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Between the Rounds

Estimating how Brazilian voters moved from the first to the second round of the 2026 presidential election.

Rennan Chagas · Working paper v1.0 · October 30, 2026 · Exploratory results · Short version (blog post)

SUMMARY

Brazil's secret ballot means that no dataset records how individual voters changed their minds between rounds. We reconstruct those movements for the October 2026 presidential election from the official results of about 499,000 ballot boxes in both rounds, using a statistical technique called ecological inference, with opinion polls as cross-checks.

We estimate that 97% of Lula's and 95% of Flávio Bolsonaro's first-round voters stayed with them; that the 9.3 million voters of the eliminated candidates split almost evenly between the finalists; and that Lula's margin of about 4.4 million votes came mostly from people who had not voted in round one and from blank and null voters. Tests on simulated elections show the method is accurate when its assumptions hold (typical error 1–3% of voters) but considerably worse (about 11%) when voting habits vary with local make-up, and its uncertainty ranges are too narrow. We therefore present the results as **exploratory**.

97.3% · 95.1%
of Lula's and Flávio's first-round voters voted for them again

3.81M vs 3.82M
voters of eliminated candidates who went to Lula versus Flávio: an almost even split

+4.8 million
net advantage for Lula among round-1 non-voters and blank/null voters: more than his whole 4.4 million margin

1.3% → 11.5%
typical share of voters misplaced in simulated elections, from the friendliest to the hardest scenario

1. Introduction

Brazilian presidential elections are decided in two rounds. In 2026 the first round took place on October 4 and the runoff on October 25. Flávio Bolsonaro led the first round with 56.1 million votes (47.0% of valid votes), ahead of Lula with 53.9 million (45.2%). Three other candidates, Augusto

Cury, Renan Santos and Ronaldo Caiado, received 2.9%, 2.2% and 2.2%. In the runoff Lula won with 64.3 million votes (51.8%) against 59.8 million.

A natural question is how the electorate moved in between. Did supporters of the eliminated candidates choose one finalist over the other? Did people who abstained in round one return? How many first-round voters changed sides? The answer matters for understanding what shaped the result, but the data to answer it directly do not exist: the ballot is secret, and no official record links a person's first-round vote with their second-round vote.

What exists are the results for every ballot box, in both rounds. This paper uses them, together with a statistical model, to estimate the full table of transitions: for every group of first-round voters, what share ended up in each second-round group. We also state clearly how far these estimates can be trusted.

What this paper does not do. It does not identify how any individual voted, it does not forecast anything, and it does not claim to settle debates about why voters chose as they did. It is a retrospective, exploratory reconstruction.

2. Data

2.1 Official ballot-box results

The Superior Electoral Court (TSE) publishes a *boletim de urna* (ballot-box bulletin) for every ballot box, called a *seção* or section. Each serves, on average, about 318 registered voters. For each section and round, the bulletin gives the number of registered voters, how many voted, how many abstained, and the votes for each candidate plus blank and null votes.

We downloaded the 56 official files (26 states, the Federal District and the overseas vote, for two rounds) and checked each against the TSE's published checksums. Summing our processed data reproduces the official national totals for every candidate, blank, null and abstention **exactly**, in both rounds (zero difference).

2.2 Matching ballot boxes across rounds

The analysis needs the same ballot box to be observed in both rounds. In the end we match 499,207 units that exist in both rounds, covering all 158,745,079 registered voters in sections that operated. (Another 423 registered voters were assigned to 41 sections that never operated; they are excluded.)

2.3 Nine kinds of first-round voter, five second-round choices

First-round voters are grouped as: Lula, Flávio Bolsonaro, Augusto Cury, Renan Santos, Ronaldo Caiado, other candidates, blank, null, and people who did not vote. "Other candidates" pools seven small candidacies, each below 0.5% of valid votes (including Romeu Zema, 0.33 million); this keeps the model from chasing groups too small to estimate. In round two the choices are Lula, Flávio, blank, null, or not voting.

2.4 Voters who changed ballot box

In 55,722 of the matched units, covering 18.6 million registered voters, the number of registered voters was different in the two rounds. A first version of our analysis simply dropped these units. An audit of TSE records showed why: voters can ask to vote somewhere else for the runoff (a *temporary transfer*), and the net change in those records explains the difference in every single unit, with zero unexplained remainder.

That does not mean 18.6 million people moved. The net movement is only about 37,000 voters in and 37,000 out, nationally. But a net change hides swaps, so we also consider a larger, better-supported number, about 65,000 in and out, which is our base case. In the model each ballot box then gets a small "technical entry" and "technical exit" account so the books balance. We test the sensitivity to this choice with alternatives of up to about 1 million moves (Section 5.4). The votes of the people who moved are unknown.

2.5 Opinion polls

We use three published polls as cross-checks, never as the main source: Quaest and Nexus/BTG (both published October 24), and Datafolha (October 24 report, plus an earlier release with a paragraph on the voters of four eliminated candidates). All three are registered with the TSE (BR-09158/2026, BR-08234/2026 and BR-09540/2026). They typically ask people how they voted in round one and how they intend to vote in round two. The Datafolha final report has no such table, so we use only the earlier paragraph. None of these polls publishes enough detail to give effective sample sizes for sub-groups.

