

Casting ballots when knowing results

Bandwagon and disillusioned voting in a real-world setting*

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December, 2019

Abstract

For decades, scholars have observed that late voters' exposure to the preferences of early voters' results in "bandwagon" in favor of the predicted winner. Yet, the mechanisms underpinning such relationship remain unclear: Do bandwagon effects emerge because of vote-switching in favor of the predicted winner or the abstention of voters who preferred the predicted loser?—Exploiting a unique quasi-experimental setting that took place during Brazil's 2018 presidential elections, we improve causal estimations of the impact of information on a high-stakes election with a compulsory voting system. We find that information impacts voters differently, depending on their prior preferences: When constituencies favor the predicted winner, information motivates vote-shifting for the front-runner; conversely, when constituencies' preferences are at odds with the predicted winner, information leads voters to migrate away from the predicted loser, resulting in vote dispersion. These dynamics have significant institutional and normative implications.

Keywords: Bandwagon; voting behavior; sequential elections; quasi-experiment; Brazil

*We are thankful to Acir Almeida, Néstor Castañeda, David Doyle, Florian Foos, Fabrizio Gilardi, Fernando Limongi, Thiago Silva, and Cesar Zucco for their helpful comments and suggestions. We also benefited from helpful questions and feedback from participants from seminars at King's College London and the London School of Economics. All the remaining errors are our entire responsibility.

First, it's absurd, right? Queuing for four hours to vote. But I think the worst part was to vote knowing about the results. Man, I got desperate. There were some people in queue who had gone to school with me, everyone was desperate, like, without knowing what to do, who to vote for. [...] Like, I swear, I was shaking when voting. I was shaking. It was 10 minutes of desperation. Everyone talking to me on Instagram. How come Bolsonaro will win in the first round [of elections]? Like, [he has] 49% [of the votes], for Christ's sake. Seriously, it was exasperating.

In a WhatsApp audio message,¹ this is how a young voter described her state of mind before voting in the first round of the 2018 Brazilian elections. Her description is aligned with something political scientists have investigated for decades: How does access to knowledge of early voters' preferences impact the decisions of late voters?

Especially since the 1980s, scholars have dedicated a large body of work to examining whether electoral information made available on election day—through exit polls or leaked results—impact voters' decisions. In particular, prominent cases profiling the alleged influence of East Coast polls on West Coast voter behavior have led this scholarship to flourish among U.S. scholars (e.g., Dubois, 1983; Jackson, 1983; Leonardo, 1983; Kenney and Rice, 1994; Best and Krueger, 2012).

The potential impact of the revealed preferences of early voters on the decisions of late voters is an increasingly salient inquiry to other countries, even those with single time zones (Bale, 2002; Morton and Ou, 2015). For example, in a recent case in Germany, early polls released through social media have arguably influenced later voters (BBC, 2019). Reasonably, the rising role of new technologies in speeding-up processes of information sharing makes the topic a relevant one for all democracies (Thompson, 2004). Despite this, the literature remains theoretically inconclusive and empirically limited.

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Theoretically, a core finding has been that information about who is predicted to win and lose elections motivates bandwagon voting that benefits the front-runner. However, scholarship diverges on whether observable bandwagon effects emerge because access to information leads some voters to shift their support to the predicted winner (e.g., Anderson and Holt, 1997; Hung and Plott, 2001; Morton et al., 2015; Van der Meer et al., 2015), or because it drives-up levels of participation among predicted winner's core supporters while depressing turnout among disillusioned voters (e.g., Battaglini, 2005; Agranov et al., 2018; Duffy and Tavits, 2008; Großer and Schram, 2010).

Disentangling between these two underlying mechanisms has proven difficult (Morton and Ou, 2015). In naturally-occurring elections, it has only been possible to examine the effect of information on voter behavior within a single election but across constituencies (e.g., Carpini, 1984; Meredith and Malhotra, 2011), or within the same constituencies but across different elections (Morton et al., 2015). Due to these limitations, much of the existing findings have derived from laboratory experiments seeking to replicate electoral conditions (e.g., Agranov et al., 2018; Morton and Ou, 2015; Battaglini et al., 2007; Battaglini, 2005; Anderson and Holt, 1997).

In other words, while existing studies have made impressive strides to examine the implications of sequential voting, limitations imposed by the conditions of previously examined elections have meant that the scholarship has yet to provide precise estimations for the effect of information on voter behavior under natural electoral conditions (i.e., when the stakes are high). Recently, this opportunity emerged during the first round of the Brazilian elections—a situation that allows us to make significant theoretical and empirical contributions to the existing scholarship.

In 2018, for the first time in history, fingerprints were used as the main form of identification for 73.6 million voters—more than half of Brazil’s electorate of 147.3 million people. Technical glitches associated with the use of the newly introduced biometric voter identification technology caused delays in voting processes, leading some voters to cast ballots after the release of the first official vote tallies. In other words, variation in delays in some polling stations meant that some voters from the same constituencies (and even the same stations) voted under completely different conditions of information exposure.

This setting, combined with the institutional set-up of Brazilian elections and the level of detail of official electoral data, allow us to move beyond existing research by: 1) Expanding tests of the existing scholarship to an election where it is possible to estimate vote shifting while taking note of turnout rates; and, 2) Accounting for exogenous variation *within* and *across* constituencies during a *single election*—and, in so doing, significantly improving on existing causal identification strategies of bandwagon effects in an electoral setting.

Employing this quasi-experimental approach, we find strong support for the existing notion that access to knowledge of early voters’ preferences impacts the behavior of late voters. Refining existing studies, we also show that information exposure results in clear winners and losers and leads voters to respond in heterogeneous ways. Specifically, we show that bandwagon effects only emerge where voter preferences are ideologically aligned with that of the predicted winner.

More precisely, we find that support for Jair Bolsonaro, the far-right candidate and front-runner, increased by an average of 8 percentage points (pp) in regions where he polled well (and, crucially, where his main opponent had the highest rejection rates). However, where his main opponent, Fernando Haddad, was the estimated favorite (and Bolsonaro had high

rejection rates), access to information about Bolsonaro’s lead did not result in vote-shifting in his favor. Instead, reported results showing their preferred candidate polling behind, *depressed* voter support for both front-runners—including the regional favorite, Haddad—and also led to statistically significant increases in blank and invalid votes. In other words, our findings suggest that aggregate bandwagon effects emerge from the shifting of votes in favor of the front-runner and the abandonment of the losing candidate—even when controlling for turnout. These findings provide theoretical nuance to the existing scholarship on the psychological mechanisms underpinning voting behavior and have important institutional and normative implications.

