

Vote Buying, Undecided Voters, and their Effects on Polling Error in Brazil

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Introduction

October 5, 2014 was a surprising day for many, not least among them pollsters in Brazil. The sitting president, Dilma Rousseff, was almost certain to advance to the second round, with a solid lead in the polls, but the second runoff candidate was a mystery. Marina Silva, of the PSB,⁴ had been riding high in the polls ever since her ticket's first candidate, Eduardo Campos of Pernambuco, died suddenly in a plane accident. No party outside of the big two, the PT⁵ and the PSDB⁶, had even made it into the second round since the first presidential election after the end of the military dictatorship in 1989. With Dilma looking vulnerable, Silva had a chance to change this in the most dramatic of ways. She enjoyed a comfortable point advantage over the third-place candidate, Aécio Neves of the PSDB, even as he made a late surge in the polls, polling between 21 and 26% the day before.

In the end, it was all a bit anticlimactic. Neves strolled into the second round with a vote total of 34%, while Silva finished 13 points behind Neves at 21%. This was far from the only surprising result of the day. In Pernambuco, IBOPE⁷ had the PT's João Paulo five points up on the PSB's Fernando Bezerra Coelho a day before the election. Bezerra Coelho ended up

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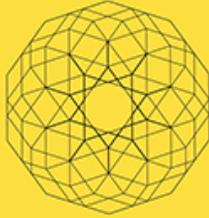
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⁴ *Partido Socialista Brasileiro*, or Brazilian Socialist Party

⁵ *Partido dos Trabalhadores* (PT), or Workers' Party in English

⁶ *Partido Socialista Democrático Brasileiro*, or Brazilian Socialist Democratic Party

⁷ A prominent Brazilian polling firm



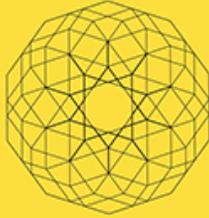
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walloping João Paulo, finishing with 64% of the vote. Seizing on some disastrous predictions in Bahia, a joke began to circulate the day after the election on Brazilian social media: “Today is October 6, so—according to IBOPE’s margin of error in Bahia—Merry Christmas.”

How could the polls have gotten it so wrong? Polls in Brazil do have well-known problems, such as accusations of bias and a lack of transparency in regards to sampling methods (Biroli, Miguel, and Mota 2011) and a reliance on quotas (El-Dash 2010), that could make them more likely to commit larger errors. We, however, argue that there are also systematic factors that make polling especially difficult in Brazil, namely, last-minute vote buying. Many of the effects of this vote buying, often known as the “*boca de urna*,”⁸ cannot be measured with quantitative methods, but we argue that one should be able to see its effects in certain specific contexts. This vote buying, in fact, results in predictable biases that are detectable by looking at financial imbalances between candidates in a given race.

In this paper, we begin by situating Brazilian electoral polls in a comparative perspective, showing their accuracy in comparison to those of other countries. Second, we describe the *boca de urna* and explain its function in Brazilian political campaigns. Third, we argue that the *boca de urna* can lead to large differences between electoral polls and electoral results. Fourth, we provide empirical results supporting our argument, showing that the largest discrepancies between polls and election results were in areas with large discrepancies in funding and large

⁸ Literally “the mouth of the voting machine” in English



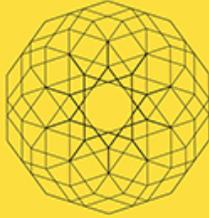
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amounts of undecided voters. We then present some preliminary thoughts on future avenues of research before concluding.

Brazilian Polls in Comparative Perspective

In the U.S. and elsewhere in the democratic world, polling has come to be an important part of modern political campaigns (Hillygus 2011). Moreover, polls make for interesting stories for the media and pundits of all stripes to talk about, especially in times when news coverage is more obsessed with horse races than issues (Broh 1980). News coverage of polls, in turn, can have effect on the electorate of their own by inducing some voters to vote strategically—by dropping one preferred candidate or party to support another one that stands a better chance of winning—and prompting others to conform to majority opinion—a contagion or bandwagon effect (Blais and Bodet 2006). Not surprisingly, election polls have been receiving increased attention by scholars of public opinion and elections. One central concern of these studies is that of polls' accuracy, that is, the extent to which they are good predictors of election results. In other words, do polls exhibit error or bias?

Most of the work on poll bias or error comes from the U.S. and was motivated first by the famous 1948 presidential election where Truman unexpectedly beat Dewey. Today's body of research on poll bias is rich and provides important insights about how particular characteristics of polls like sample size, survey mode, time to the election, filters for likely and non-likely voters, and others, affect the accuracy of poll results. These studies, however, are limited in scope because they do not tell us much about poll bias in varying contexts (parliamentary vs.

