

Decision procedures and critical junctures:

the case of Brazil


MARCELO VELOSO MACIEL


*PhD Student, Department of Political Science, University of California, Irvine,
(mvmaciel@uci.edu)*


Every collective choice depends upon aggregation procedures, which differ in terms of normative attributes and which alternative they choose, even when holding constant the distribution of preferences they receive as input. The 2018 presidential election used a two-round system in Brazil but still elected an extremist candidate, Jair Messias Bolsonaro. Elections are critical moments for polyarchical systems, particularly under a shifting environment that threatens them with democratic backsliding. The paper empirically demonstrates that the elected president was neither a Condorcet nor a Borda winner. The Condorcet/Borda winner did not go to the second round, while the Condorcet loser did. Those concepts embody a generalized version of majoritarianism, which underlies most democratic regimes. Therefore, it shows that an extremist candidate was not the majoritarian choice and that two-round system failed to uphold majoritarian principles. Thus, the paper contests the majoritarian claim of legitimacy that elected extremist candidates tend to make use of while pushing for destabilizing moves within the political system. Furthermore, it considers possible alternative scenarios under different voting procedures and a feasible set of candidates, contributing to understanding a critical juncture in the democratic backsliding of a country.

Word Count: 3769

INTRODUCTION


The populist/extremist wave of recent years that hovers over polyarchical political systems is closely associated with cases of democratic backsliding¹, such as Hungary, Brazil, or even the EUA; and the constant fear of what can happen if extremist candidates finally get elected, given their current solid electoral prospects(Norris and Inglehart 2019). In Chile, for instance, a far-right candidate, Jose Kast, got 44% of the votes in the second round of 2021 presidential election  analogously, Marine Le Pen who is also considered a far-right candidate got 41% of the second-round French presidential elections. What democratic institutional arrangements would be more robust against such threats (Elster 2013)?

Bolsonaro's government in Brazil is, arguably, one of the main bastions of such a wave. Beyond the already measured impact in terms of lives, welfare, economic indicators, environmental destruction, and cultural standardization and polarization (Maria 2021; Ferrante and Fearnside 2019), his ongoing, continuous, forceful populist dismantling of the democratic tissue of the country is of a magnitude that will likely take decades to revert²(Avritzer et al. 2021) 

Despite the multiple historical contingencies that might explain his victory, the electoral moment constitutes a critical juncture(Capoccia 2016), as every political system is built upon the nexus between politicians and citizens (Miller 1971), and the electoral connection is central for polyarchies maintenance and legitimacy claims (Dahl 1989; Habermas 1975). This claim of legitimacy is the backdrop for the justification of recently elected extremist  politicians' destabilizing reforms and postures. However, what if those candidates' vote shares are not even consistent with generalized notions of the majority, such

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This is a manuscript submitted for review.

¹By which I mean a country losing scores in some aggregate index of "being democratic" such as V-DEM's scores, or Polity. 


²For a general discussion of the downstream effects of electing "closet authoritarians" see Chiopris et al. (2021).

as Condorcet winner³ or borda⁴ winner? If so, how would they fare under different voting procedures? Those are the specific questions this research aims to answer, having Brazil as a case.

To answer those questions, I make use of pre-electoral representative surveys to reconstruct the full 4-top rankings of the Brazilian population, using a bayesian preference learning model (Sørensen et al. 2019). Subsequently, I make use of this augmented data to simulate the electoral results under different decision procedures (Eggers 2020). Finally, I discuss the significance of the results and conclude by pointing out the limitations of the endeavor.

THEORY

Regardless of the specific democratic criteria or theory used to evaluate polyarchical political systems⁵, elections are consistently enumerated as central to the functioning of those systems (Riker 1982). No wonder ever since the inception of the representative government opening the black box of the input-output process performed by voting mechanisms has emerged as a recurrent preoccupation of politologists (Rothschild 2005; McLean 2014).

The realization that the result of collective decisions is inseparable of the decision procedure being used and that such procedures differ in terms of their consistency with normative evaluative criteria (Saari 2001; Sen 2012) naturally leads us to wonder what possible adjacent paths that could have been taken at critical moments for the polity (Kaminski et al. 1998; Kamiński 1999; Tabarrok and Spector 1999). Since there are, in principle, infinite possible decision procedures (Saari 2001)  such endeavor ought to be ruled by some structuring and simplifying principles of analysis. Sticking to “close” counterfactuals (Menzel 2021; King and Zeng 2006) is one way of reducing the complexity of the analysis while improving the reasonableness of our inferences. In the case of the election of extremist candidates, the majoritarian rhetoric is an anchoring point for two reasons: first, majoritarian

³An alternative is a Condorcet winner if it beats all other alternatives in majority contests (Arrow et al. 2010).

⁴An alternative is a Borda winner if it has the highest Borda score (Saari 2001).

⁵That is, those political systems characterized both by comprehensive inclusion of the population and a competitive market for votes of the population (Krouse 1982).

⁶Just treat a positional voting procedure as an assignment of a real number to each position. The voting procedures might lead to the same output, and as such be extensionally equal, but are algorithmically distinct.

principles are typically contained in democratic ideals (List 2011); second, populist politicians typically invoke their majoritarian support to legitimize their destabilizing movements within the political system (Grossman et al. 2022).