The current article proceeds as following. First, we provide a brief summary of the existing literature. We then introduce the case of Brazil and formalize our hypotheses. In the third part of the paper, we describe our quasi-experimental setting and detail our empirical strategy. Our main section follows, where we present our results and discuss how our findings contribute to our understanding of the psychological underpinnings of voter behavior. Finally, we summarize our findings, discuss their implications, and propose future avenues for research.

Information exposure and “bandwagon” voting

Since Duverger’s work on the mechanical and psychological mechanisms that drive electoral outcomes (Duverger, 1954), generations of political scientists have sought to better understand the factors that shape voter decisions.² Key to the psychological underpinnings of

²Although it is worth highlighting that scholars have been debating the merits of bandwagon voting theories at least since the 1940s (Gallup and Rae, 1940).

voter behavior is the notion that individuals' assessments of the the extent to which their votes "count" shape their decisions (Cox, 1997). That is to say, when making choices about for whom to vote, individuals tend to consider how the ideological proximity and electoral viability of available candidates maximize the chances that, if they choose to undergo the costs of voting, their votes are not "wasted" (e.g., Downs, 1957; Gartner, 1976; Agranov et al., 2018).

Even when candidate options and voters' ideological preferences are taken as given, perceptions of candidates' electoral prospects may still impact voter choices. Put differently, access to information give individuals an opportunity to update their knowledge about candidates' chances of election and adapt their voting choices accordingly. Exposure to information is thus a key piece to understanding voter behavior.

Political scientists and economists have known this for many decades, producing a large body of work to explore how information shapes voters' decision-making in elections. Amidst this vast literature, an important finding is that exposure to information about candidates' electoral prospects leads to a "bandwagon" effect in favor of the predicted winner (e.g., Simon, 1954; Zech, 1975; Gartner, 1976; Bartels, 1988; Grillo, 2017).³

Voters' access to information about candidates' electoral prospects may take many forms. Commonly, media coverage and pre-electoral polls offer voters cues about candidates' expected performances (Simon, 1954; Schmitt-Beck, 1996; Moy and Rinke, 2012). Furthermore, electoral rules that make elections sequential, such as primaries or runoffs, also give voters knowledge about candidates' performance in a first race, allowing them to make estimations about candidates' potential in subsequent races (Bartels, 1988; Morton and Williams, 1999).

³As the scholarship contends, this effect could be driven by various types of psychological motivations, including the use of information about others' preferences as a sign of the predicted winner's higher competence; individuals' desire to be associated with winners; or altruism (Barnfield, 2019; Kenney and Rice, 1994).

In other words, voters' opportunities for information exposure is not uncommon. While such contexts have been associated with bandwagon effects, information about candidates' electoral viability disseminated in pre-electoral periods is still predictive—and, thus, imperfect (Blais et al., 2011; Cox, 1997; Barnfield, 2019).

Increasingly, however, new information about candidates' electoral prospects—via leaked exit polls, for example—emerge *while elections are taking place and voters can still cast ballots*. These instances are different from the others mentioned above in significant ways. First, these are cases of otherwise simultaneous elections that only become sequential as a result of the unanticipated dissemination of information. Second, the information released in these circumstances is more precise than in the aforementioned ones and reveal the *actual* choices of early voters. As such, when electoral results become available while elections are still taking place, the actions of early decision-makers can influence the behavior of those making choices later (e.g. Battaglini, 2005; Battaglini et al., 2007; Thompson, 2004).

Historically, scenarios prompting sequential voting in technically simultaneous elections have been more common in countries with multiple time zones, where polls close in some parts of the country while remaining open in others. In this regard, the 1980 U.S. presidential race between Reagan and Carter is perhaps the most notorious: Carter conceded to Reagan based on media coverage of East Coast results, but polls had not yet closed in the West—something that has been associated with lower turnout and support rates for Democrats also in Western congressional races (e.g., Carpini, 1984; Dubois, 1983).⁴

Although the literature on bandwagon voting is vast, the scholarship remains inconclusive about the mechanisms underpinning observed effects in favor of the predicted winner

⁴Some scholars have challenged these findings based on data quality and model specifications (see: Morton et al., 2015).

(Morton and Ou, 2015; Grillo, 2017; Barnfield, 2019): While a number of authors emphasize that individuals' tendency to align themselves with the winner is a result of voters' decisions to shift their votes (e.g., Anderson and Holt, 1997; Hung and Plott, 2001; Morton et al., 2015; van Kippersluis and Rietveld, 2018), others have argued that voters do not change their preferences, but, instead, are more likely to undergo the costs of voting if their preferred candidate is expected to win (e.g., Battaglini, 2005; Agranov et al., 2018; Großer and Schram, 2010; Grillo, 2017).⁵

Beyond providing expectations for turnout based on voters' priors, this latter type of explanation also makes a crucial distinction: Exposure to information may impact voters differently depending on whether it places their preferred candidate as a winner or loser (Grillo, 2017). In fact, contextual factors—including the closeness of elections and voters' priorities—have been deemed crucial factors shaping whether exposure to information results in bandwagon voting or not (e.g., Fleitas, 1971; Levine and Palfrey, 2007; Rich, 2015). This is consistent with findings that voters' perceptions of the extent to which their votes “count” shape their participation, with those whose votes are non-pivotal being less likely to participate (Duffy and Tavits, 2008). That is to say, exposure to information not only gives voters cues about their preferred candidates' electoral viability, but also of whether their own votes could meaningfully impact these prospects.

⁵Although some authors have also found evidence of “underdog effects,” where there are higher rates of turnout among voters supporting minority candidates (Palfrey and Rosenthal, 1983; Börgers, 2004; Levine and Palfrey, 2007).

The case of Brazil

With 35 registered parties, 28 of which attained congressional seats in the 2014 elections, Brazil stands as one of the most highly fragmented party systems in the world (Vaz de Melo, 2015; Power and Rodrigues-Silveira, 2019). Despite high party fragmentation, recent democratic history indicated the stability of a bi-partisan norm in presidential races, with candidates from the center-left *Partido dos Trabalhadores* (Worker's Party, PT) and center-right *Partido da Social Democracia Brasileira* (Brazilian Social Democratic Party, PSDB) generally competing for the country's highest office (Melo, 2015; Limongi and Guarnieri, 2015).