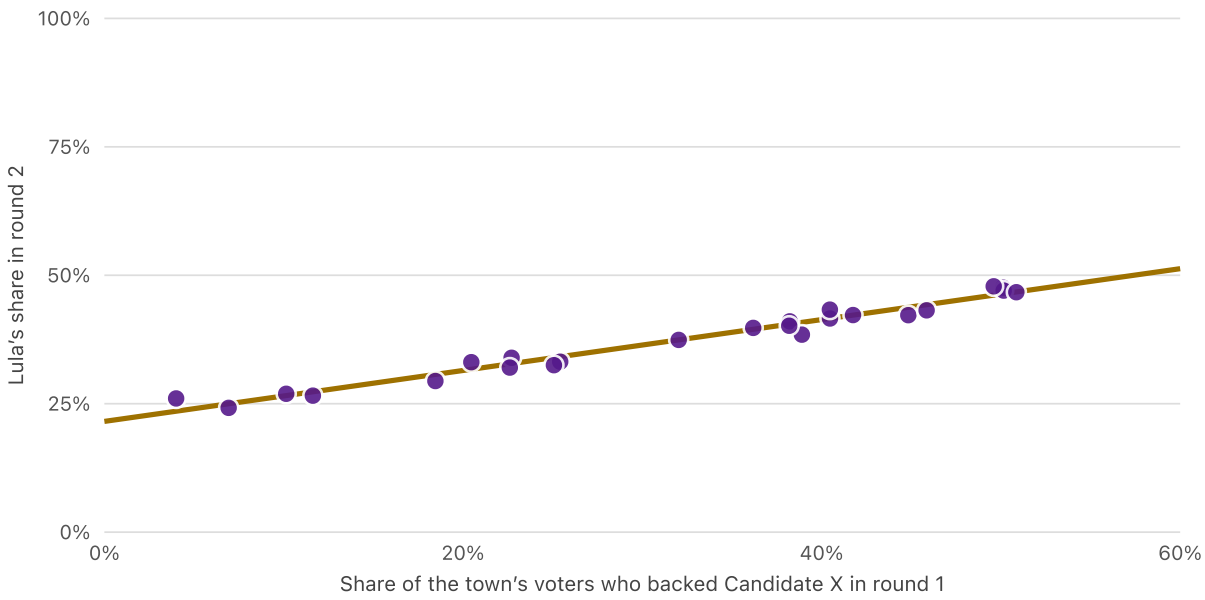
3. Method, in plain language

3.1 The core idea

Suppose we know, for many towns, the share of voters who backed Candidate X in round one and the share who voted Lula in round two. If towns with more X-voters gave Lula more votes in round two, it suggests X-voters went to Lula. A straight line through the towns reveals the rate: where the line meets the right edge (a town made only of X-voters) is the estimate of how X-voters behaved. This kind of reasoning is called *ecological inference*: inferring the behavior of individuals from group-level data.

Figure 1 · The core idea, and where it breaks

Each dot is an imaginary town; the line is the best straight-line summary.



Real share of X-voters who chose Lula	What the line says	Error
70%	**71%**	**1 pp**

Made-up data. In this world, 70% of Candidate X's voters really chose Lula, and 22% of everyone else did.

The weakness is the one the slider reveals. If X-voters behave differently where they are plentiful than where they are rare, a "neighborhood effect", the line no longer reflects what any X-voter did. Statisticians call this *ecological bias*. Nothing in the ballot-box data can fully rule it out, which is why the analysis needs a careful testing program (Section 5).

3.2 The model

We adapt the modified Brown–Payne model (Brown and Payne, 1986; Forcina, Gnaldi and Bracalente, 2012), using the normal approximation as stated by Forcina and Pavía (2026, Section 2.1, Equation 1). In words:

- We split the country into **183 areas** of ballot boxes (about 2,500 matched units each, inside one state, built from consecutive municipalities and electoral zones; they are not exact geographic neighborhoods). Within an area we assume that a given type of first-round voter has the *same chance* of ending up in each second-round choice, in every ballot box.
- Given those chances, the model predicts how many votes each choice should get in each ballot box (the sum, over first-round groups, of group size times the chance). It then picks the chances that make predictions best match what was actually counted, across all boxes of the area.
- Because real ballot boxes are more variable than a coin-toss would be, the model allows extra randomness, estimated from the data (*overdispersion*).

- Different areas get different chances, so the model can capture that Northeast voters behave differently from Southern voters.

3.3 Making the books balance

The fitted chances are approximate. To turn them into a table of voter counts, we use *iterative proportional fitting*, a classic technique that nudges the table until the rows add up exactly to the first-round result and the columns to the second-round result of each ballot box. We then add the ballot boxes to get tables for the whole country, a region or a state. The tables are expected counts, not a list of individuals.

Forcina and Pavía (2026) compare ways of doing this step and find that a minimum chi-square method does slightly better than iterative proportional fitting when both are applied to an area's totals. We keep iterative proportional fitting because it can be applied box by box, so that every ballot box's own totals are respected; their minimum chi-square method works on area totals. In the strict-match baseline, swapping one method for the other at area level moves about 0.1% of voters; reconciling box by box rather than by area moves about 0.5%. In our own simulations the two methods differ by less than 0.02 percentage points of voters in every scenario, with no consistent winner.

3.4 People who changed ballot box

For the voters who appeared in or left a ballot box, the model adds a technical "entry" and "exit" account (Section 2.4). Exits are assumed to be a random draw from the people in the box; entrants have their own, estimated, pattern of choices. Entering directly into exiting is ruled out. These accounts hold about 0.04% of voters in the base case.

3.5 Quantifying uncertainty

We report two kinds of range for every cell of the table.

- **Hard limits.** Given the totals of a ballot box, no more voters can go from group A to group B than the smaller of the two groups, and some minimum may be forced. Adding these limits over all boxes gives a range that is always true, but usually wide.
- **95% range from resampling.** We repeat the analysis on 1,000 resamples of the areas (a technique called the *bootstrap*) and keep the middle 95% of results. This captures how much results depend on which areas happen to be in the data, but not the uncertainty about the model's assumptions. We show in Section 5 that these ranges are too narrow.

3.6 Blending in polls (sensitivity analysis)

As a stress test, and in the spirit of Klima et al. (2017) and Greiner and Quinn (2010), who combine aggregate data with surveys, we also fitted versions that blend the ballot-box information with the polls. One ("trusting polls") treats the poll answers as informative, with a strength we vary across three plausible values. The other ("allowing poll bias") gives each polling firm its own bias and allows for occasional wild answers. These are national approximations, not full re-analyses; they are used for comparison only (Figure 8).