Following List (2011) we can define majoritarianism as a necessary condition for the collective choice of an alternative from the feasible set is that it has majority acceptance, where majority acceptance amounts to the alternative having 50% + 1 of the support from the voters.⁵ Given May (1952) classical theorem in a collective choice between two alternatives, which states that simple majority rule is the only decision procedure which satisfies universal domain, anonymity, neutrality, and positive responsiveness; majoritarianism is intuitively desirable within democratic decision-making environments.

Note, however, that May's theorem does not extend to more than two alternatives (Coleman and Ferejohn 1986).⁶ And yet, majoritarianism remains a center-piece in the electoral arena's normative backdrop. How can one then extend majoritarianism to more than two alternatives?⁷ Both Borda and Condorcet⁷ gave their own answers to this question. Condorcet extended the majority rule to *pairwise majority rule*: apply majority rule to all pairwise comparisons. One possible and, particularly strong, condition that generalizes majoritarianism is what is known as the Condorcet criterion: a decision procedure is Condorcet consistent if it selects the candidate, if there is any, that wins in all pairwise majority contests, the Condorcet winner (Felsenthal and Machover 1992). Borda, on the other hand, devised a scoring scheme: if there are say 3 alternatives $\{A, B, C\}$ and an agent i has ranking $B > C > A$ then the Borda score in i 's ranking for each alternative is $A : B : C = 0 : 2 : 1$ ⁸. The Borda score for the whole profile, all voters rankings, is the sum of each alternative score at each voter ranking. Note that underlying this scoring system there is also a latent generalization of majority rule: given i 's ranking, each alternative gets a score equal to how many pairwise comparisons it wins within i 's ranking.

Since both the Condorcet and Borda winners are reasonable extensions of majoritarianism, those

⁷In the 18th century in particular, the Marquis de Condorcet and Charles Borda could be considered the exponents of the study of how collective decision procedures transform the beliefs, preferences, attitudes, and judgments of individuals into political choices (McLean 2014).

⁸Alternatively, it can be coded as $1 : 3 : 2$.

concepts will be the touchstone of our analysis. Within the American context, it has been argued, for instance, that Donald Trump was most likely not a Condorcet winner in the primaries (Potthoff and Munger 2021; Woon et al. 2020; Kurrild-Klitgaard 2018). Our theoretical expectation is that, in general, extremist candidates will not be either Borda or Condorcet winners in polyarchical political systems, inasmuch democratic ideals in which citizens are socialized would bias their rankings against candidates that represent threats to the maintenance of the rules of the democratic game⁹.

CASE/DATA

Jair Messias Bolsonaro was elected the president of Brazil in 2018. For more than 20 years as a congressman, he has always been a vocal defender of the military dictatorship and typical extreme-right rhetoric. The 2018 electoral scenario in Brazil was one of high rejection of the traditional political elite, particularly of the Labour Party (Partido dos Trabalhadores - PT), after corruption scandals and an impeachment process of the previous president, Dilma Rousseff, a Labour politician. The main contestants, among 12, were him, an extreme-right candidate; Fernando Haddad, a leftist candidate from PT; Geraldo Alckmin, a center-right candidate; and Ciro Gomes, a center-left candidate. The presidential election in Brazil follows a two-round system. In the first round, the results were the following: Bolsonaro:Haddad:Ciro:Alckmin:White/Null = 46.3% : 29.28% : 12.47% : 4.76% : 8.79%. One other candidate, Joao Amoedo, got 2.5% of the votes, while all others got less than 1%. There was a 20% abstention. In the second round the result was: Bolsonaro:Haddad:White/Null = 55.12% : 44.78% : 9.57%. The abstention in this round was 21.3%.


The dataset used for the analysis is a representative street survey done on 10/02/2018, less than a week before the first round (10/07/2018). One question, in particular, is the only variable in our

⁹I admit this is a strong hypothesis to be made, which most likely requires itself a proper theoretical model to substantiate it. However, it is not hard to imagine an outline of a preference dynamics model that does exactly that. Take the models of Falmagne (1996) or Falmagne et al. (2019), and add a bias against extremist candidates, where extremist is defined along a dimension related to how threatening it is to the full cluster of democratic ideals that underly a polyarchical system. Then the distribution of voters' full rankings will be biased against those candidates, even though their top choices might not.

TABLE 1. Frequency of pairwise comparisons in the dataset.

Number of Pairwise Comparisons	Frequency
1	15
2	42
3	462
4	118
5	503
6	1797

Note: Since we are analyzing 4 candidates the total number of possible pairwise comparisons is $6 (n(n-1)/2)$.

analysis: pairwise comparisons between the 4 top candidates. With it is possible to reconstruct the full 4-top ranking of the voter. Preliminary pre-processing has led us to drop 171 observations where all pairwise comparisons were missing and 132 in which they were cyclic. This leaves us with 2937 out of 3240 observations. As Table 1 shows only 1797 observations compared all 4 candidates. As such, we have to augment the data with transitive closures for 1140 observations, by methods discussed in the next section 


METHODS

I use a Bayesian Mallows model to infer the missing rankings (Sørensen et al. 2019). The model has the following mathematical form¹⁰:

- PDF for $\mathbf{r} \in \mathcal{P}_n$: $P(\mathbf{r} \mid \alpha, \rho) = \frac{1}{Z_n(\alpha)} \exp \left[-\frac{\alpha}{n} d(\mathbf{r}, \rho) \right] 1_{\mathcal{P}_n}(\mathbf{r})$
- Likelihood : $P(\mathbf{R}_1, \dots, \mathbf{R}_N \mid \alpha, \rho) = \frac{1}{Z_n(\alpha)^N} \exp \left[-\frac{\alpha}{n} \sum_{j=1}^N d(\mathbf{R}_j, \rho) \right] \prod_{j=1}^N 1_{\mathcal{P}_n}(\mathbf{R}_j)$
- Prior for α : $\pi(\alpha \mid \lambda) = \frac{\lambda \exp(-\lambda\alpha) 1_{[0, \alpha_{\max}]}(\alpha)}{1 - \exp(-\lambda\alpha_{\max})}$
- Uniform prior for ρ
- Posterior:

$$P(\alpha, \rho \mid \mathbf{R}_1, \dots, \mathbf{R}_N) \propto \frac{1_{\mathcal{P}_n}(\rho)}{Z_n(\alpha)^N} \exp \left[-\frac{\alpha}{n} \sum_{j=1}^N d(\mathbf{R}_j, \rho) - \lambda\alpha \right] 1_{[0, \alpha_{\max}]}(\alpha).$$

Where $\rho \in \mathcal{P}_n$ is a location parameter representing the consensus ranking, $\alpha \geq 0$ is a scale parameter, $Z_n(\alpha)$ is a normalizing function, $d(\cdot, \cdot)$ is a right invariant distance among rankings, $1_{\mathcal{P}_n}(\mathbf{r})$

¹⁰I won't discuss it due to lack of space... 

is an indicator function for the set \mathcal{P}_n which equals one when $\mathbf{r} \in \mathcal{P}_n$ and zero otherwise; and $\mathbf{R}_j = (R_{1j}, \dots, R_{nj})$ is the ranking for voter $j, j = 1, \dots, N$ (Sørensen et al. 2019). The inferred rankings are sampled from the numerically computed posterior distribution. After the rankings are inferred, I compute the results for the top 4 candidates under different voting procedures and visualize the results for the top 3 candidates using the diagrams by¹¹ Eggers (2020).

¹¹It is possible to use a related diagram to visualize the top 4 candidates. However, I am not aware of any package that implements Saari's opened tetrahedrons (Saari 2001).

RESULTS

TABLE 2. Rankings inferred by the Bayesian Mallows Model

ranking_vectors	prop
bolsonaro > alckmin > ciro > haddad	14.0
haddad > ciro > alckmin > Bolsonaro	12.4
bolsonaro > ciro > alckmin > haddad	11.1
haddad > alckmin > ciro > Bolsonaro	7.1
ciro > haddad > alckmin > Bolsonaro	6.8
ciro > alckmin > haddad > Bolsonaro	5.0
bolsonaro > alckmin > haddad > ciro	4.4
bolsonaro > ciro > haddad > alckmin	4.3
alckmin > ciro > haddad > Bolsonaro	4.2
haddad > ciro > Bolsonaro > alckmin	3.5
alckmin > haddad > ciro > Bolsonaro	3.2
bolsonaro > haddad > ciro > alckmin	3.1
alckmin > ciro > Bolsonaro > haddad	2.9
alckmin > Bolsonaro > ciro > haddad	2.8
ciro > alckmin > Bolsonaro > haddad	2.7
bolsonaro > haddad > alckmin > ciro	2.7
ciro > Bolsonaro > alckmin > haddad	2.0
haddad > Bolsonaro > ciro > alckmin	1.6
alckmin > Bolsonaro > haddad > ciro	1.5
ciro > haddad > Bolsonaro > alckmin	1.2
haddad > Bolsonaro > alckmin > ciro	1.2
haddad > alckmin > Bolsonaro > ciro	0.9
ciro > Bolsonaro > haddad > alckmin	0.8
alckmin > haddad > Bolsonaro > ciro	0.5

Table 2 shows the inferred rankings for the sample. One specific pattern is that the top two rankings were the reversals of each other: the top ranking is Extreme Right > Center-Right > Center-Left > Left ,

while the second most frequent ranking is Left > Center-Left > Center-Right > Right. This is evidence of the “polarization” of the election, extended to full rankings.

However, those polarized preferences are only 26.4% of the electorate. The inferred data contains much more information about the Brazilian voters’ preferences at this critical moment in the country. Figure 1 gives an overview of what is going on with the full profile. Two patterns are worth noting. First, the first choice of the electorate is symmetrical to the last choice. That is, the top two plurality candidates were also the most rejected. Second, and consequently, even though the centrist candidates wouldn’t do well in a plurality or for what matters in a two-round system they were strong second and third choice candidates. Obviously, that information is lost by a voting procedure that only asks for the top choice of the electorate.

FIGURE 1. Frequency plots for each choice in the inferred rankings.

