, filters for likely and non-likely voters, could affect the accuracy of poll results. That said, it is still interesting to note how much higher the average polling error is in Brazil as compared to the other countries in Table 4. Moreover, it is even more interesting to note that Brazil's DALP score is also, by far, the largest reported in that table, while the country with the second-highest average polling error (Italy) also happens to have the second-highest DALP score. This analysis is merely illustrative, but even so, it does indicate that Brazil has high levels of polling error, and that what we uncovered in this paper may very well be a real relation between polling error and vote buying.

Conclusion

This paper develops and tests the argument that illegal last-minute campaigning is in part responsible for elevated levels of polling error in Brazil. Using a quantitative approach to answer a theory that was derived from qualitative fieldwork during the 2014 election, our

paper shows that using polling errors is an effective way of measuring the floor effect of last-minute vote buying in Brazil, as it is correlated with the number of undecided voters and financial imbalances between campaigns.

This article gives us a glimpse at a future research agenda with ample promise. Our method only scratches the surface of a wider phenomenon that could be further examined in the future with more data and different measurement techniques. As a result, we can think of several extensions to this work.

First, this paper used a limited set of elections over a limited period of time. We do not yet have enough data to confirm whether (and why) certain types of elections have more vote buying than others. Senate races, for instance, seem to have consistently higher errors than other majoritarian elections, but it is not entirely clear why (perhaps the higher percentages of undecided voters in senatorial elections?). Lower-house proportional representation elections have reputations for having more vote buying, but there are no systematic data to prove this. Future work should incorporate polls on lower-house elections to the degree that they exist in the public domain, especially because they could shed light on differences in how the *boca de urna* is used between majoritarian and proportional elections in Brazil.

Second, we would like to be more specific in isolating the role of compulsory voting in promoting (or suppressing) vote buying. We believe that compulsory voting promotes vote buying, at least in the Brazilian context, because it increases the number of people who are uninterested in politics but vote, thereby widening the pool of undecided voters that can be targeted by vote buyers. Our data, however, do not allow us to draw any definitive conclusion about this. Collecting more data on vote buying in other countries—particularly those with varying degrees of compulsory voting and the enforcement of it—could help us clarify this question.

Third, a wider range of data for our independent variables would also be helpful. Last-minute changes in voting could be due to other causes, after all. Both Gramacho (2013) and El-Dash (2010), for example, delve into the different sampling methods used by polling firms in Brazil. Although, to our knowledge, no variation of this type exists among Brazil-

ian polling firms (and we found no evidence that certain polling institutes systematically outperformed others), it is possible that these methods, particularly the use of quotas, result in larger polling errors in Brazil than in other, comparable countries. Using this knowledge about sampling methods to inform our measures and further investigate this question would be one way to address this potential explanation.

Alternative ways to measure one's capacity to practice the *boca de urna* would also be helpful; after all, publicly available data on campaign finances only exists from 2002 onwards, and records can be spotty for 2002 and 2004. Furthermore, as recent developments have made abundantly clear, unregistered illegal funds are commonplace in Brazilian campaigns, which means that publicly available data on campaign finances only represents a portion of the funds that campaigns could be using on the *boca de urna*. Any other data that could measure off-the-books finances would be helpful for supplementing this research.

In short, our results are only a first step that could lead scholars of political behavior to an exciting new avenue of research. Vote buying has often been seen as un-measurable, but with this article, as well as future iterations of this research agenda, we hope to show that social scientists can measure important influences on voting behavior, even if they had previously been written off as impossible to measure and estimate.

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Appendix

Table A1: Explaining polling error, one day before the election

	Dependent variable:
	Absolute Polling Error
2^{nd} round	-1.391**
	(0.495)
Effective number of candidates	-0.102
	(0.311)
Electoral competitiveness	-0.019
	(0.012)
Incumbency	-0.363
	(0.353)
Undecided voters	-0.647
	(0.330)
Financial imbalances	-0.545
	(0.315)
Financial imbalances*Undecided voters	0.054*
	(0.022)
Constant	10.690*
	(4.614)
Observations	203
R^2	0.423
Adjusted R^2	0.373
F Statistic	8.507*** (df = 16; 186)

*p<.05; **p<.01 (two-tailed)

Note: Entries are OLS coefficient estimates with standard errors in parentheses. In addition to dummies for office, major polling firms, and regions, the model also controls for election year dummies (2004, 2006, 2008, 2010, and 2014, with 2012 as the reference category). Again, only the dummy variables for senatorial elections and Northeast are statistically significant. Both have positive effects on polling error. We excluded these coefficients from our table in the main section of the paper for the purpose of clarity.