For the curious: the model in a few lines

In ballot box s, let x_{si} be the number of first-round voters of group i and y_{sj} the number choosing j in round two. With p_{ij} the chance that group i ends up in j, the model uses a normal approximation with

$$\text{mean: } \mu_s = \Sigma_i \, x_{si} \, p_i$$
$$\text{covariance: } V_s = \varphi \cdot \Sigma_i \, x_{si} \, [\, \mathrm{diag}(p_i) - p_i p_i^{\top} \,], \; \varphi \geq 1$$

and maximizes the resulting likelihood over the p_i in each area (L-BFGS-B optimizer, analytic gradients, φ profiled out). The extension for registration moves replaces the mean by $f \cdot x_s P + e \cdot q$, where f is the share of the box's voters who remain, e the number of entrants and q their destination probabilities, and adds hypergeometric variance terms for who leaves. The reconciliation step is iterative proportional fitting in each box with structural zeros (entry → exit is impossible). The full specification is in the repository (`docs/population/model_specification.md`).

This is an adaptation, not a replication of the published methods: it uses a common overdispersion per area, no covariates, bounded logits and pools very small candidates.

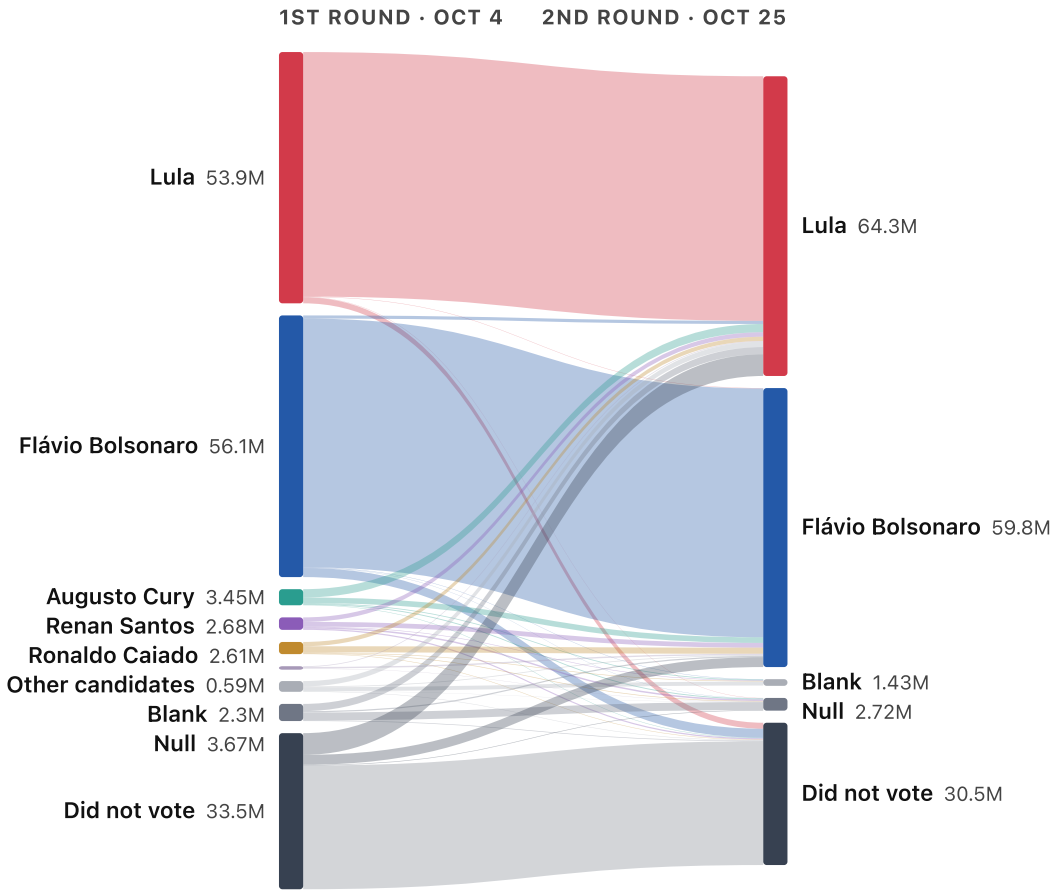
4. Results

All figures below are interactive. The *Where* filter changes the geography in every chart at once. The *Registration-move assumption* filter switches between six assumptions about registration moves and model-area size; they change very little (Section 5.4).

4.1 The big picture

Figure 2 · Where each group of voters ended up

Left: round-1 choice (Oct 4). Right: round-2 choice (Oct 25). Ribbon width = estimated number of voters.



Brazil (whole country): 158,745,079 registered voters; the model was fitted in 183 areas (1 did not fully converge).

Hover over a bar to follow one group; hover over a ribbon for its size and uncertainty. “Did not vote” includes registered voters who stayed home. About 65 thousand voters whose registration moved between ballot boxes are not drawn (0.04%).

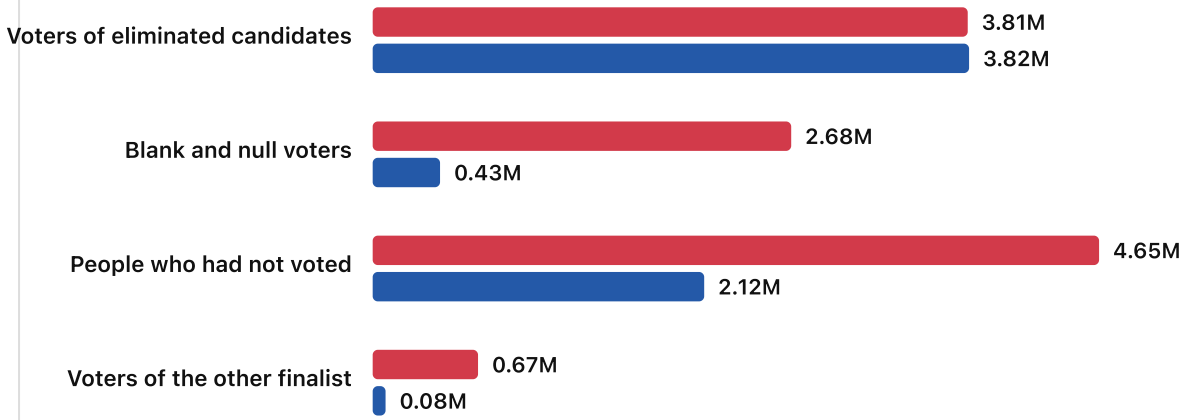
Most voters did not move. We estimate that 97.3% of Lula’s first-round voters and 95.1% of Flávio’s voted for them again. Each finalist’s main leak was non-voting (2.4% for Lula, 3.5% for Flávio). Direct switching was small and one-directional: about 0.67 million of Flávio’s voters moved to Lula (1.2%), against about 82 thousand the other way (0.15%).