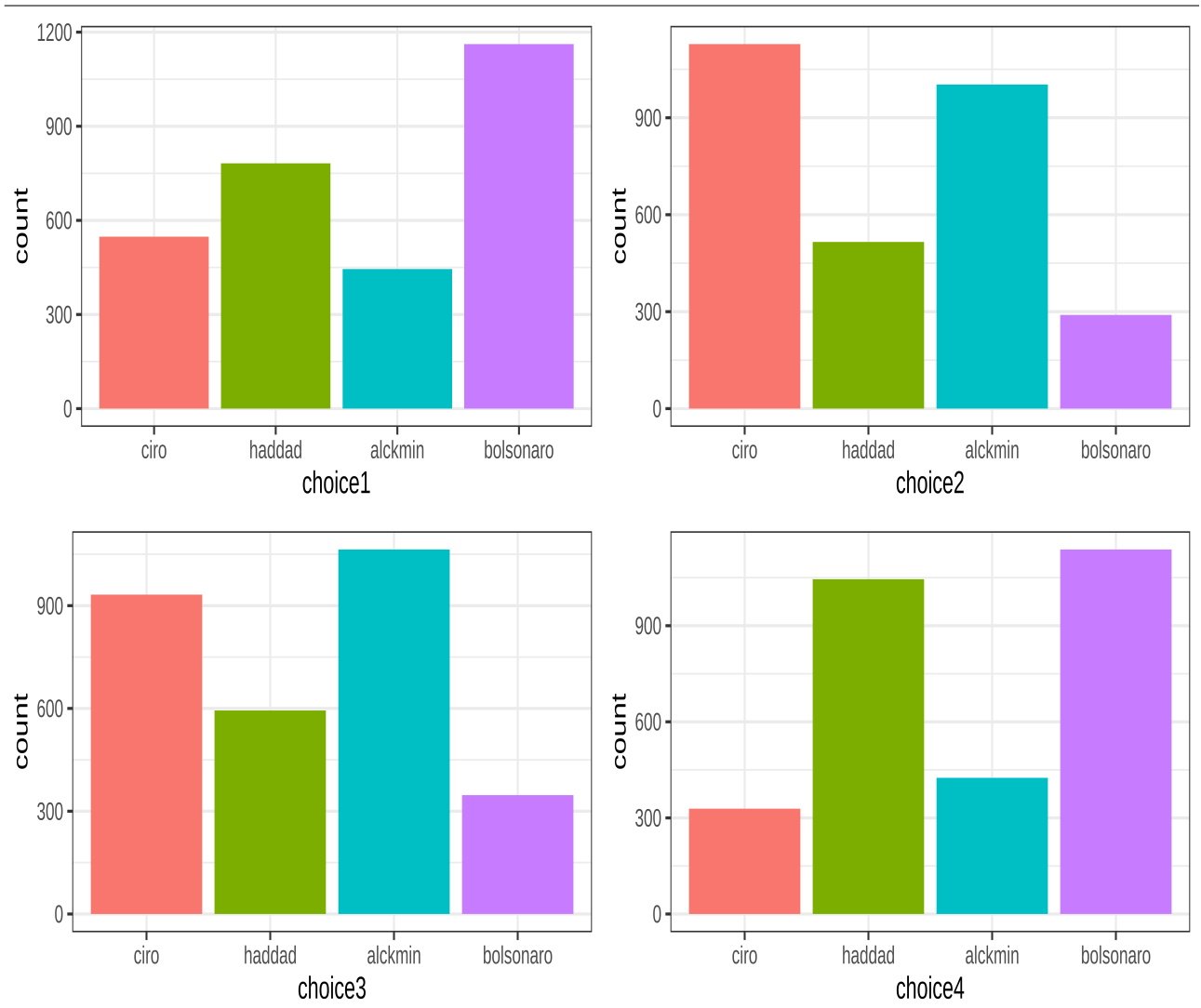


TABLE 3. Electoral result for inferred rankings

Candidates	Plurality	Antiplurality	Borda
Alckmin	15.1%	14.5%	7342
Bolsonaro	39.6%	38.8%	7350
Ciro	18.7%	11.2%	7769
Haddad	26.6%	35.6%	6909