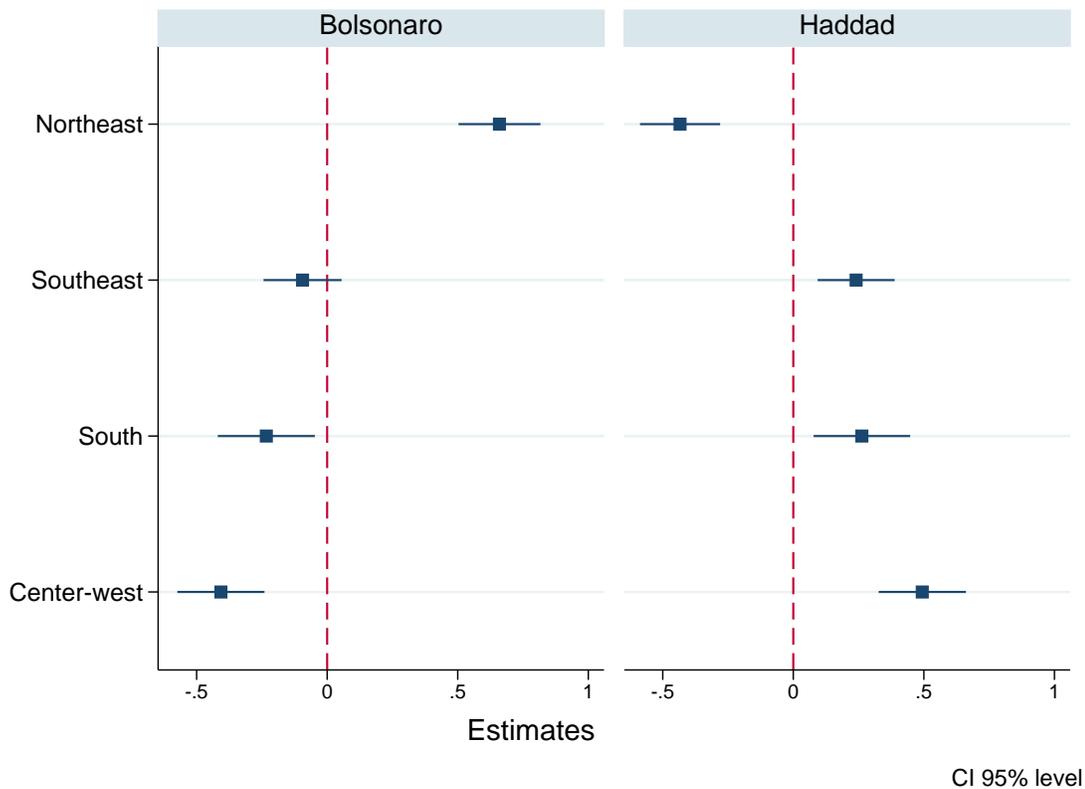
Especially since 2006, a regional divide emerged around these two parties, with the Northeast becoming the PT's major supporter in presidential races (Alves and Hunter, 2017; Zucco, 2008; Hunter and Power, 2010). As shown in Online Appendices A-C, since 2006, the PT has consolidated electoral support in the Northeast—a pattern that remains even when controlling for other individual-level voter characteristics. By contrast, we observe non-significant results for the South, Southeast, and Center-West regions. That is to say, since 2006 patterns of voting preferences in Brazil are regional and largely determined by voters' geographic location.

In 2018, the Brazilian general elections took place under contentious times, following the impeachment of Dilma Rousseff in 2016 and growing levels of voter distrust in traditional parties and political elites (Winters and Weitz-Shapiro, 2014; Hunter and Power, 2019). In the months preceding the October elections, increasing levels of polarization showed signs that the PT vs. PSDB race (to which voters had become accustomed) might not repeat itself in 2018.

As the pre-electoral period unfolded, a replay of what had become a “traditional” race

became increasingly unlikely: Polls suggested the PSDB candidate, Geraldo Alckmin, to be highly unpopular; meanwhile, the imprisonment of PT’s leader, former president Luiz Inácio Lula da Silva, meant that he had to be substituted for Fernando Haddad, a name that did not seem to inspire voters to overlook the PT’s recent failures and regain trust in the party (Hunter and Power, 2019).

Figure 1: Predicted rejection of main presidential candidates, Bolsonaro (PSL) and Haddad (PT), by region (2018)



Note: Compiled by authors with nationally-representative opinion poll data collected by DATAFOLHA on 06 October 2018, one day before the first round of the 2018 presidential elections (N = 18,745), to generate logit estimates with robust standard errors. The unit of analysis individual respondents. Our dependent variable takes a value 1 if an individual has declared s/he would never support Haddad/Bolsonaro in the presidential election and a value of 0 otherwise. Models for each candidate include the following individual-level controls: Age, sex, income, schooling, income, employment status, and the size of the municipality. The North region (omitted) is the reference category in our estimates.

At the same time, the growing popularity of far-right candidate Jair Bolsonaro, from *Partido Social Liberal* (Social Liberal Party, PSL)—a party that had secured only one seat in the

Chamber of Deputies just four years prior—indicated voters’ support for new leadership. While throughout the electoral campaign Bolsonaro and Haddad maintained the lead, they also retained the highest levels of voter rejection. This meant that, for many voters, keeping Bolsonaro or Haddad (i.e., the PT) out of office was the main goal (Hunter and Power, 2019).

As Figure 1 shows, on the day before the 2018 elections, there was a clear regional pattern of rejection for the two presidential front-runners. Notably, the predicted rejection of Bolsonaro (PSL) was substantively and statistically significantly higher in the Northeast than in other Brazilian regions (CI 95% level), even when controlling for individual-level covariates. In contrast, Haddad (PT) had the lowest rejection rates in this same region. As others have argued, “anti-partisanship” in Brazil (particularly anti-PT partisanship) has become a more salient form of voter identification than partisan attachment (Samuels and Zucco, 2018). In other words, although Bolsonaro’s popularity disturbed the “traditional” dynamics of Brazil’s presidential elections, voters’ electoral preferences continued to differ across regional boundaries in 2018, reflecting the Northeast’s tendency to support the PT and of other parts of the country to strongly oppose the party.

In Brazil’s highly fragmented party system, multiple parties tend to present presidential candidates. If in the first round of elections none of the candidates is able to attain 50% (plus one) of the valid votes, the two candidates that receive the most votes compete in a second round. Although majoritarian in nature, the first round of elections grant voters the opportunity to signal their ideological preferences by casting a vote to a candidate closer to their ideological preferences—as a consequence, increasing the number of competitive candidates (Duverger, 1954; Fujiwara, 2011). In times of polarization where keeping a party out of office may be more important than electing a specific candidate, however, the first

round of elections could also provide voters the opportunity to coordinate (Bouton et al., 2019) to prevent their least desired (rather than their preferred) outcome—a logic that would likely reinforce binary polarization.