4.2 What decided the runoff

Lula gained 10.4 million votes between rounds and Flávio 3.7 million. The figure below shows where the new votes came from.

Figure 3 · Where each finalist's second-round votes came from

By type of first-round voter. Switch to "Net advantage" to see how the final margin is built.



Brazil (whole country): Lula kept 97.3% of his round-1 voters; Flávio kept 95.1% of his.

The four net bars add up to the final margin between the finalists.

- **Eliminated candidates' voters** (9.3 million). They split almost evenly: 3.81 million to Lula, 3.82 million to Flávio. Another 18% did not vote or voted blank or null.
- **Blank and null voters** (6.0 million). 2.68 million chose Lula and 0.43 million chose Flávio.
- **Round-one non-voters** (33.5 million). 79% abstained again. Among those who came back, 4.65 million chose Lula and 2.12 million Flávio, a split of about 69% to 31%.

In net terms, Lula's margin of about 4.4 million is the sum of 2.5 million from non-voters, 2.2 million from blank and null voters, about zero from the eliminated candidates' voters, and 0.3 million *against* him from the finalists' own first-round voters (Flávio started with the larger base). The headline "even split" of the eliminated candidates is where we are least comfortable, since polls disagree with it (Section 5.3).

4.3 The full table

Figure 4 · Transition matrix

Each row is a first-round group; each column a second-round choice.

	Lula	Flávio Bolsonaro	Blank	Null	Did not vote	Total
Lula	97.3% 52,417,073	0.15% 82,468	0.011% 5,695	0.12% 64,903	2.4% 1,285,687	53,879,538
Flávio Bolsonaro	1.2% 674,805	95.1% 53,338,561	0.14% 77,424	0.097% 54,533	3.5% 1,935,879	56,104,503
Augusto Cury	51.6% 1,778,107	34.8% 1,200,720	5.0% 170,747	5.8% 199,696	2.8% 97,882	3,448,569
Renan Santos	35.8% 957,595	37.9% 1,012,524	4.5% 119,938	12.0% 320,504	9.9% 263,879	2,675,887
Ronaldo Caiado	35.2% 916,811	50.3% 1,310,017	5.0% 129,627	5.4% 139,449	4.2% 108,138	2,605,148
Other candidates	27.1% 158,787	50.6% 296,729	4.2% 24,873	11.5% 67,227	6.7% 39,149	587,143
Blank	49.5% 1,138,219	7.3% 168,829	36.6% 841,053	2.1% 47,792	4.5% 104,212	2,300,798
Null	42.0% 1,542,399	7.2% 262,642	0.84% 30,683	46.3% 1,702,413	3.7% 135,039	3,674,249
Did not vote	13.9% 4,652,654	6.3% 2,123,311	0.085% 28,526	0.37% 124,046	79.3% 26,528,768	33,469,244
Total	64,256,232	59,826,041	1,430,496	2,723,305	30,509,005	158,745,079

Brazil (whole country): 158,745,079 registered voters; the model was fitted in 183 areas (1 did not fully converge). Rows add up to 100% (ignoring about 0.04% of voters whose registration moved). Hover or tap a cell for the 95% range.

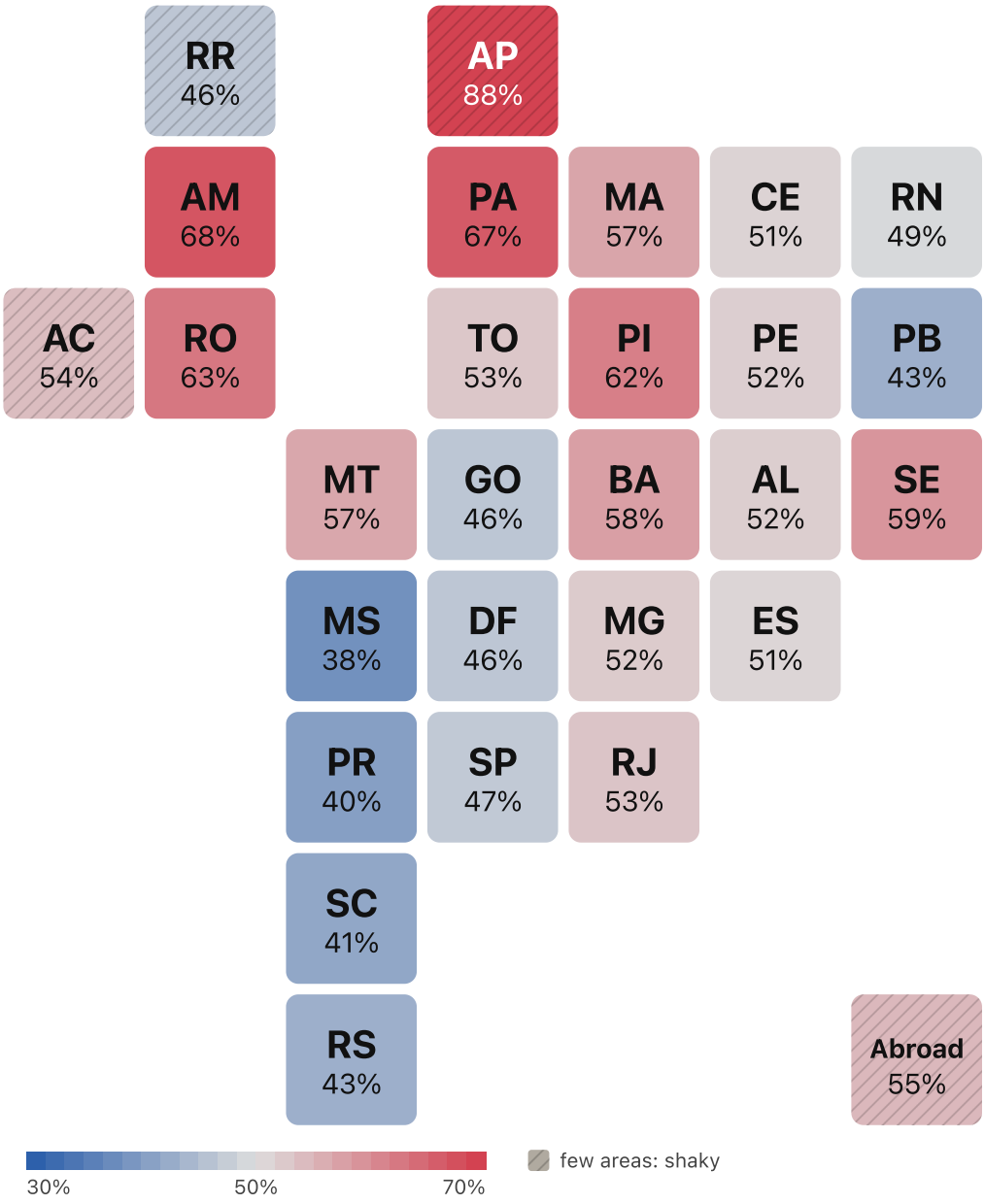
Cell color is proportional to the share of the row. Hover or tap a cell for the 95% range and the hard limits.