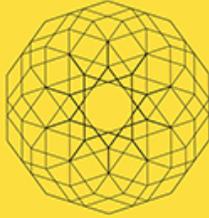


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presidential elections, two-party vs. multiparty systems, PR vs. majoritarian and plurality elections, young vs. established democracies, etc.). Luckily, scholars have also examined poll bias in other democracies. In what follows, we provide a brief overview of this growing literature.

One way to analyze the existing comparative literature on poll bias is to divide the studies into those concerned with executive and legislative elections. In terms of executive elections, there are countless studies on American presidential elections, as well as those dedicated to gubernatorial and mayoral elections. Similarly, Durand and colleagues have examined poll bias in French presidential elections (e.g., Durand, Blais, and Larochelle 2004; Durand 2008)). Such interest was once again spurred by polls' inability in 2002 to accurately predict extreme-right leader Jean-Marie Le Pen's (*Front National*) second-place finish in the first round, leaving leading candidate Lionel Jospin (Socialist) in third place. According to Durand's work, the average absolute error is comparable to what is found in other parts of the world (~2%), but is particularly large for more extreme candidates such as Le Pen (~4%+ in 2002 and 2007).

As for legislative elections, the interest in studying poll bias was in great part motivated by the catastrophic prediction of a Labour victory in the 1992 general British election. In the end, the Conservatives won by more than seven percentage points. In a vast analysis of election polls from 1945 to 1997, Sanders (2003) found that the average absolute error poll in British general elections was about 2%. Interestingly, Sanders found that polls in the UK had a large polling error when it came to estimating the difference between first and second place. The recent 2015 British election was, to be sure, pollsters' worst nightmare: none predicted the Tories to win that



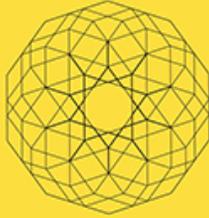
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election. David Cameron and his troop buried the Labour Party by almost 7% (36.9% to 30.4%)! A post-mortem report concluded that all polls oversampled young voters—who were more favorable to Labour—and under-sampled old voters—who themselves were more supportive of the Conservative Party (Sturgis et al. 2016).

Other legislative elections in other countries have also been examined closely. Callegaro and Gasperoni (2008), examining 70 published and 19 unpublished polls from the 2006 Italian parliamentary election, found that the average absolute error was about 3 to 4 percentage points. This polling error was quite large, especially when compared to what was found by Magalhães (2005) in Portugal (about 2.4% for general elections from 1991 to 2004), by Schnell and Noack (2014) in Germany (about 2-3% for general elections from 1957 to 2013), and by Wright, Farrar, and Russell (2014) in New Zealand (about 1.3% for the 2005, 2008 and 2011 general elections).

In regards to Brazil, El-Dash (2010), examining presidential, gubernatorial and mayoral elections in Brazil from 1989 to 2004, found that the average absolute error was substantially smaller for presidential polls (~1%) than it was for both gubernatorial and mayoral elections (~4%). In a recent analysis of the 2010 Brazilian elections, Gramacho (2013) found larger average absolute errors for both presidents and governors, but with errors that were once again larger for gubernatorial elections (3.9% vs. 2.3%). In other words, presidential elections tend to have errors that are comparable to those of other nations, at least in the second round, but gubernatorial elections tend to have especially large errors.

The Boca de Urna



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It was two days before the election, and the candidate whose campaign one of the authors was following during the 2014 elections had no ostensible reason to worry: he was ten points up over his nearest rival in the latest poll. The candidate was confident, and he said as much; in fact, he was already discussing his first actions after assuming office with mayors he was meeting. Yet, after another long day of campaigning, one of his advisors 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 if the election were in only two days? It was for the *boca de urna*, he said. Even though it is illegal to campaign immediately before the election, he explained, it is 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 10 points with 80% of the state’s results already in, and duly conceded defeat.

What, then, is this *boca de urna*? *Boca de urna* campaigning takes place on the day of the election and can encompass everything from handing out campaign material, such as stickers, *santinhos* (little cards advertising a candidate with a suggested *chapa*, or ticket, on the reverse side), personal face-to-face appeals, money, or combinations of all of the above. Such campaigning is illegal; Brazilian electoral law prohibits it.⁹

⁹ According to Article 41-A of Law Number 9504 from September 30, 1997, known as the Law of Elections