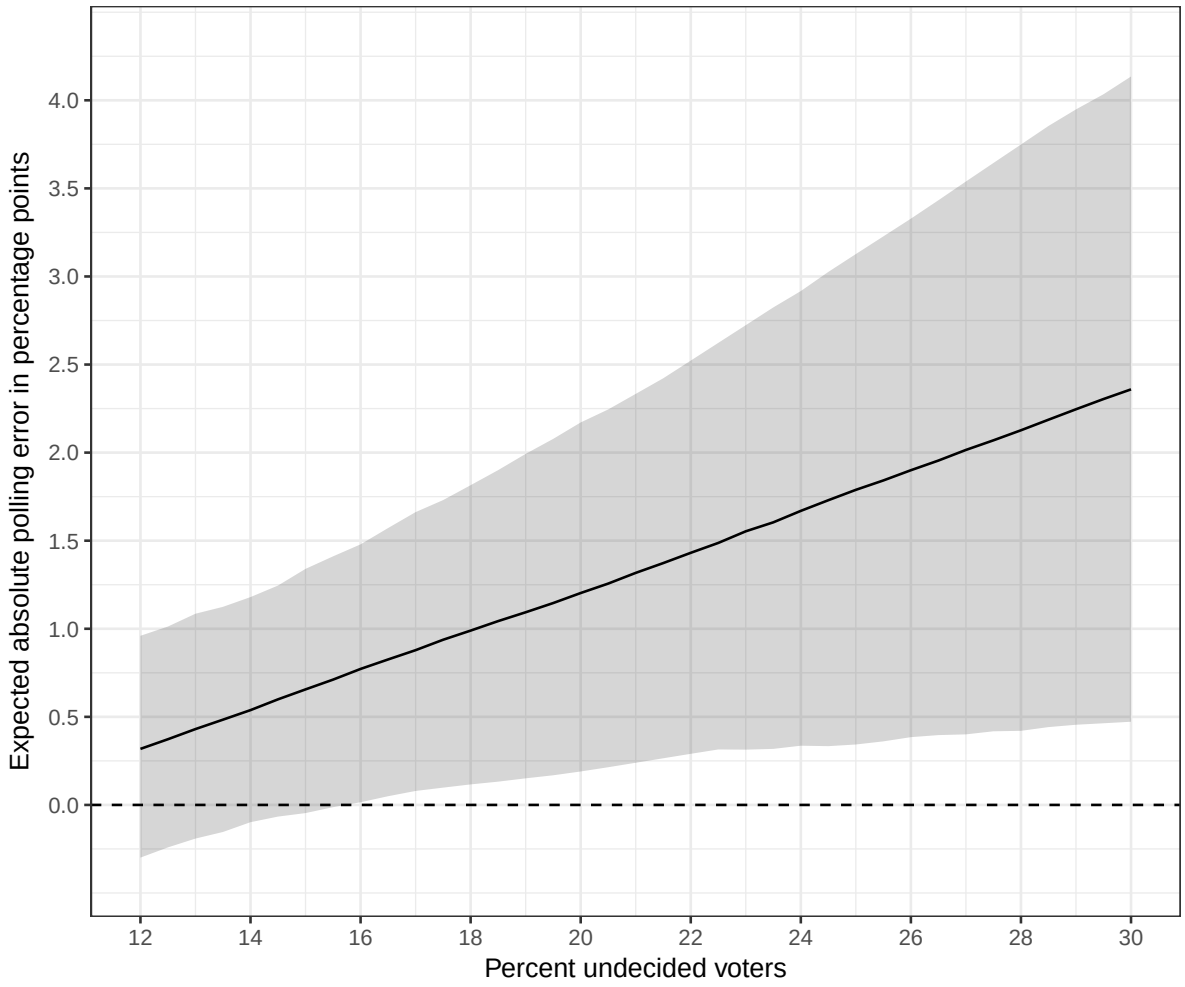
Table A2: Explaining polling error, one day before the election