Differences between the eliminated candidates are visible. Cury's voters leaned to Lula (52% against 35% for Flávio). Caiado's leaned to Flávio (50% against 35%). Renan Santos's voters split (36% Lula, 38% Flávio) with an unusually large 12% voting null. Blank voters were a mix: 49% went to Lula and 37% voted blank again; null voters 42% Lula and 46% null again.

4.4 Geography

Figure 5 · Geography of the transitions

A tile map of the 26 states, the Federal District and the vote abroad. Click a tile to select it in every chart.



Red: eliminated candidates' voters leaned to Lula; blue: leaned to Flávio. Percentage of those who chose one of the finalists.

Hatched tiles rest on very few model areas and should be treated as shaky.

Regional contrasts are clear. Among the eliminated candidates' voters who chose a finalist, 54% chose Lula in the Northeast, 65% in the North and 41% in the South. Return of round-one non-voters ranged from 17% (North) to 26% (Northeast). State-level results are noisier than national ones; Acre, Amapá, Roraima and the vote abroad are based on a single model area each.

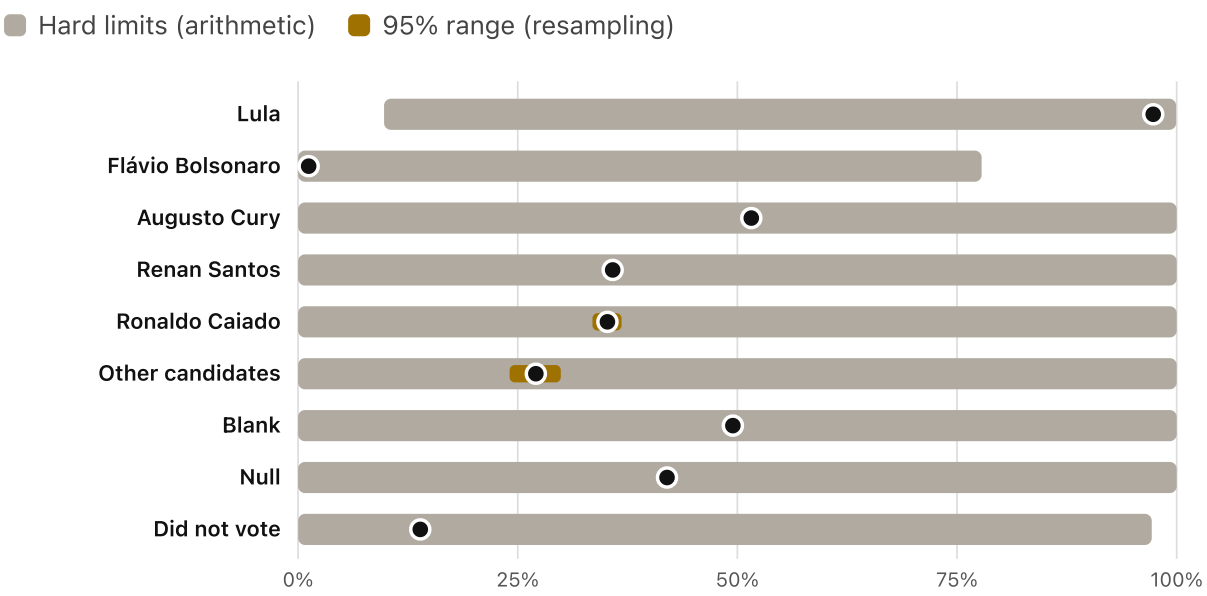
5. How reliable are these estimates?

5.1 The ranges

Figure 6 compares the best estimate with the hard limits and with the 95% resampling range. The hard limits, which use only arithmetic, are wide for most cells: the official totals alone say little about individual flows. The resampling ranges are much narrower, because the model assumes a structure; whether the structure is right is the subject of the next two sections.

Figure 6 · Estimates, 95% ranges and hard limits

Share of each first-round group that went to the selected destination.



Brazil (whole country): 158,745,079 registered voters; the model was fitted in 183 areas (1 did not fully converge).

Grey: hard limits from the official totals alone. Gold: 95% range from resampling areas (1,000 draws). Dot: best estimate. Ranges exist for the base case only.