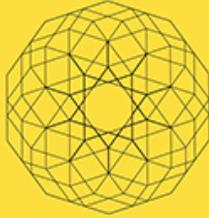
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It is well-known that such activity on the day of the election is illegal; as a result, most *boca de urna* activity is performed by someone at least two connections away from the candidate so that he/she can claim plausible deniability. For the simplest 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). This *cabo eleitoral*, who is usually on the campaign's official payroll, will then distribute money and material to trusted confidants, who will in turn distribute *santinhos* and a small amount of money (usually 50-100 reais) to friends and acquaintances in their district whom they can trust. This 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 *cabos eleitorais* 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 *cabo eleitoral* is confident of not being caught; the *cabo eleitoral's* confidants will approach voters on their way to the poll and ask if they have already decided on whom they will vote for.¹⁰ If they answer that they are undecided, the confidant will distribute money 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 or ex-mayors or city councilmen, who will then hire the *cabos eleitorais*, who then arrange the buying of votes.¹¹ This type of sophisticated multilayered network can make it

¹⁰ See, for instance, Crime eleitoral, boca de urna ocorre livremente em Porto Alegre, 2014

¹¹ For a good illustration of how these inter-campaign networks can work, see Ames 1994.



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very difficult to catch a candidate buying votes because the people actually buying votes are several steps away from him/her. For example, one 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 whether he was in fact involved in this transaction). 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.

This *boca de urna* practice might sound like clientelism, and it is a form of it, but it a specific subset (Gans-Morse, Mazza, and Nichter 2013; Stokes 2007). In clientelism as traditionally understood (see, for instance, Graziano 1976, 168; Hilgers 2008, 125; Kaufman 1974; Kitschelt 2000, 849; Lemarchand and Legg 1972, 151), clients have long-term relationships with their patrons. Those who sell their vote in the *boca de urna* 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.

Who is Most Affected by the *Boca de Urna*?

The first thing one notices on Election Day is the ground—or rather, the lack thereof; you literally cannot see it in some places. This is because campaigns cover the ground with *santinhos* the night of the election, hoping that someone will pass by and pick one up; in fact, several elderly women had to go to the hospital this past election after losing their footing on the



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santinhos and falling (Aposentada de 70 anos escorrega em santinhos e fica ferida em São Carlos, 2014). These ladies were casualties of the no-holds-barred fight that takes place every election over *indecisos*, or the undecided voters.

Voting is compulsory in Brazil, in accordance with Law Number 4737, from July 15, 1965. Anyone between the age of 18 and 70 is required to vote unless they provide a justification for not voting (voting is optional for those between the ages of 16 and 18 and over the age of 70). 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 and get one's passport and ID. 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 1st round of the general election (more than 115 million voters).

It is can be difficult to be a voter in Brazil, however. For one, many of the cognitive heuristics that 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).¹² The party system is extremely fragmented (Ames, Baker, and Renno 2009; Borges 2015); in fact, 28 parties won seats in the House of Deputies in 2014. Parties are weak financially and organizationally, with virtually no ability to support campaigns financially. Politicians often switch parties when it is convenient to them, with almost no ill effects (Desposato 2006).¹³ This is because Brazil's open-list proportional representation electoral system gives power to

¹² The PT is arguably an exception, as are several very small parties on the left.

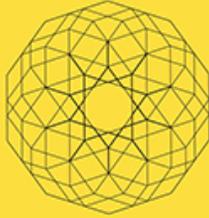
¹³ This has been curtailed by a recent law forcing candidates to give up their elected post if they switch parties, but a loophole allowing politicians to join *new* parties has greatly curtailed its effectiveness.



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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 even if their party wins many votes as long as they win less votes than their co-partisans (Carey and Shugart, 1995; Shugart, Valdini and Suominen, 2005).

Alliances and coalitions further complicate the picture. Because parties are so weak, politicians often go to other politicians for support rather than their parties, regardless of the party of the other politician. An enormous amount of money can change hands between campaigns as candidates scramble to win the approval 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 (about 75,000 USD) in exchange for supporting a federal deputy or senatorial candidate. Other, weaker, state deputy candidates might “only” ask for the other campaign to pay for their campaign material or electricity bills. Each federal deputy or senatorial candidate, of course, will not stop at supporting one candidate; I, for instance, once followed a federal deputy candidate as he campaigned for six different state deputy candidates in one day. Furthermore, parties themselves often form coalitions with agreements on which candidates will run for which posts. These coalitions can vary wildly from state to state, and often have nothing to do with ideology. Two parties that are fierce enemies in one state might be coalition partners in another. In short, the labyrinthine combination of personal alliances and party coalitions further complicate the voter’s task of keeping track of candidates and deciding on whom to support.



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The number of candidates, though, is probably the biggest obstacle for voters. It is difficult to overstate the number of candidates running for office in Brazil. In the Federal District in first round of the 2014 elections, for instance, this meant that every voter had to pick one from 11 presidential candidates, 6 gubernatorial candidates, 8 senatorial candidates, 127 federal deputy candidates, and 978 *deputado distrital* candidates, and somehow remember the identifying numbers of all of them.¹⁴ While not every candidate will campaign in every town (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 a lot of indifference and voter error. The number of *votos nulos* (null votes, or votes that are spoiled) and *votos em branco* (blank votes) in a given Brazilian election can be astounding; for instance, 9.77% of the electorate in Rio Grande do Norte cast *votos nulos* for federal deputy in the 2014 elections while 8.53% cast *votos em branco*. Many spoil their votes on purpose, but many others simply make mistakes—one either has to remember the numbers of all their candidates or prepare a list of candidates into the voting booth with them.