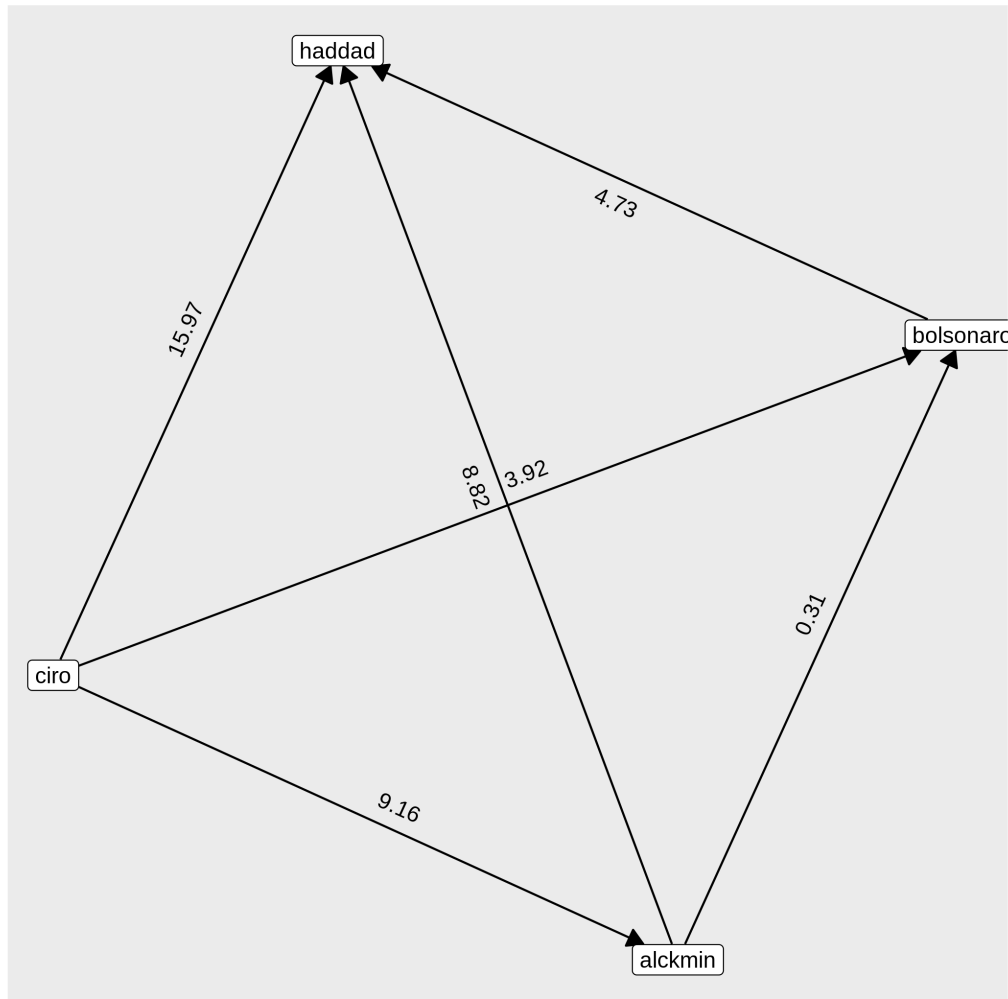
Note: **Bold** is winner under the voting procedure. Gray is the last position according to the vote procedure

Table 3 shows the inferred electoral results under plurality, antiplurality, and Borda. Plurality would tell us who would go to the second round, while antiplurality summarizes the rejection pattern seen in Figure 1. The plurality result mirrors the actual electoral result, while the antiplurality also shows that Bolsonaro was the most rejected candidate, in consonance with the bar plots. Moreover, the center-left candidate, **Ciro**, was the least rejected candidate. Finally, the Borda column shows two facts: **Ciro** was the Borda winner, which in our interpretation is seen as a generalized majority will while the leftist candidate, **Haddad**, who went on to the second round, was the candidate with the smallest Borda score, among the top 4 candidates.

Figure 2 shows a graph implied the pairwise majority comparisons. As expected, Bolsonaro was not a Condorcet Winner. The actual Condorcet winner was again the center-left candidate **Ciro Gomes**. Furthermore, Bolsonaro was virtually tied with the center-right candidate, **Geraldo Alckmin**. Finally, and of great relevance, is the fact that a candidate who competed in the second round, **Haddad**, was the Condorcet loser among the top 4 candidates: he would lose to all other candidates in a pairwise majority contest. The Condorcet graph of the inferred rankings is also consistent with a similar graph for the raw survey data¹² shown in Appendix 1.

¹²We can calculate it directly from the raw data since all that is needed for it is the pairwise data. Therefore, missing pairwise comparisons can be ignored.