5.2 Tests on simulated elections

We generated 1,000 artificial elections using real ballot-box sizes from two places (Acre and the overseas vote), five invented voter groups, and six types of world:

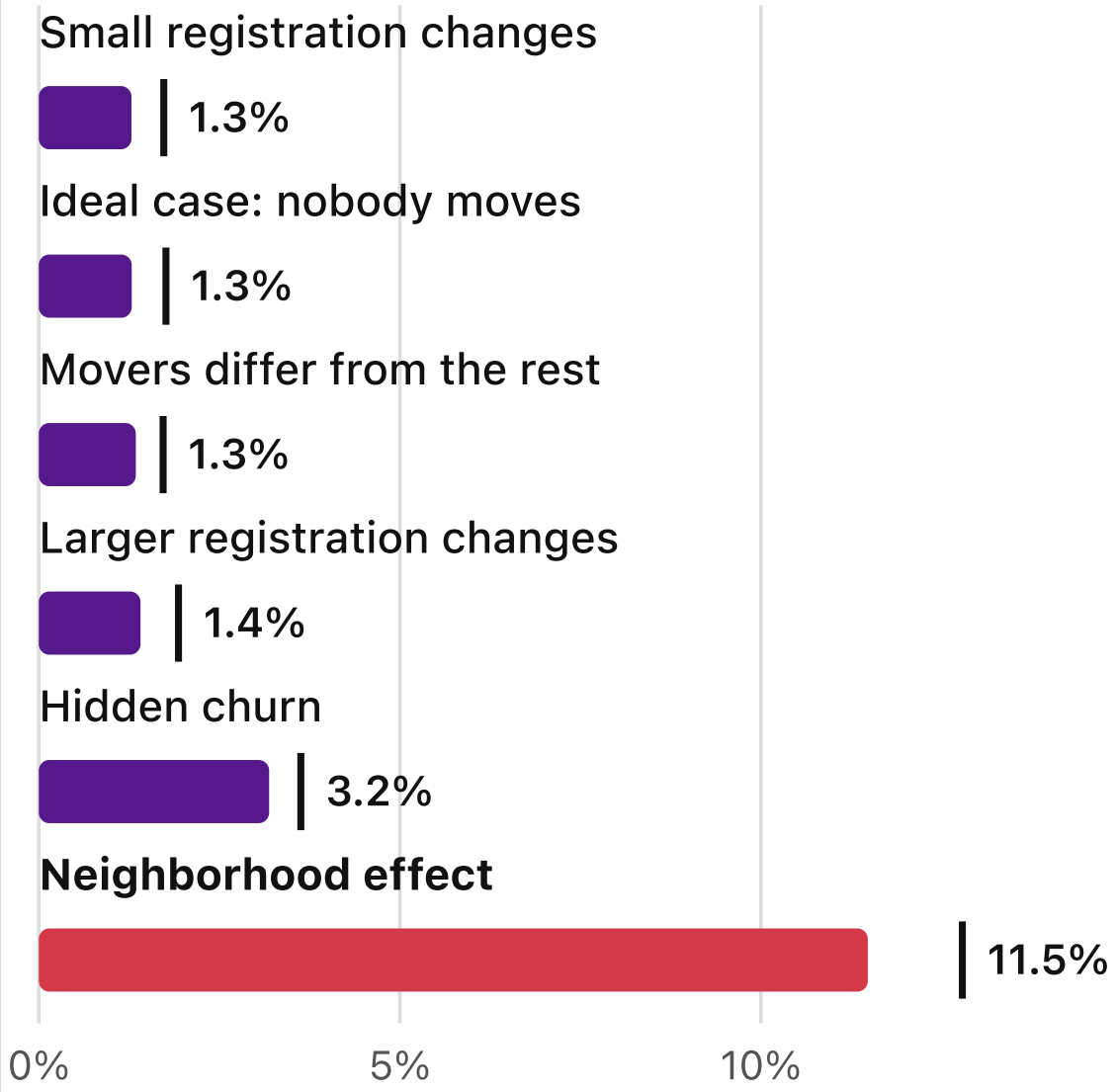
- **Ideal case:** nobody changes ballot box and everyone behaves as the model assumes.
- **Registration changes (small, larger, selective):** some voters join or leave boxes, at random or not.
- **Hidden churn:** as many arrive as leave, so totals do not reveal it.
- **Neighborhood effect:** behavior depends on who is around, the case of the toy example.

For each artificial election we knew the truth, ran the method and measured the error as the share of voters assigned to a wrong cell of the table. In ten artificial elections per scenario (60 in all) we also checked the 95% ranges, using 80 resamples each; that is few, so the hit rates below are rough.