While many of these problems seem specific to 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 their electoral messages can cause

¹⁴ *Deputados distritais* are district-level deputies in the Federal District. The equivalent in other states is the *deputado estadual*, or state deputy



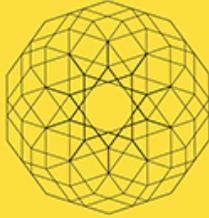
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information overload, not only when it comes to deputy elections, but also when it comes to senatorial or gubernatorial elections.

After all, other elections have to compete for attention with the deputy elections in the first round, and only gubernatorial, presidential, and some mayoral races get the benefit of a second round with two candidates. Besides, while national politics has indeed gained more visibility over the past few elections, and coattails voting indeed can have an impact on state-level elections (Borges and Lloyd 2016), the number of parties and the complexity of party alliances can still make these networks of alliances far from easy for even the most motivated voter to keep straight.

In short, voters are forced to vote in elections, but are presented with a veritable sea of candidates from a massive variety of ideologically bereft parties without any sense of long-term identity. Both candidates and parties arrange to support other candidates and parties, often independently from one another, which further complicates things instead of simplifying it. Of Lau and Redlawk's five categories of cognitive heuristics, 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. 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 *indecisos* are the targets of the *boca de urna*. As one political operative told me, “the *boca de urna* just doesn't work on those



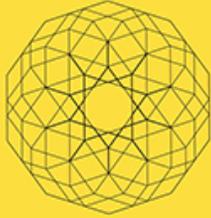
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who already have a candidate. You don't convince someone with money." There are, however, so many voters who have to vote, yet have no idea whom to vote for, that the *boca de urna* can have plenty of targets anyhow.

Despite relatively recent initiatives making it easier to punish vote buying and remove practitioners from office (Nichter 2011), there are few things deterring voters from accepting money just before or during the day of the election. It is difficult to detect vote buying, and even when detected, vote sellers are very rarely punished (see Martins and Pedrosa 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 is in need of 100 extra *reais*.

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

What he did instead was buy the support of *convencedores* (literally, "convincers"), hiring people to stand on street corners with *santinhos* on the day of the election. As voters walked by toward the polls, this employee would ask them if they already had a candidate. If not, the employee would slip the voter a *santinho* with the candidate's *chapa*. 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



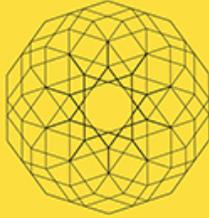
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(employees) will just take my money and throw the *santinhos* on the ground,” he added, but there was no way he could do anything about it except try to hire people his campaign knew. And yet, even then—with a success rate of about 3.33% among the employees who actually bothered to do their job—the numbers gained from the *boca de urna* could still be worth it.

Given this environment, even campaigns not enamored with the *boca de urna* can feel as if they have no option but to join in. In fact, as one campaign advisor told me, the *boca de urna* was more of a defensive tactic than anything. “Last election [during the mayoral elections], 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 often be more than enough to turn victory into defeat.

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 they take place. Undecided voters, particularly poorer ones, should consistently be targets for *boca de urna* campaigns. This effect, though, would not always be noticeable to 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, working purely as a defensive maneuver.

Its effect, however, should be noticeable in situations in which one competitor has either a large advantage or a large disadvantage in regards to his/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



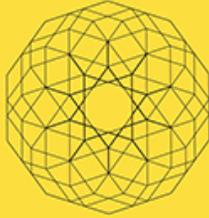
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competitors. The full extent of the *boca de urna* might not be measurable, but one can measure the correlation of last-minute swings with the financial advantages or disadvantages of a candidate. A last-minute swing might theoretically not be due to campaigning, and any change due to campaigning might theoretically not be due to outright vote buying, but a robust correlation between financial campaign imbalances and last-minute swings would provide a strong indication that vote buying was a relevant factor in these swings.

Publicly available data on campaign finances has been collected by the Brazilian electoral board (the *Tribunal Superior Eleitoral*, or TSE) since 2002, and can help us identify campaigns that have either a much larger or much smaller ability to conduct *boca de urna* campaigns than their competitors.¹⁵ While campaigns that are engaging in illegal campaigning might not always declare all of the assets they have, some campaign workers who were interviewed 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.¹⁶ As a result, we find it reasonable to expect that, at the very least, there would be some correlation between publicly declared assets and total assets. In short, we argue that financial imbalances in given elections should lead to greater polling errors in those elections, particularly in the presence of a large body of undecided voters.