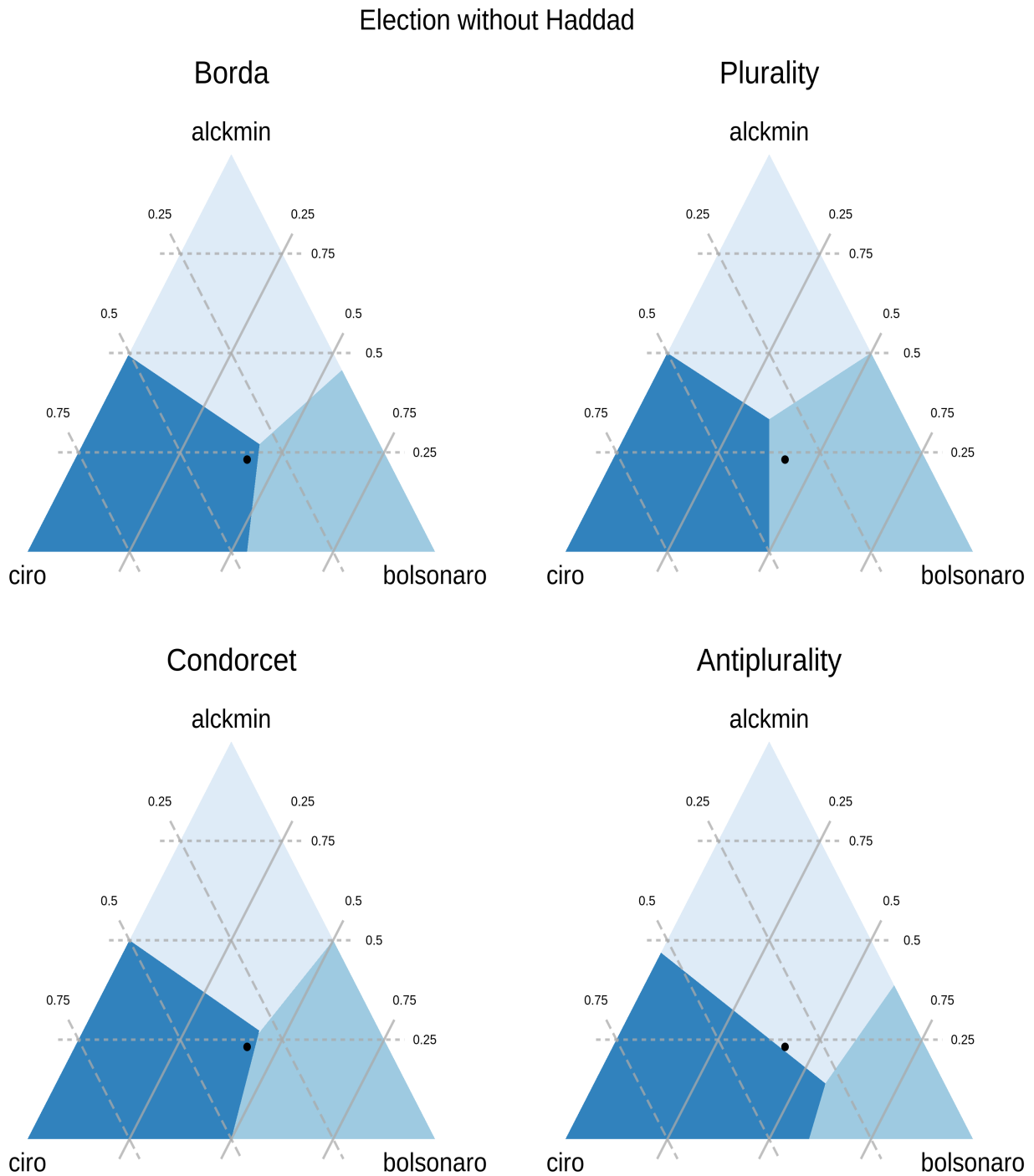
FIGURE 2. Condorcet Graph for inferred rankings



Note: Edge numbers are margins of victory. Arrow direction $A \rightarrow B$ means A beats B in the majority relation.

Overall, the analysis confirmed the theoretical expectations: Bolsonaro was neither the Condorcet nor Borda winner, even though he was elected president. Not only did the Condorcet winner not get selected for the second round, but, more perversely, the actual Condorcet Loser of the election was selected to compete in the second round. This perverse scenario incites us to consider two alternative scenarios: what if Haddad had not competed, or coalesced with Ciro? The second possibility was a theme of bargaining between the two candidates, but this option failed to gain traction and be adopted. Another scenario would be: what if Bolsonaro did not compete? After all, he was always a vociferous apologist of the country's dictatorial past. The first possibility is shown in Figure 3.

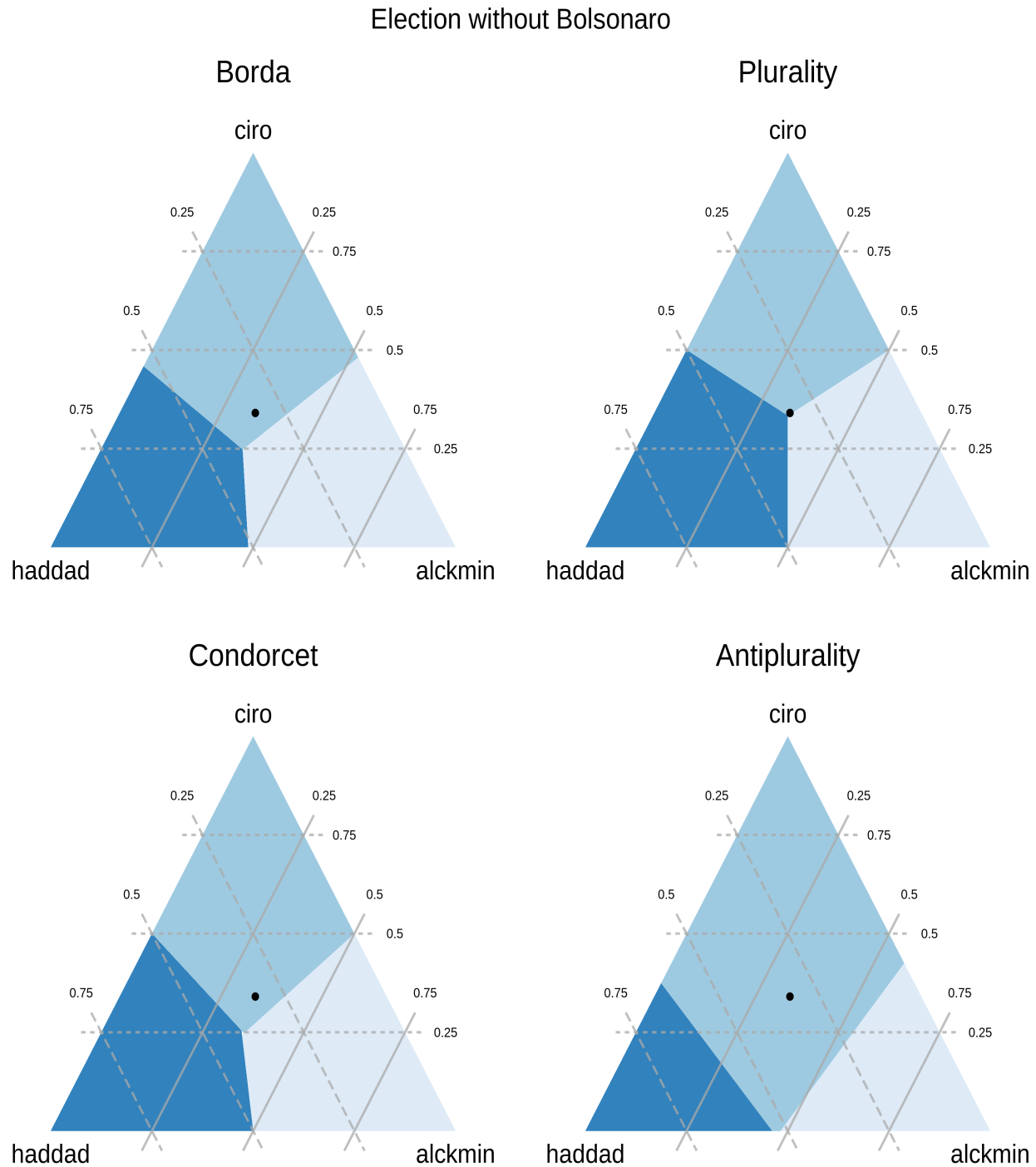
FIGURE 3. Eggers Diagram for scenario without Haddad (leftist candidate).