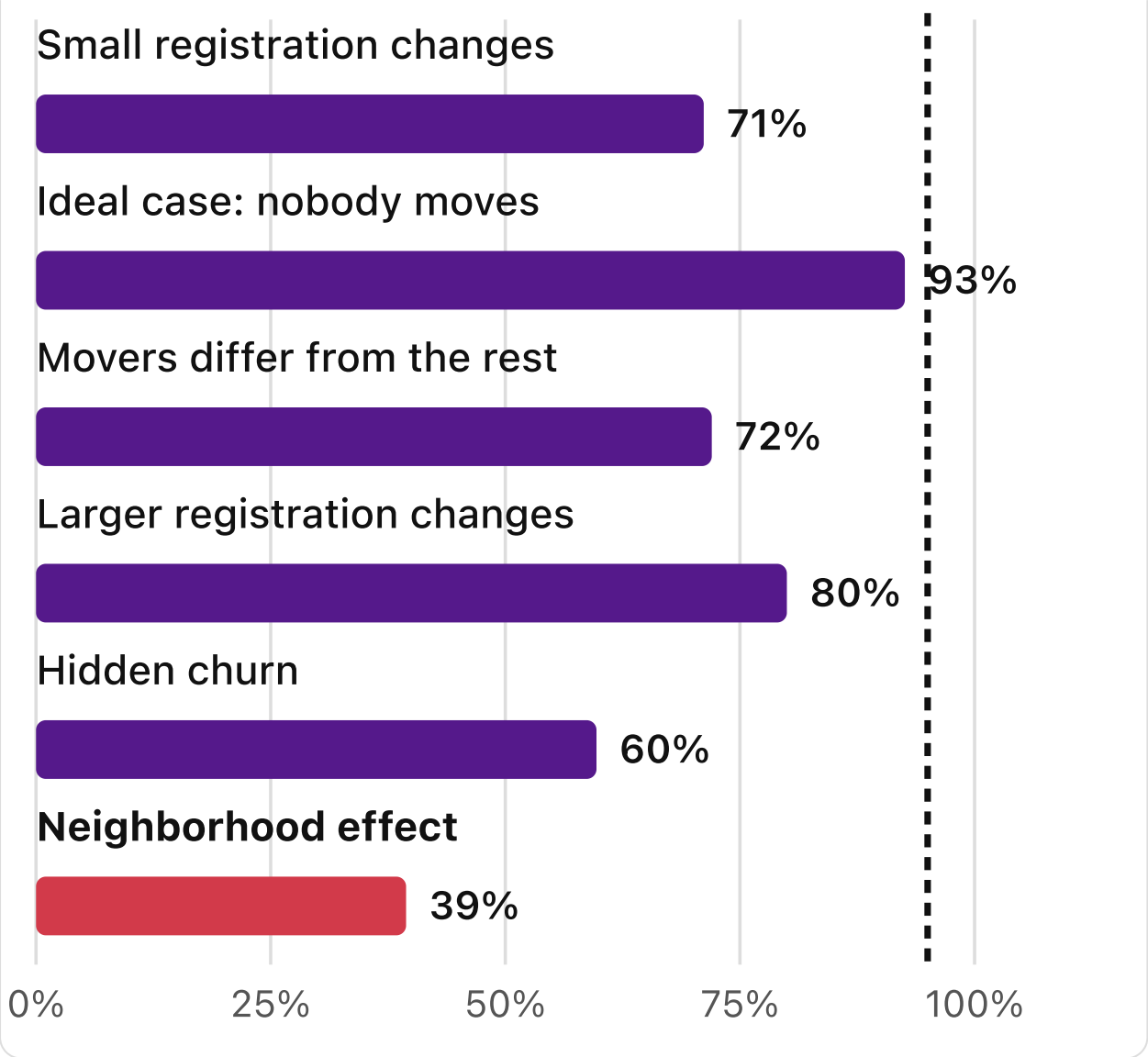
Figure 7 · Accuracy on simulated elections

Mean error and how often the 95% range contained the truth.

Average share of voters in the wrong box



Share of "95% ranges" that contained the truth (target: 95%)



The red bar marks the scenario where voting habits vary with local make-up. Black ticks on the left panel mark the 95th percentile of the error.

Scenario	Typical error	Bad-day error (worst 5%)	Typical error if boxes with changed rosters are dropped	Share of "95% ranges" that held	Fits fully converged
Small registration changes	1.3%	1.7%	1.5%	71%	63%
Ideal case: nobody moves	1.3%	1.8%	1.3%	93%	30%
Movers differ from the rest	1.3%	1.7%	1.6%	72%	63%
Larger registration	1.4%	1.9%	6.7%	80%	95%

Scenario	Typical error	Bad-day error (worst 5%)	Typical error if boxes with changed rosters are dropped	Share of "95% ranges" that held	Fits fully converged
changes					
Hidden churn	3.2%	3.6%	1.9%	60%	56%
Neighborhood effect	11.5%	12.8%	11.5%	39%	36%

"Typical error" is the average over simulated elections; "bad-day" is the 95th percentile. The fourth column is the error of our first version, which dropped boxes whose roll changed; it shows why the extension matters when registrations change a lot (larger changes: 6.7% versus 1.4%). In the hidden-churn scenario the older version looks better (1.9% versus 3.2%), but only because it judges just the boxes it kept. "Fits fully converged" is the share of fits meeting a strict numerical criterion; a separate experiment found that more optimizer effort improved convergence but did not remove bias.

WHAT THE TESTS SAY

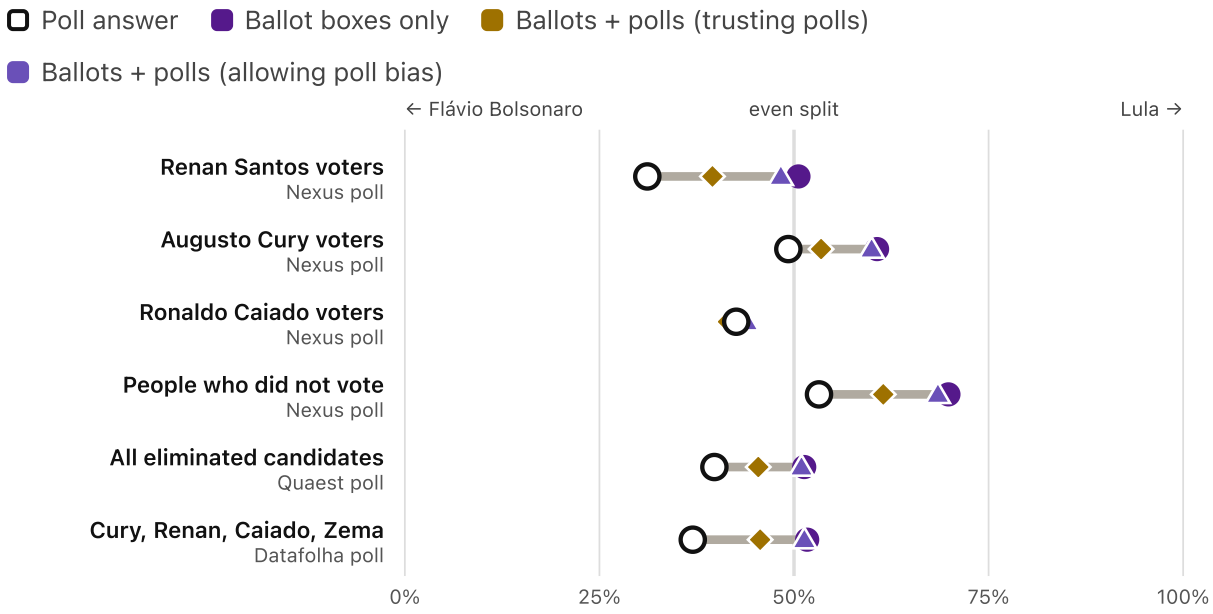
When the model's assumptions hold, it recovers the truth well (about 1.3% of voters misplaced) and 95% ranges are close to right (93%). With hidden churn, the error rises to about 3%, and with a neighborhood effect to about 11%, with 95% ranges that hold only about 39% of the time. Our own pre-set accuracy and coverage targets were not fully met, and we kept the failures visible.