¹⁵ One should, however, 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-antiores/eleicoes-2004/resolucao-21.609-2004>

¹⁶ 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.



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Data

We used state-level electoral data from the presidential elections of 2002, 2006, and 2010, and 2014, the gubernatorial elections of 2002, 2006, 2010, and 2014, the senatorial elections of 2006, 2010, and 2014,¹⁷ and municipal-level data from the mayoral elections of 2004, 2008, and 2012. Electoral and polling data for presidential, gubernatorial, and mayoral elections were obtained thanks to the generosity of Neale El-Dash, who used some of these data in his 2010 article and has made the rest available on his website, www.pollingdata.com.br. Polling data for senatorial races were obtained through the site of Fernando Rodrigues (<http://noticias.uol.com.br/politica/pesquisas/>).¹⁸ Electoral results for senatorial elections from 2002-2010 were obtained from the Centro de Estudos da Metrópole, while results from the 2014 elections were obtained from the *Tribunal Superior Eleitoral* (TSE). Information on campaign expenditures was obtained also from the TSE.

Empirical Results

Our unit of analysis was each poll. Our dependent variable, as in Gramacho (2013), was Mosteller's third measure—the average absolute deviation in percentage points between predicted and actual returns for each candidate (Mosteller 1949). We denote this variable with *absmm3*. Our cutoff point for the inclusion of a candidate was, following El-Dash (2010), either

¹⁷ While there does exist data on 2002 Senate polling, the polls did not, to our knowledge, collect complete information involving undecided voters—namely, given that each voter had two votes that year, how many had chosen one candidate, but were still undecided on a second. Without that key piece of information, it was too difficult to calculate the percentages of valid votes commanded by each candidate and the number of undecided voters. Given the situation, we opted to simply leave out that year. If such data become available in the future, it would be a worthwhile undertaking to include them in an updated study.

¹⁸ We also used state-level poverty data from the *Instituto de Pesquisa Econômica Aplicada* (IPEA), as well as the number of candidates running in each race, but did not find significant effects for either type of variable.



polling above or receiving at least 3 percent of the vote. Polls were included if they were conducted no more than 30 days before the election and had the requisite information (polling for non-valid votes). We used percentages of valid votes for both polling figures and results.¹⁹

As can be seen below in Table 1, the level of error was quite high in comparison to other countries in the comparative polling literature. No race had polls with an average error below 4%, and Senate polls average an error rate above 7%. Second-round results for the executive positions were indeed lower, with average presidential error going as low as 3.06%, for instance.

Table 1: Avg. Polling Error

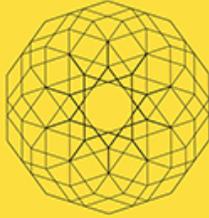
Position	Avg. Error	Number of Observations
Mayor	4.43%	946
Senator	7.13%	354
Governor	4.87%	668
President	4.27%	177

For all polls within 30 days of the election

Table 2 shows descriptive statistics for all polls conducted the day before the election. As expected, the error rates decrease considerably, with both presidential and mayoral average error rates dropping below 3 percent. Average senatorial error, however, is still quite large, at almost 6 percent, while gubernatorial average error decreases to 3.17%. These results suggest that, even though some error from our first figures is accounted for the closer one gets to the day of the election, there is still a considerable amount of error to be accounted for.

Table 2: Avg. Polling Error, Day Before Election

¹⁹ Polling figures came in percentages of total votes, so they were adjusted to reflect the percentage of valid votes



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Position	Avg. Error	Number of Observations
Mayor	2.68%	75
Senator	5.98%	46
Governor	3.17%	85
President	2.16%	19

Our independent variables were the number of undecided voters in the given poll (*Undecided*), the number of days before the election the poll ended (*DaysBefore*), whether the poll was for the second round (*Round2*).²⁰ We also used variables that measured the standard deviation of the expenses of all campaigns measured in each poll (*SDExpenses*) divided by the number of voters in each voting unit,²¹ the poverty level of the state (*Poverty*) and the number of candidates running in the election (*CandNr*). We also included a variable to indicate polls for elections that were not competitive (a standard deviation of polling figures of at least 20), as competitors in these races would have less of a motivation to pay voters (*Landslide*). Finally, we included, to account for time and space, a centered measure for the year in which the election took place, and dummy variables for region. Our key independent variable was a cross-level interactive term between our expenses term and our undecided voters term (*Und_Exp*). Figure 1 below shows a scatter plot of all of our data, with average polling error plotted against the standard deviation of expenses divided by the number of voters in the election, while Figure 2 shows the same scatter plot for last-day polls.

²⁰ House effects, or the effects of individual polling firms on results, were not included in this study. While they could affect the accuracy of polls, they should not affect the validity of our main arguments. That said, they certainly deserve more scholarly attention in Brazil, and will be the subject of a further paper in the near future.