Casting ballots when knowing results

Brazilian electoral regulation establishes that throughout the country, polls officially close at 17:00 local time. Due to being home to three time zones, regulations also stipulate that vote tallies can only start being released after the polls officially close in the last time zone, Zone 5 (encompassing the state of Acre and a small portion of Amazonas state). In practice, this regulation sought to protect voters in all time zones from gaining knowledge about others regions' electoral preferences. That is, because vote tallies can only be released after polls officially close in Zone 5, voters in Zones 4 and 3 can only possibly be exposed to electoral results if they experience delays in voting of at least one hour in Zone 4 states⁶ and two hours in Zone 3 states.⁷

Severe delays in voting have traditionally been an unlikely prospect: In Brazil's modern democratic history, a number of electoral institutions have been put in place to facilitate the exercise of compulsory voting.⁸ Setting elections for a Sunday; assigning voters to electoral stations close to their registered residencies; limiting the number of voters per assigned station; and, digitizing the voting experience through the use of electronic machines, have

⁶The Northern states of Amazonas, Rondônia, and Roraima, as well as the Center-West states of Goiás, Mato Grosso, Mato Grosso do Sul, Distrito Federal.

⁷The Northern states of Pará, and Amapá, the Northeastern states of Maranhão, Piauí, Ceará, Rio Grande do Norte, Pernambunco, Paraíba, Sergipe, Alagoas, and Bahia; the Southeastern states of São Paulo, Rio de Janeiro, Espírito Santo, and Minas Gerais; and the Southern states of Paraná, Rio Grande do Sul, and Santa Catarina.

⁸Although voting is compulsory in Brazil, abstention remains an option from which voters can choose (Cepaluni and Hidalgo, 2016). This is further discussed in Online Appendix X.

generally meant that for Brazilian voters, exercising their citizenship right (and obligation) was not a time-consuming or laborious affair (Nicolau, 2012).

Put differently, regulation establishing that the release of official results could only begin after the closing of polls in Zone 5 worked well in the past: Elections were carried out efficiently and 1 and 2 hour differences across time zones ensured that voters from other regions of the country were done casting ballots before the official closing of elections in Zone 5—when the release of vote tallies began.

In 2018, however, this was not the case. In this occasion, the use of fingerprints as a form of identification became mandatory for 73.6 million voters from 2,793 Brazilian municipalities (50.3% of the electorate).⁹ As explained by the Superior Electoral Tribunal (TSE), the employment of biometrics was meant to reduce “human intervention” in the electoral process and prevent fraud that could arise from an individual impersonating another, or errors in voter registration that had previously created duplicate voting IDs for a single individual (Clavery, 2018). Ironically, although the system was meant to improve the quality of elections, technical difficulties in its implementation might have (inadvertently) influenced electoral results. This is because while the innovation did not cause disturbances in some voting stations, technical problems related to the identification of voters using fingerprint readers caused considerable delays in many others.

As explained by Giuseppe Dutra Janino, Head to the Secretariat for Information Technology of the TSE, technical errors happened when there were physical problems with the machines,¹⁰ or, more often, when reading voters’ fingerprints took more than one try—a problem that emerged not only due to staff misplacing voters’ fingers on the machines, but also

⁹The system was also available (but not mandatory) in another 1,533 municipalities, thus covering a total of 77.7% municipalities and 59% of the electorate.

¹⁰See Online Appendix D for the machine used for fingerprint reading.

as a result of inappropriate collection of biometrics data in the period preceding the election (Clavery, 2018).¹¹ Overall, technical problems meant that voters assigned to stations employing the system were significantly more likely to face delays and vote after 19:00 Brasília-time, when the Brazilian Superior Tribunal (TSE) officially started disseminating election results.¹² Consequently, voters who got to the polls after the elections' official closing time were plausibly better informed about predicted electoral outcomes than those who voted earlier.

The exposure of late voters to information about early voters' preferences is a particularly reasonable scenario in Brazil: While in many other countries late voters may be influenced by exit polls, in Brazil, the use of electronic voting machines means that electoral results are calculated quickly and start being publicly released immediately after the official closing time of polls in Zone 5. To give an idea of what this means, when vote tallies started being released at 19:00 in Brasília, more than 65 million votes (44% of total votes) had already been computed.

Furthermore, the role of technology and widespread dissemination of information through mobile-phone messaging systems and apps was a key characteristic of the 2018 electoral period (Resende et al., 2018; Machado et al., 2018). This is not surprising given that roughly 60% of Brazilian adults own smartphones and Brazil currently ranks 5th in the world in respect of number of hours spent on smartphones and 3rd in hours spent in communication apps (most

¹¹To expedite the use of biometrics as a form of voter identification, the TSE operated a data sharing scheme with other government institutions. In practice, this meant that the collection of voters' fingerprints was not all completed by the TSE (and respective regional institutions) for voter identification purposes, but also by other government authorities that issue ID cards (such as state transit departments, Detran) and whose main objective when collecting fingerprints is not their use as a recurrent form of identification (Mendonça and Albernaz, 2018).

¹²We use "official closing time" to refer to established election hours, not the time of the last vote cast in a given machine. In other words, voters who arrived at their assigned voting stations before said station's official closing time were guaranteed their right to cast a ballot, even if they had to stay in queue and only managed to reach voting machines well-past their station's official closing time. As such, the actual (i.e., recorded) time of closure of specific voting machines can be considerably later than their "official closing time."

notably WhatsApp, Facebook, and Instagram).¹³ In other words, electronic voting and the rapid release of electoral results by electoral authorities, combined Brazilians' extensive reliance on mobile messaging systems and apps to disseminate elections-related information, mean that it is highly plausible that individuals still waiting in queue when electoral results were released would have quickly become knowledgeable about candidates' performances on the polls.

When results started being announced, Bolsonaro had 48.83% of the counted valid votes¹⁴—just 1.17% short of reaching the 50% (plus one vote) required to win on the first round. The second runner-up, PT's Fernando Haddad, came 22.75 pp behind, with 26.08% of the valid votes. Throughout the counting (and announcement) of votes, Bolsonaro led by a wide margin of at least 16.45 pp (Grandin et al., 2018).

Hypotheses

Overwhelmingly, the existing scholarship on sequential voting has emerged from U.S. elections¹⁵ or similarly structured laboratory experiments, where abstention is widespread and races between two parties are the mode. Examining bandwagon voting in the context of a multi-party system with compulsory voting may lead to new theoretical insights.

Traditionally, in highly fragmented multi-party systems, runoff elections give voters the opportunity of selecting a candidate closer to their ideological preferences, signalling their support for a non-majoritarian policy agenda. For instance, in 2018, 13 candidates from different parties ran for president in Brazil. Yet, in a context where bipolar rejection rates

¹³For more details, see Lopez (2019).

¹⁴"Valid votes" account for votes cast for a specific candidate and thus exclude "blank" or null" votes.

¹⁵Although exceptions of studies on other countries include Studlar and McAllister (1991), Morton et al. (2015), and van Kippersluis and Rietveld (2018)

may be higher than partisan support, access to information may reinforce bi-polarization (Studlar and McAllister, 1991) and create incentives for voters to revise their decisions in heterogeneous ways.