	Dependent variable:
	Absolute Polling Error
$2^{nd}round$	-1.391**
	(0.462)
Effective number of candidates	-0.102
	(0.302)
Electoral competitiveness	-0.019
	(0.011)
Incumbency	-0.363
	(0.345)
Undecided voters	-0.647*
	(0.325)
Financial imbalances	-0.545
	(0.298)
Financial imbalances*Undecided voters	0.054*
	(0.023)
Constant	10.690*
	(4.195)
Observations	203
R^2	0.423
Adjusted R^2	0.373
F Statistic	8.507*** (df = 16; 186)

*p<.05; **p<.01 (two-tailed)

Note: Entries are OLS coefficient estimates with Eicker-Huber-White robust standard errors (HC2) in parentheses. The model also includes dummies for office, major polling firms, and regions. Again, only the dummy variables for senatorial elections and Northeast are statistically significant. Both have a positive effect on polling error. We excluded these coefficients from our table in the main section of the paper for the purpose of clarity.

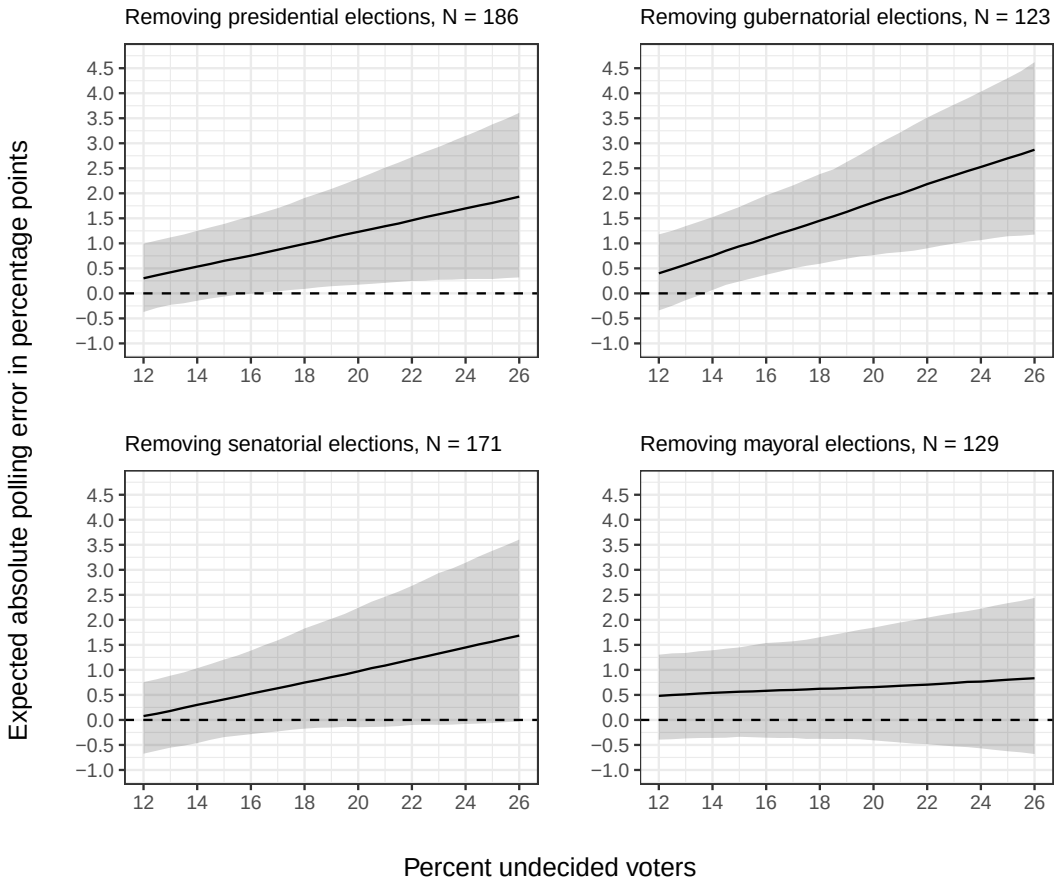
Figure A1: Effect of financial imbalances by the percentage of undecided voters on the expected absolute polling error, one day before the election



Note: Financial imbalances are measured as the logarithm of the differences in expenses between the three biggest-spending campaigns.

The bandwidth illustrates the 95% confidence interval.

Figure A2: Effect of financial imbalances by the percentage of undecided voters on the expected absolute polling error by excluding one type of election, one day before the election



Note: The bandwidths illustrate the 95% confidence interval.