²¹ Although, again, we excluded campaigns who won less than 3% of the vote and 3% in the given poll, so we also excluded them from this calculation.

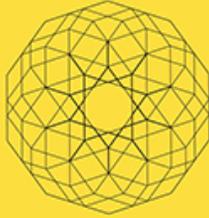


Figure 1: Average Error vs Interactive Variable: Undecided Voters*Logged Standard Deviation of Expenses

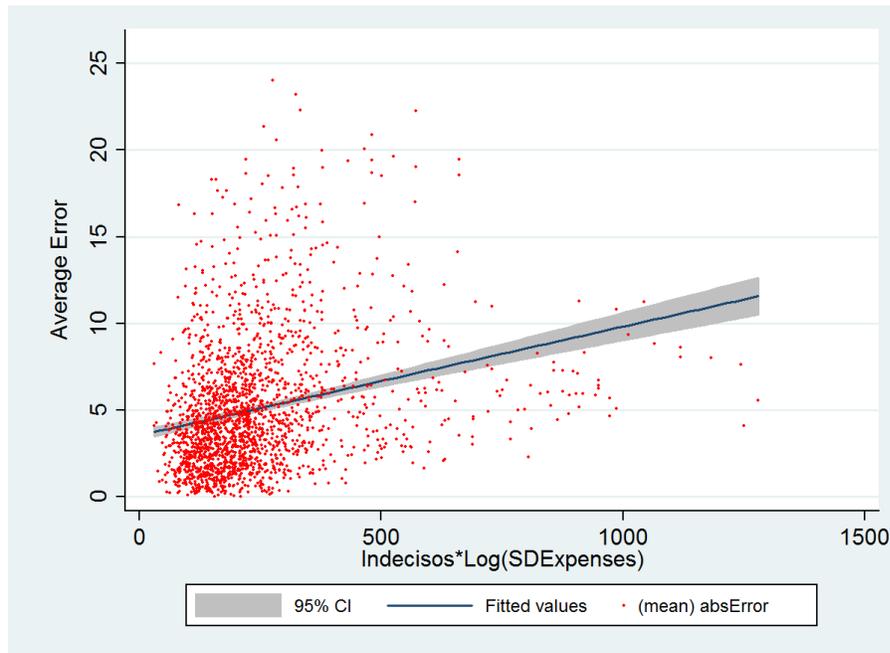
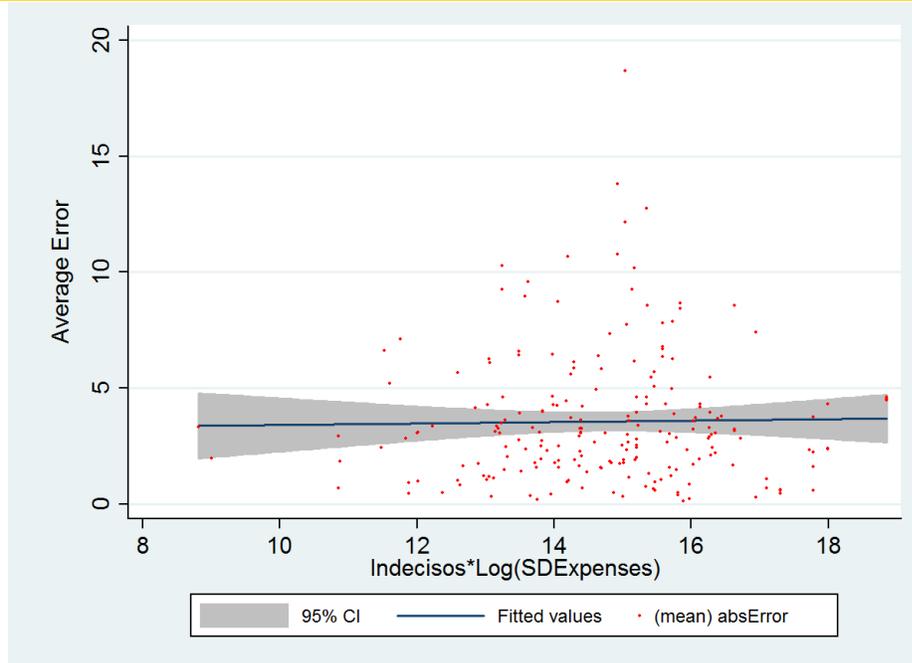
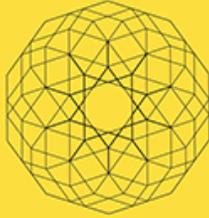
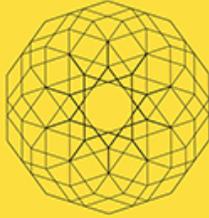


Figure 2: Average Error vs Interactive Variable: Undecided Voters*Logged Standard Deviation of Expenses, Last-Day Polls



Our theoretical expectations indicated that our explanatory variables would exist on multiple levels, which was confirmed by some preliminary tests of variance components and intra-class correlations. As a result, we used a two-level hierarchical linear model to test our argument for most of our polls. For senatorial and gubernatorial polls, poll-level variables were on the first level, and state-level explanatory variables were on the second level. For mayoral polls, we used the same structure, but municipal-level variables on the second level. For presidential elections, given that we would have had to use the year of the election as our second-level grouping variable, and that we would only have had four different groups, we opted for a simple linear regression.