That is to say, when voters' main goal is to keep one of two candidates out of office, gaining knowledge of electoral results creates clear winners and losers. More specifically, in these contexts, information about another candidate's lead may provide cues about candidates' respective levels of electoral capital and likelihood of winning against voters' least preferred option. Put simply, when a predicted winner is more closely aligned with voters' preferences, information exposure may drive vote shifting in his favor.¹⁶ Meanwhile, information about a candidate's electoral advantage may result in disillusionment among voters whose main goal is to keep said candidate out of office—particularly when voters' deem that their own preferred candidate is unable to “catch up” and all other options also seem electorally inviable. Formally, we hypothesize that:

- **H1:** Among voters whose preferences are proximal to the front-runner's and distant from the runner-up, access to information results in “bandwagon voting”: Increasing votes for the predicted winner by abandoning other options and concentrating support for a single candidate.

In the case of Brazil's 2018 elections, this translates into our expectation that Bolsonaro's lead should have given him a boost among late voters that highly reject the PT's candidates (i.e., those located in regions outside the Northeast); a process that is expected to have motivated voters to shift their preferences in Bolsonaro's favor and to increase the possibility of him beating the PT in the first round.

¹⁶As Van der Meer et al. (2015) argue, vote-switching to the predicted winner is more likely among “voters who support candidates with similar characteristics rather than ideological opposites.”

- **H2:** Among voters whose preferences are proximal to the runner-up and distant from the predicted winner, access to information results in “disillusioned voting”: Decreasing votes for the predicted loser and dispersing support across different options.

Taking account of the electoral context, we expect that exposure to information signaled to PT constituents/anti-Bolsonaro voters that their votes were no longer pivotal (i.e., would not change electoral results). As such, upon learning about Bolsonaro’s wide advantage over Haddad and the inviability of all other candidates,¹⁷ PT constituents (concentrated in the Northeast) should have experienced disillusionment, decreasing electoral support for Haddad and dispersing their votes.

Empirical strategy

Given limitations imposed by other methods to make causal claims, many scholars have employed laboratory experiments (e.g., Agranov et al., 2018; Morton and Ou, 2015; Battaglini et al., 2007; Battaglini, 2005; Anderson and Holt, 1997; Fleitas, 1971) to estimate bandwagon effects. Through randomized controlled trials, researchers can improve causal estimations by creating reliable comparison units. The method, however, yields low external validity: Simulations tend to take place in unrealistic settings that cannot replicate the stakes of elections (even when financial incentives are offered) and are most commonly carried out among homogeneous groups of participants (generally university students).

In the current article, we take an additional step towards enhancing existing causal identification strategies by employing data from a single (and real) election to examine the impact

¹⁷When electoral results started being released, the third runner-up, Ciro Gomes, polled roughly 13.5 pp behind Haddad (BBC, 2018; Estadão, 2018).

of information exposure on voter behavior. A key advantage of this approach is its high external validity since we rely on real-world settings. Furthermore, unlike previous studies (e.g. Studlar and McAllister, 1991; Meredith and Malhotra, 2011; Morton et al., 2015) that have relied on information exposure across units (e.g., constituencies, elections or points in time)¹⁸, we exploit an unique source of exogenous variation within the same constituencies.

Biometrics and late voters

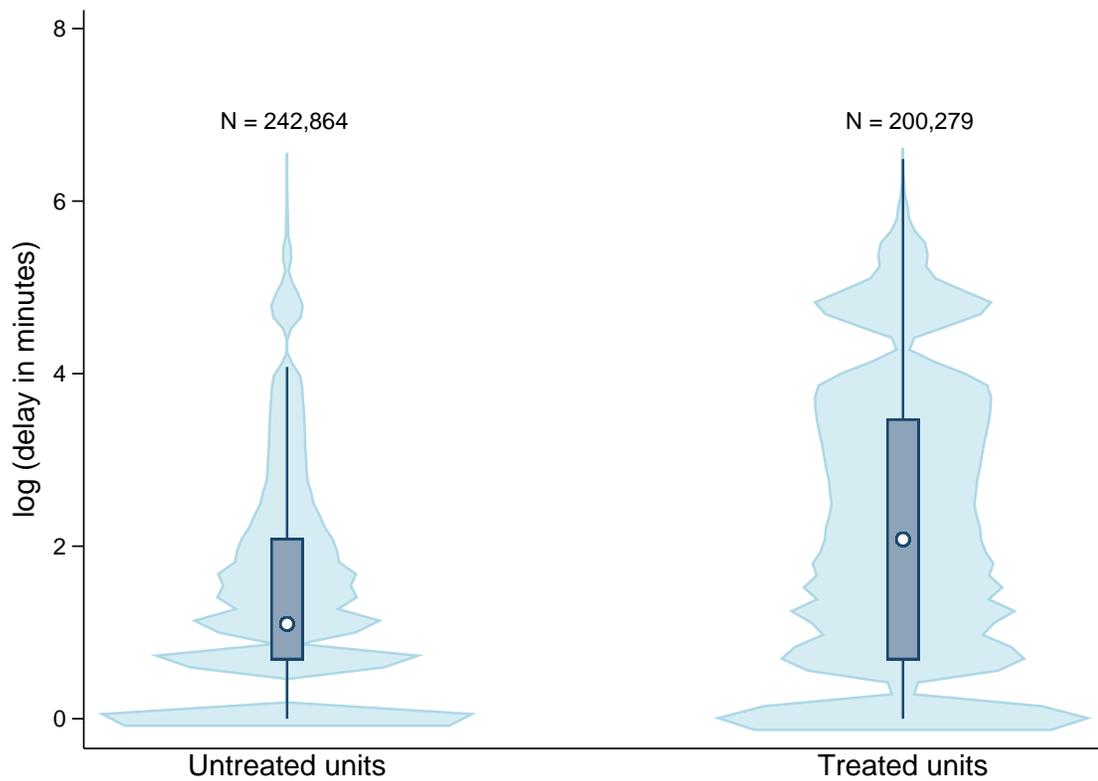
We identify treated units as voting machines located in stations where the biometrics system was used as the main form of voter identification. Specifically, we distinguish between voting machines where this form of identification was mandatory (N = 200,292), voluntary (N = 237,881), or not available (N = 4,991). By construct, stations where the use of biometrics was “voluntary” are different from those where the system was obligatory since it is possible that the non-compulsory employment of the system led electoral staff to suspend its use if experiencing technical problems. We thus consider voting machines located in stations where biometrics were “voluntary” as untreated. In other words, our treatment variable takes the value of 1 where the use of biometrics was mandatory and 0 otherwise.¹⁹ Using this definition, we identify 200,279 voting machines that were treated and 242,864 machines that remained untreated.