As expected, Bolsonaro would still be the plurality winner, with Ciro going with him to the second round. Ciro would still be the Borda and Condorcet winner, and the antiplurality winner would be Alckmin, but in a very close election with Ciro. The size of Alckmin's region on the Condorcet plot shows that he was the one with the most second choices compared to the other two candidates. Figure 4,

on the other hand, shows that the removal of the Condorcet loser would have led to near tied election under plurality for the remaining top 3 candidates while establishing Ciro as the winner in all voting procedures besides plurality.

FIGURE 4. Eggers Diagram for scenario without Bolsonaro (extreme right candidate)



The remaining other 2 scenarios are shown in Appendix 2. Removing centrist candidates would

consolidate Bolsonaro’s plurality result, while another voting procedures remain prioritizing the remaining centrist candidates.

CONCLUSION

Given the systematic threat of extremist candidates to polyarchical systems, the paper contributes to the analysis of the institutional robustness of those systems, by considering credible alternative voting procedures’ outcomes and properties at a critical juncture in Brazil’s political history. We have demonstrated empirically that the winner was neither the Condorcet nor the Borda winner under the current voting procedure stated preferences. Moreover, it allowed the Condorcet Loser to go to the second round and excluded the actual Condorcet/Borda winner from the second round of the dispute.

The most glaring limitation of the paper is that agents adapt to new institutional environments. By assuming a direct translation between preferences and behavior we are ignoring strategic voting. The percentage of strategic voting in a large scale election, however, is an open empirical problem (der Straeten et al. 2010; Kawai and Watanabe 2013). Nevertheless, a combination of game-theoretic models with a simulation parameterized by the inferred ranking distribution is a route of research that I intend to pursue.

The research used only one variable from the dataset, the pairwise comparisons, to simulate alternative scenarios. However, socio-demographic variables from the dataset could have been used to strengthen the data imputation procedure. Speaking of imputation, simpler imputations, such as the Impartial Culture assumption (Regenwetter et al. 2006), could have been used as benchmarks to compare with the imputation through the bayesian mallows model. Moreover, it is necessary to properly analyze the pattern of missingness of pairwise comparisons. Roughly less than half of the dataset is constituted of incomplete pairwise comparisons, and there might be valuable information on the agent’s preferences contained in patterns of missingness (McElreath 2020).

Other voting procedures could have been used. Particularly, truncated positional voting methods could have been directly applied to the raw data (Terzopoulou and Endriss 2021). Moreover, we have been disregarding indifference in the agent’s preferences. Again, this is valuable information, and it is known that forcing strict preferences when indifference exists leads to artificial inflation of the

profile inconsistency (Gehrlein 2010). Finally, though we have analyzed the four top candidates, there is no direct relationship between the result of an election with positional procedures when we have a subset of the alternatives vs when we have the whole set of candidates (Saari 2001). It is well known, for instance, that the Borda Count violates WARP precisely because it is not contraction-expansion consistent (Schwartz 2018). The relevance of Alckmin in our analysis, even though he only had got 4% of the first choice votes is a case in point. Nonetheless, we expect that the results will not reverse, given that the bottom candidates could be deemed irrelevant to most of the population (and as such, be tied in the bottom of the rankings). This is a subject for a more thorough analysis, in any case. Finally, even though we have analyzed scenarios in which candidates were removed, and alternative voting procedures could have been used, it would be more realistic to simulate the formation of coalitions and how voters would have reacted to those. The assumption of a pure additive transfer of votes, implicit when we removed candidates, is not necessarily true with coalitions, insofar voters of a center-left candidate, for instance, could actually, vote for the center-right candidate if they are alienated by an alliance with the Left, which in the case of the election under scrutiny, was highly rejected, as shown in our analysis.