We ran our model on separate subsets of our data, looking at presidential, senatorial, gubernatorial, and mayoral elections separately. We also ran our models on a subset of polls that were conducted the day before the elections.



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As one can see, our explanatory variables do not entirely behave as expected. Some variables did consistently behave predictably, such as how far before the election the poll was conducted. Furthermore, our results for mayoral elections did conform to expectations, with our interactive variable for the standard deviation of expenses and undecided voters being significant at the .001 level, as shown by Table 3.

The results for our other models, however, was not as foreseeable, as can be seen in Tables 4 and 5. The interactive variable was not significant for gubernatorial, senatorial, or presidential elections. Furthermore, we tried to estimate last-day polls as a separate sub-sample, but the small number of polls for each election proved to produce results that were not robust.

These mixed results suggest two possible solutions: correcting for some sort of misspecification in our models, whether due to omitted variable bias or incorrect functional form, and the future incorporation of Bayesian modeling, which would be better able to deal with smaller numbers of observations.

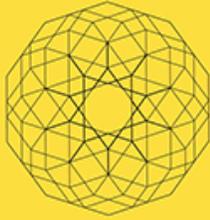
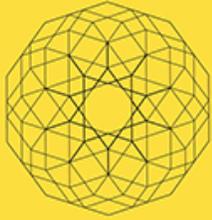


Table 3: Hierarchical linear model results, unstructured covariance

	Model 1: Mayor	
	<i>Coefficient (std. error)</i>	<i>Z-score</i>
Undecided Voters	0.013[0.028]	0.48
SDExpenses	-0.171[0.139]	-1.23
Und_Exp	0.03[0.013]	3.12
DaysBefore	0.098[0.012]	8.15
Landslide	-0.549[0.265]	-2.08
Poverty	-0.005[0.0132]	-0.34
CandNr	-0.079[0.058]	-1.37
Round2	-0.14[0.384]	-0.36
Constant	3.504[0.968]	3.62
	<i>Estimate (standard error)</i>	<i>[95% Confidence Interval]</i>
<i>Random-effects parameters</i>		
City: Identity		
Var(constant)	2.224[0.52]	[1.407, 3.517]
Var(residual)	7.482[0.381]	[6.771, 8.267]
<i>Wald chi-squared test</i>	155.36	
Prob>chi-squared	<0.001	
<i>LR test vs. linear regression: chi-squared</i>	67.38	
Prob> chi-bar-squared	<0.001	
Number of observations	901	



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Number of groups	127
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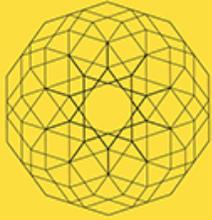


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Table 4: Hierarchical linear model results, unstructured covariance

	Model 1: Senator		Model 2: Governor	
	<i>Coefficient (std. error)</i>	<i>Z-score</i>	<i>Coefficient (std. error)</i>	<i>Z-score</i>
Undecided Voters	-0.051[0.019]	-2.7	0.139[0.035]	3.98
SDExpenses	-0.416[0.462]	-0.9	0.186[0.126]	1.48
Und_Exp	0.031[0.02]	1.54	-0.02[-0.009]	-2.25
DaysBefore	0.147[0.022]	6.61	0.119[0.014]	8.46
Landslide	-0.853[0.664]	-1.28	0.322[0.33]	0.98
Poverty	-0.32[0.074]	-4.34	0.006[0.02]	0.29
CandNr	-0.34[0.117]	-2.9	0.328[0.074]	4.44
Round2			0.71[0.519]	1.37
Constant	14.335[2.255]	6.36	-1.45[1.37]	-1.06
	<i>Estimate (standard error)</i>	<i>[95% Confidence Interval]</i>	<i>Estimate (standard error)</i>	<i>[95% Confidence Interval]</i>
<i>Random-effects parameters</i>				
State: Identity				
Var(constant)	7.6[2.619]	[3.867, 14.93]	1.758[0.576]	[0.925,3.343]
Var(residual)	11.308[0.895]	[9.683, 13.206]	8.015[0.456]	[7.169,8.96]
<i>Wald chi-squared test</i>	89.52		205.38	
Prob>chi-squared	<0.001		<0.001	
<i>LR test vs. linear regression: chi-squared</i>	87.36		95.42	
Prob> chi-bar-squared	<0.001		<0.001	
Number of observations	352		643	