In stations where the biometrics system was not mandatory (i.e., untreated units), delays in voting machines were of, on average, only 10 minutes (SD = 28.7). As shown in Figure 2, delays in these units were overwhelmingly small—as indicated by a high concentration

¹⁸Something that raises questions about the potential influence of other sources of variation that are unrelated to bandwagon.

¹⁹To show that our results are not sensitive to this treatment decision, we also run our estimates with alternative treatment categorizations by considering different levels of the biometrics system coverage. Online Appendix E shows these alternative estimates.

Figure 2: Delay in voting machines with and without biometrics system (2018)



Note: Compiled by authors with data from the TSE. The unit of analysis in figure 2 is the voting machine. The y-axis is a natural logarithm transformation of delay (measured in minutes) in voting machines. The white circle is a marker for the median, the thick line shows the interquartile range with whiskers extending to the upper and lower adjacent values, while each group is overlaid with a density of the data.

of units at the bottom of the distribution—and likely occurred due to issues common to all elections, including the length of time individual voters took to cast their votes for all six offices, or the need to substitute voting machines that broke throughout the day (Mendonça and Albernaz, 2018). By contrast, treated voting machines closed, on average, more than 25 minutes (SD = 49.8) after their official closing times. Lengths of delays are also well distributed across treated units, which display a higher concentration of voting machines with long delays (the upper values)—a strong indication that these delays were a consequence of technical problems associated with the implementation of biometrics.

Data

In Brazil, voting is compulsory for citizens between the ages of 18 and 70 (and optional for those between 16 and 18, or over 70 years old), something that requires individuals to register with the electoral authorities. Once registered, voters are assigned to a specific voting locale and station (“seção”) that becomes their permanent voting place unless they change domiciles or the electoral authorities redesign voting distributions (e.g., due to demographic growth). Voting stations are a sub-division of a locale, meaning that a single locale is generally made up of several stations. For example, a locale could be a public school and a station could be a particular classroom within said public school. Depending on the number of voters assigned to a given station, it may also contain more than one voting machine.²⁰

The TSE’s systematic records of voter allocation into locales and stations, their tracking of voter presence in elections, as well as their recording of votes per voting machine, provide us with detailed data that are crucial to our empirical strategy. Particularly, official electoral

²⁰See: <https://www.tre-sc.jus.br/site/institucional/justica-eleitoral/divisao-administrativa/index.html>.

data include: 1) The number of voters assigned to vote in a given station; 2) The share of voters per station that were registered to use the biometrics system; 3) The number of voters registered to use biometrics in each station, but who had to use another form of identification due to technical problems; and, 4) The time of actual closure of each voting machine (i.e., when the last vote was cast). Together, these data allow us to identify the extent to which technical problems associated with the use of biometrics was responsible for causing voter delays and by how much.

Additionally, the data also provide information on the number of votes cast for each electoral option in each voting machine. This includes the number of votes cast for each of the 13 presidential candidates, as well as blank and null votes.²¹ Using this information, we derive four different outcome variables, namely: 1) Share of valid votes for Bolsonaro (PSL); 2) Share of valid votes for Haddad (PT); 3) Share of blank votes; and, 4) Share of null (i.e., invalid) votes cast per voting machine.

To capture exposure to information, we employ as our variable of interest a proxy for voting delays caused by problems in the implementation of biometrics. This measure corresponds to the number of people registered to be identified through biometrics in a given station, but for whom the system did not work (and had to be identified through other means instead).²² In other words, this variable is a direct measure of technical problems that resulted from the implementation of the system, and thus a proxy for delays that resulted from it. By using this variable we leverage on the delays caused by biometrics, a strategy that reduces the risk of deriving estimations based on other potential causes of delays.

These extremely granular data allow us to provide precise estimations for voting ma-

²¹Voters can cast null votes by selecting invalid candidate numbers, i.e., numbers that do not correspond to any candidate, and confirming their choice to vote for no one.

²²This variable ranges from 0 to 363, has a mean of 18 and a standard deviation of 18.6.

achines within the same constituencies (and even the same locales, i.e., a public school). Employing voting machines as our unit of analysis, we identify a total of 451,105 observations,²³ of which 6,899 (1.5%) continued open after the official closing of elections in all time zones (19:00 in Brasília).

Models

Using the previously described data, we employ a variety of model specifications to examine whether and how late voters' access to information about early voters' preferences affects their voting behavior. First, in Ordinary Least Squares (OLS) baseline models, we estimate the following equation:

$$Y_{it} = \beta_0 + x_{it}\beta + v_i + e_{it} \quad (1)$$

Where $x_{it}\beta$ is our proxy for technical problems caused by the implementation of biometrics and corresponds to the number of voters in a given station whose fingerprints were registered to be used as a form of voter identification, but for whom the system did not work. v_i is a municipality fixed effects term, and e_{it} denotes that our estimates standard errors are clustered at the voting station level to account for variation across voting machines located in the same stations.²⁴

Brazilian electoral authorities used non-random criteria to select municipalities to become early adopters of the biometrics system. To address this in our main models, we use the technical problems associated with the implementation of biometrics as a source of exogenous

²³Due to Acre being the last state to vote, even a one-minute delay in a voting station in Acre would place it after our cut-off point (19:00 in Brasília) so we exclude it from analysis.

²⁴For a descriptive summary of the variables we employ in all models, see Online Appendix F.

variation to predict the role of information exposure on voter behavior. More specifically, we estimate Local Average Treatment Effects (LATEs) by employing Two-Stage Least Squares (2SLS) regressions that take advantage of the quasi-experimental setting that the 2018 Brazilian elections offer: Continued voting after the release of electoral results, a unique situation prompted by the aforementioned technical problems.

We use our previously detailed proxy—the number of voters in a given station whose fingerprints were collected, but for whom the biometrics system did not work—to estimate unbiased coefficients in the second stage (reduced form) of our 2SLS regression models. We then use this variable to instrument the treatment—i.e., if treated with the biometrics system or not—in the first stage of our 2SLS estimate. Specifically, we run our models with 2SLS specifications to provide unbiased reduced form estimates. In a simultaneous-equation framework, we could write our model fit as:

$$Y_i = \beta_1 X_i + \beta_2 Z_i + U_i \quad (2)$$

$$Y_i = \pi_1 X_i + \pi_2 Z_i + V_i \quad (3)$$

Where Y_i is our electoral outcome variable for the i_{th} observation, X_i represents our instrument, Z_i represents the excluded exogenous regressors, and π_1 refers to the first-stage effect of the instrument. U_i and V_i are zero-mean error terms, and the correlations between U_i and the elements of V_i are presumably nonzero.