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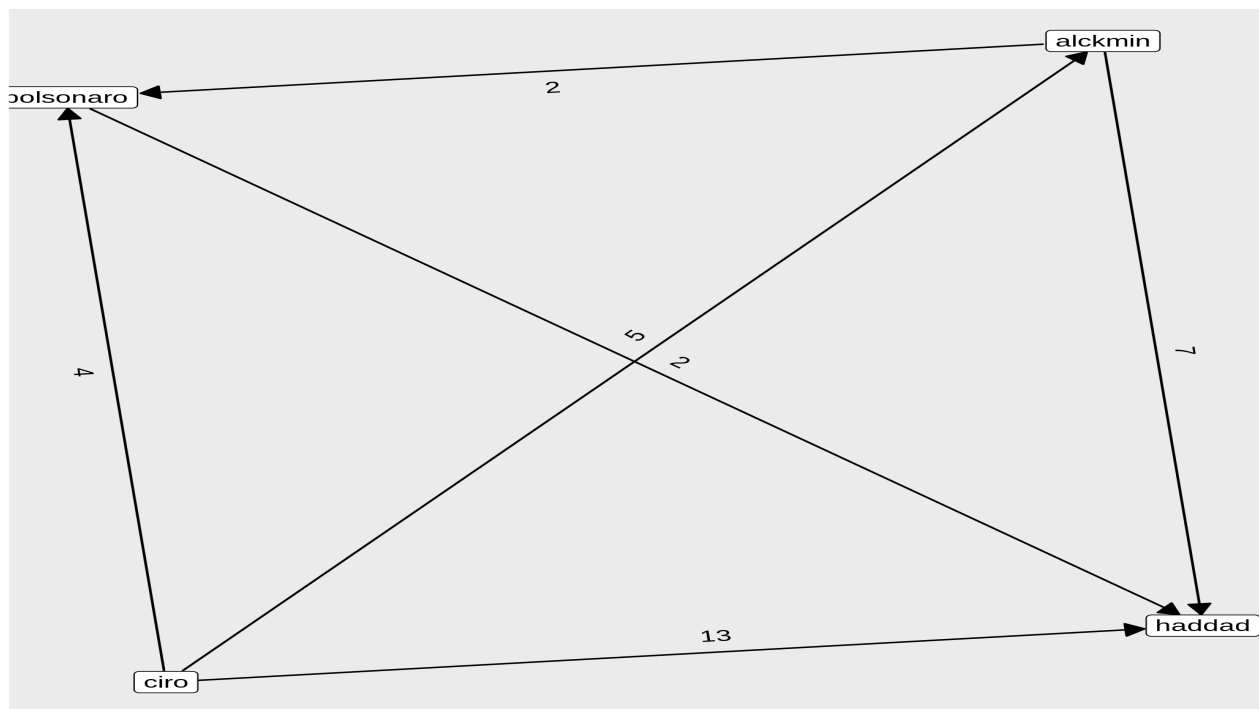
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APPENDIX 1 - RAW DATA CONDORCET GRAPH

FIGURE 5. Raw Data Condorcet Graph



Note: Edge numbers are margins of victory. Arrow direction $A \rightarrow B$ means A beats B in the majority relation.

APPENDIX 2 - ELECTORAL SCENARIOS

FIGURE 6. Eggers Diagrams for scenario without **Ciro** (center-left candidate).

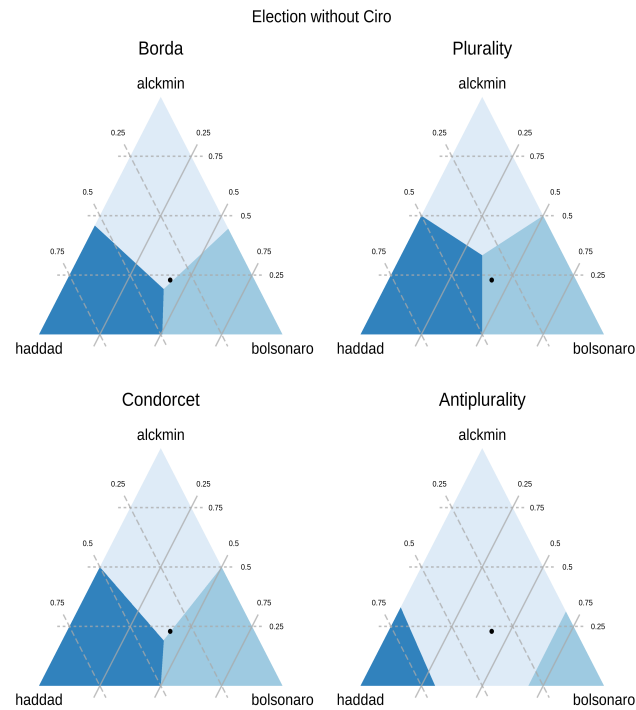


FIGURE 7. Eggers Diagrams for scenario without **Alckmin** (center-right candidate).