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Number of groups	27	27
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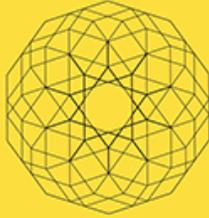


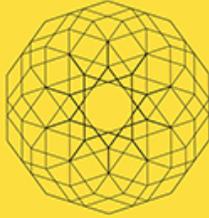
Table 5: Linear regression results, presidential polls

	Model 1	
	<i>Coefficient (std. error)</i>	<i>t-score</i>
Undecided Voters	0.412[0.097]	4.23
SDExpenses	2.449[2.268]	1.08
Und_Exp	0.174[0.164]	-1.07
DaysBefore	0.059[0.017]	3.52
Landslide	1.733[0.522]	3.32
Poverty	0.231[0.062]	3.75
CandNr	1.205[0.235]	5.13
Round2	6.167[1.321]	4.67
Constant	-23.236[3.938]	-5.9
	<i>Estimate</i>	
<i>F-score</i>	36.96	
Prob>F	<0.001	
<i>R-squared</i>	0.699	
Number of observations	153	

Future Research

This article can give us a glimpse at a research agenda with lots of promise for the future. That said, a considerable amount of work besides this conference paper remains to be done if we are to build on this work and make true advances. As a result, the authors plan to make several extensions to this work in the near future.

First, this body of research should incorporate a wider range of cases. This paper only used a limited set of elections over a limited set of time. Future work should incorporate polls on lower house elections, to the degree that they exist in the public domain, particularly given that



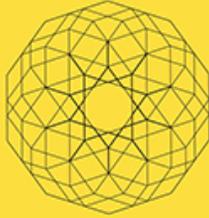
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they can shed light on differences in the *boca de urna* between majoritarian and proportional elections in Brazil.

Second, a wider range of data would also be helpful for this research agenda. Last-minute changes in voting could be due to other causes. Both Gramacho (2013) and El-Dash (2004), for example, delve into the different sampling methods used by polling firms in Brazil. 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 alternative argument.

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, *caixa dois* 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*. As a result, even though these figures are likely correlated with the true amounts of funds available to campaigns, it is a very imperfect, although useful, measure. Any other data that could measure things that could affect voting distributions while remaining invisible to polls would be helpful for supplementing this research.

As an example, given the number of political candidates who are also doctors, privileged access to health care, including sterilization procedures, is often promised in return for votes (Caetano and Potter 2004). If data on elective medical procedures such as sterilization became



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available, increases in them just before or just after elections could be used to explain polling errors that might otherwise be difficult to explain.

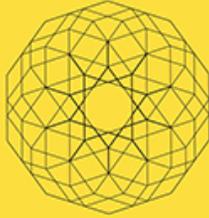
Third, alternate models and measures would be useful for testing the robustness of the claims in this paper. The small number of last-day polls available makes modeling them with hierarchical models difficult in a frequentist framework. Perhaps a Bayesian framework would be more effective at modeling these small-*n* subsamples.

It would also be useful to try other measures and specifications. For instance, how do results change when campaigns' incomes are used to measure their capabilities to conduct *boca de urna* campaigns? Is there a way to measure campaigns which are known to use *caixa dois* funds, and might that make a difference? Candidate-level variables could also be included: for instance, do certain parties consistently have their vote totals under- or overestimated? What about certain polling firms—do they have built-in biases? What about more second-level variables, such as state- and municipal-level measures of political knowledge or abstention rates? This matter is especially important because we noticed that there was a large degree of unexplained variance at the second level of our models.

These are questions worth pursuing in order to test the integrity of our model, and thereby our argument.

Conclusion

In conclusion, this paper attempts to develop and test the argument that illegal last-minute campaigning is in part responsible for elevated levels of polling error in Brazil. Using a



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quantitative approach to answer a question that came from qualitative fieldwork during the 2014 election, our paper shows that polling error in Brazil is sometimes correlated with numbers of undecided voters and financial imbalances between campaigns. This finding implies that higher levels of polling error in Brazil could be systematically related to the practice of vote buying just before the elections.

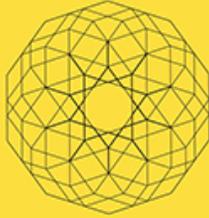
Our results could be only a first step, but a more refined and methodologically sophisticated approach like this could lead political behaviorists to an exciting new avenue of research. Vote buying has often been approached as unmeasurable in the context of political behavior and elections. We hope to show, with both this and future iterations of this work, that one can measure importa

nt influences on voting behavior, even if they are not traditionally taken into account in electoral polling.



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