The validity of our causal claim relies on key assumptions, which we show that hold in the Online Appendix G, H, and I. First, more delays take place in voting stations that

have a higher concentration of biometrics voters. Second, there is a positive and statistically significant effect of the IV on the treatment in the first stage. Substantively, this result means that delays in voting stations were more likely to occur where the use of biometrics as a form of voter identification was mandatory. Third, we present evidence in favor of the exogeneity of our IV. Overall, these tests provide evidence to support that our IV affects the outcome only through the treatment variable.

Results

We begin by discussing results from our baseline estimations, derived from our OLS models. Given our heterogeneous expectations about the effects of information exposure on the Northeast (where we anticipate disillusioned voting) and other regions (where we anticipate bandwagon voting), we report separate models for the Northeast and other regions. Online Appendix J reports our results.

Our findings provide support for our heterogeneous regional expectations: Outside the Northeast, increases in the number of people who failed to vote using the biometrics system—a proxy that is associated with delays in voting and exposure to electoral results—is correlated with higher levels of electoral support for Bolsonaro, a finding that is consistent with our bandwagon voting hypothesis (H1). On the other hand, consistent with our hypothesis of disillusioned voting (H2), an increase in the likelihood of information exposure in the Northeast is also associated with higher numbers of blank and null votes in this region.

As a second step, we restrict our analysis only to voting stations treated with the biometrics system. Online Appendix J also shows consistent and statistically significant estimates

similar to those accounting for the whole sample.²⁵ In other words, our baseline OLS estimates provide support for bandwagon voting behavior only in regions where Bolsonaro was the preferred candidate. Although these OLS baseline estimates are informative, they could be biased since the biometrics system was not randomly implemented. To address this, we employ 2SLS models. In the next section, we discuss our main findings that derive from these estimates.

Main findings: The “widening funnel” effect

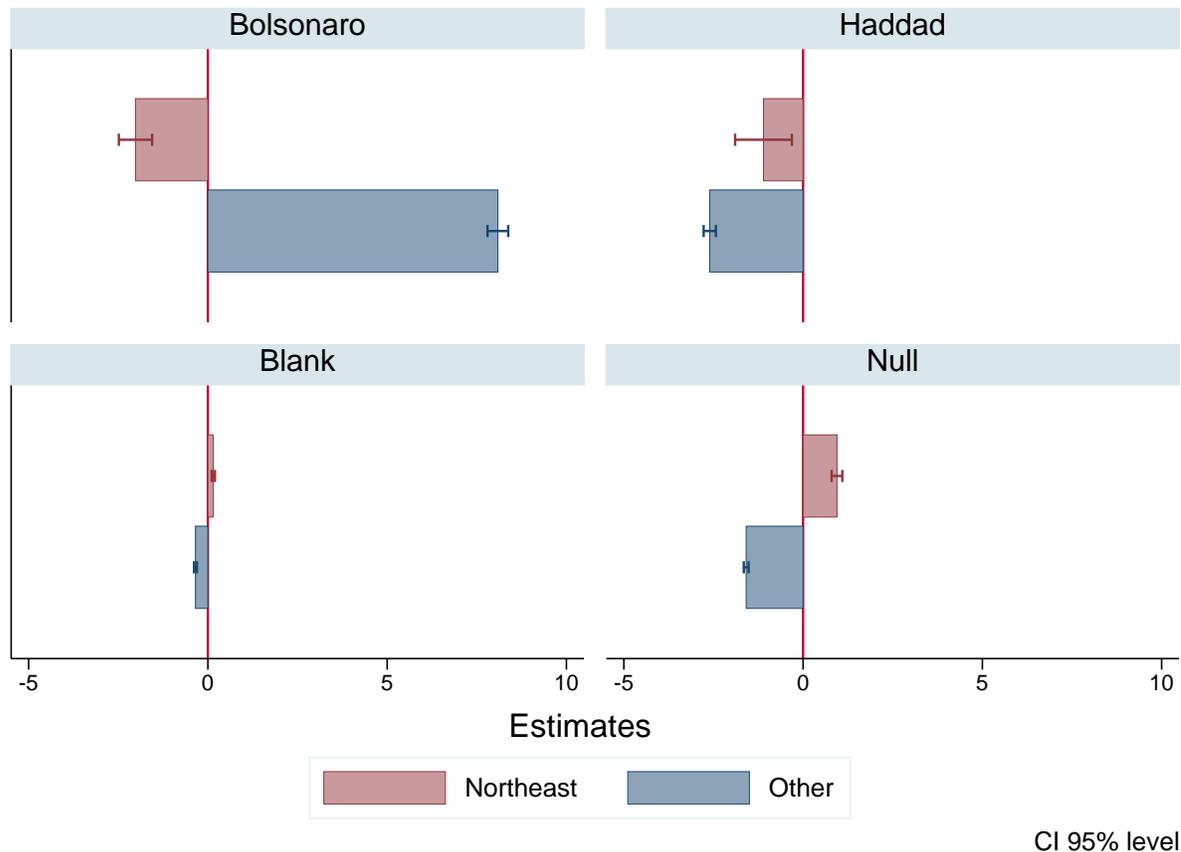
Figure 3 reports the results of our 2SLS estimates for our four dependent variables. In line with our expectations, for three of our four dependent variables, the reduced-form effect of the IV on our electoral outcomes produces coefficients in opposite directions for the Northeast and other regions. In other words, exposure to information led to “disillusionment” in the Northeast and to “bandwagon” voting in other regions, creating a “widening funnel” effect that distances the first and second front-runners from each other.

Specifically, the announcement of electoral results showing Bolsonaro’s lead gave him a boost of 8 pp among late voters outside of the Northeast—where voting intentions before the elections were in his favor and against his opponent (refer back to Figure 1). Evidence of “bandwagon voting” (H1) is strengthened by the coefficients of three of our other models: Outside of the Northeast, an increase in support for Bolsonaro among late voters was met with a decrease in support for Haddad (2.6 pp), as well as in lower numbers of blank (0.34 pp) and null (1.5 pp) votes—options generally employed by voters who are undecided,

²⁵Online Appendix J shows consistent and statistically significant estimates when we include a set of covariates.

find all candidates inadequate, or choose to cast a protest vote.²⁶ Together, these findings suggest that, influenced by information about electoral results, some voters abandoned their previous choices and concentrated their support on the predicted winner.