5.3 Polls

The figure below sets the ballot-box estimates against what poll respondents said. The ballot-box estimates agree well with Nexus for Caiado's voters, are within a few points for Cury's, and differ for Renan Santos's voters, for non-voters, and for the combined eliminated candidates in Quaest and Datafolha. Part of the difference is expected: polls measure intentions before the vote, with small samples, recall error and non-response; and the poll answers are about the share choosing Lula *among those who chose a finalist*, which cannot be compared directly with a raw share. But the gap also tells us that the ballot-box estimate for these groups is not beyond doubt.

Figure 8 · Ballot boxes versus polls

Among people who chose Lula or Flávio, the share who chose Lula, by first-round group.



Polls measure vote intention shortly before the vote from small samples; the ballot-box method measures the actual result with model assumptions. Neither is ground truth.

Blending polls into the model pulls estimates toward the polls when they are trusted, and leaves them close to the ballot-box answer when poll bias is allowed. The blend that trusts the polls puts Lula's share of the eliminated candidates' voters at about 45%, the one that allows for poll bias at about 51%.

5.4 Sensitivity to assumptions

Figure 9 · Do the headline numbers depend on our assumptions?

Brazil-wide estimates under the six alternative assumptions about registration moves and model-area size.

	Base case	Base, larger areas	Fewest moves	Fewest, larger areas	More moves	Many moves
Lula voters who stayed with Lula	97.3%	97.4%	97.3%	97.4%	97.7%	98.0%
Flávio voters who stayed with Flávio	95.1%	95.3%	95.1%	95.3%	95.6%	96.0%
Eliminated candidates' voters who chose Lula*	49.9%	50.4%	49.9%	50.4%	50.5%	51.2%
Blank/null voters who chose Lula*	86.1%	86.1%	86.2%	86.2%	85.8%	85.5%
Non-voters of round 1 who voted in round 2	20.7%	20.6%	20.7%	20.6%	19.9%	19.2%
Returning non-voters who chose Lula*	68.7%	69.2%	68.7%	69.2%	69.2%	69.7%

*Among those who chose Lula or Flávio. The numbers hardly move: these assumptions are not what limits the analysis.

The headline estimates barely move across the six assumptions (registration moves from about 37 thousand to about 1 million; model areas of 2,500 or 5,000 units). This tells us the analysis is not fragile to *these* choices, but it says nothing about the bigger unknown, the neighborhood effect, which cannot be tested with the real data alone.

Smaller areas do move the answer. Forcina and Pavía (2026) fit their model in much smaller areas (roughly 50–90 polling stations), arguing that voters are more alike there. We refitted the strict-match baseline with areas of about 500 and 250 units (769 and 1,370 areas). Among eliminated-candidate voters who chose Lula or Flávio, Lula's share falls from 50.6% with 2,500-unit areas to 48.9% and 48.6%; about 0.7% and 1.0% of voters change cell. The shift points the same way in all five regions and abroad (largest in the North, about 6 points, and smallest in the South); Rio de Janeiro is the main state that moves the other way. It survives a second optimization pass (after

which 41 and 83 small-area fits, about 6% of voters, still miss our convergence criterion). Smaller areas make the equal-chance assumption more plausible but give each fit less information, and the real data cannot say which effect dominates. We therefore read the headline as uncertain by at least about 2 points in this direction, beyond the ranges in Section 3.5.

5.5 Numerical health

In the base case, 182 of 183 area fits met our numerical convergence criteria; one did not and is flagged. In the polls-blended versions, all five variants converged with no divergent transitions (maximum R-hat 1.006).

6. Limitations

1. **No individual-level data.** Every number here is an estimate for a group. The secret ballot makes it impossible to verify against individuals.
2. **The neighborhood effect.** The method assumes the same chance of switching within an area. If that is wrong in ways that track local make-up, estimates can be off by around 11% of voters, as in our worst simulation.
3. **Ranges are too narrow.** Our 95% ranges contained the truth between 39% and 93% of the time in tests. Read them as minimum uncertainty.
4. **Moves between ballot boxes.** We know how many voters changed boxes (at least 37,000, probably about 65,000), not how they voted. Alternative assumptions barely change results, but they are still assumptions.
5. **Small places.** Acre, Amapá, Roraima and the overseas vote rest on one area each; their results and ranges are unreliable.
6. **Small candidates.** Candidates below 0.5% of valid votes are pooled; we say nothing about them individually.
7. **Polls.** Polls measure intention and recall. We use them only as cross-checks, not as ground truth, and the poll-blended models are national approximations.
8. **Not a replication.** The method adapts published work; it is not an exact replication. The full article by Forcina and Pavía (2026), supplied as a local PDF, and its official supplement were consulted, and the first area of their supplement was reproduced. Their model areas are much smaller than ours (roughly 50–90 polling stations); Section 5.4 reports how our results change with smaller areas. Forcina, Gnaldi and Bracalente (2012) is cited through their description. For Klima et al. (2017), access remains limited to published metadata and software.
9. **Not peer reviewed.** This is a working paper. Some of our pre-set accuracy and coverage goals were not met.

7. Glossary

Ballot box / section (*seção*)
The smallest unit for which results are published; about 300 voters.

Blank / null vote

Voting for nobody (blank) or an invalid ballot (null). Neither counts as a vote for a candidate.

Abstention / "did not vote"
A registered voter who did not turn out.

Ecological inference
Inferring how individuals behave from group-level data.

Ecological bias / neighborhood effect
Error that arises when individuals behave differently depending on the make-up of their group.

Bootstrap / "95% range from resampling"
Repeating the analysis on many resampled versions of the data to see how much results move.

Hard limits
The range of values for a table cell that is consistent with the official totals, whatever the behavior.

Temporary transfer
A voter's request to vote at a different place for a given round.

Iterative proportional fitting
A technique that adjusts a table until its rows and columns add up to given totals.

8. References and sources

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