Figure 3: The effect of exposure to information on voting behavior in the 2018 Brazilian presidential elections, 2SLS reduced-form estimates



Note: The unit of analysis is voting machine (N = 451,105). Bolsonaro (PSL) = the percent of valid votes for Bolsonaro, from PSL; Haddad (PT) = the percent of valid votes for Haddad, from PT; Blank = the percent of blank votes; Null = the percent of null votes. Voting machines are located within voting stations (which may have more than one voting machine). Since voters are assigned to stations, rather than machines, technical problems take place at the voting station-level. Therefore, we cluster standard errors at the level of voting stations in our 2SLS estimates to account for variation within stations.

Conversely, however, in the Northeast, where the PT has traditionally held the greatest level of endorsement and Bolsonaro had the highest levels of rejection, the announcement

²⁶As Zucco and Nicolau (2016) have shown, however, null votes can sometimes also result from voters' inadvertent mistakes.

of Bolsonaro's lead resulted in behavior consistent with our disillusioned voter hypothesis (H2). As our estimates indicate, gaining information about a preferred candidate's loss depresses support (2 pp) for said candidate *even when individuals choose to undergo (or have already undergone) high costs of voting*, such as queuing for at least one hour (in Zone 4) or two hours (in Zone 3). As expected, voters' gained knowledge that their votes were no longer pivotal, resulted in the dispersion of votes in the Northeast—also decreasing support for the front-runner, Bolsonaro, and increasing blank (0.15 pp) and null (0.94 pp) votes.

Crucially, Bolsonaro's gains are considerably larger than the decreases in the shares of blank and null votes cast outside the Northeast, while, together, Haddad's and Bolsonaro's losses in the Northeast are not matched by equivalent increases in blank and null votes in the Northeast. This suggests that, in other regions of the country, Bolsonaro gained votes from individuals who would have otherwise supported other candidates (plausibly, including from individuals who planned to vote for Haddad), while Haddad and Bolsonaro lost votes to other candidates in the Northeast.

In short, our findings show that constituencies' preferences are a crucial factor mediating the impact of information on voter behavior. More specifically, when constituencies reject the second runner-up, information about the predicted winner's electoral performance over their least favorite option leads some late voters (who would have otherwise voted for other candidates or cast blank/null ballots) to migrate to the candidate who could plausibly win in the first round and displace their rejected candidate from the competition.

Conversely, when constituencies' preferences are at odds with the predicted winner, access to information about their preferred candidate leading far-behind leads some voters to disperse: Distancing themselves from the two front-runners—a result that possibly emerges

from voters' acceptance that their votes could no longer modify results, something that then allows them to signal their true preferences or disillusionment by casting blank/null votes.

To empirically distinguish between whether the bandwagon and disillusioned voting patterns we identify result from vote-shifting or turnout, we estimate model specifications that control for turnout. We also control for other potentially meaningful covariates for which we have information. These are: 1) The number of voters assigned to vote in each station; 2) The number of voters registered to use the biometrics system; and, 3) The delay (in minutes) of voting machine closure after 19:00 in Brasília. As we show in Online Appendix M, our results continue to hold when these controls are employed. As expected, it also shows that our effects are substantially larger in Zone 4, where there were likely more voters left to cast ballots when electoral results started being released and where electoral polls indicated lower rejection rates (and higher support) for Bolsonaro. These additional tests provide further support for our argument that both, bandwagon and disillusioned voting effects result from vote-shifting rather than different levels of turnout or resilience.

In sum, our findings concur with the existing scholarship that late voters' exposure to information about early voters' preferences shapes their electoral behavior in predictable ways, namely by benefiting early voters' preferred candidate. As we show, however, this advantage results not only from bandwagon voting in favor of the predicted winner, but is reinforced by depressing levels of support for the second runner-up, a consequence of voter disillusionment—processes that are conditioned by voters' prior preferences. Put differently, exposure to electoral results pushes groups of voters in different directions, generating a “widening funnel” effect that further distances the predicted winner from the predicted runner-up.

Conclusion

This article sought to assess whether and how gaining knowledge of electoral results affects voters behavior. Taking advantage of the unique quasi-experimental conditions under which the 2018 Brazilian presidential elections took place, as well as of the level of detail of official electoral data, we improve on existing causal identification strategies and provide the first assessment of the impact of information on the behavior of voters from within the same constituencies in a single election. Differently from existing studies, which have overwhelmingly covered U.S. elections, this article also tests previously identified theories on the case of Brazil: A highly polarized multi-party system with compulsory voting and runoff elections. The empirical strategy and case we employ thus enable us to make relevant theoretical and empirical contributions.

Employing a variety of model specifications, we consistently find that gaining access to information about the behavior of early voters considerably impacts the behavior of late voters. In a context of compulsory voting where candidates from various parties compete for support from the majority of the electorate or one of two places in the second-round, access to information on electoral results encourage vote-shifting in favor of the front-runner (H1) among constituencies where there is high support for the predicted winner (and high rejection for his opponent). Conversely, access to information leads to opposite effects in constituencies where the front-runner enjoys high rejection rates: Deflating support for the preferred (but losing) candidate and dispersing votes. In sum, effects in opposite directions further distance the first-placed candidate from the second runner-up in a “widening funnel” effect that strengthens the electoral advantage of early voters’ favorite.

These dynamics have significant institutional and normative implications. First, our find-

ings indicate that delays caused by technical problems associated with implementation of a new form of voter identification exposed voters to information that influenced their behavior. This prompts questions about the unanticipated consequences of institutional innovations. As Morton et al. (2015); Morton and Ou (2015) have argued, the effects of sequential voting on electoral behavior should be increasingly discussed, since the use of institutions that facilitate voter participation—such as convenience voting—is a growing trend with the potential to prompt more situations of information diffusion during elections. In the current article, we further this discussion by raising concerns about the implementation of technological innovations in elections.

We contend that although the total number of votes gained and lost as a result of information exposure would not change electoral outcomes, this is only the case because Brazilian electoral technologies and institutions are highly efficient²⁷; despite problems associated with the implementation of biometrics, the number of machines that remained open after electoral results began being announced would not be sufficient to alter electoral results at the national level. In other words, the effects we estimate in our models are local (as a consequence of our instrumental variable approach that estimates the local average treatment effect instead of an average treatment effect of treatment) and could have led to more serious substantive consequences if a greater number of units had been exposed to information, or if these technical problems had taken place in races with smaller electorates or guided by different rules.

Of course, our findings additionally have normative implications for democratic elections and institutions (Thompson, 2004). As other authors have posed (Morton et al., 2015;

²⁷Refer to Online Appendix L.

Battaglini, 2005; Battaglini et al., 2007), exposure to information gives early voters' preferences greater weight in elections. This may be particularly problematic in a country like Brazil, where voter preferences are regionally diverse. As technological innovations continue to increase the likelihood of information diffusion during elections, academics and practitioners should engage in greater discussions about the potential consequences of sequential voting to voter behavior and electoral integrity across different systems.

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