Analysis of the Quick Count in the 2019 Bolivia Election[1]

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On October 20, 2019, Bolivia held its third general election under its 2009 constitution. Nine presidential candidates competed in the presidential election, but early polling indicated a likely two-way race between president Evo Morales of the Movimiento al Socialismo (MAS-IPSP) and former president Carlos Mesa of Comunidad Ciudadana (CC).

On the day of the election, the unofficial count (*trep*) stopped at 7:40 PM, with only around 84% of the tally sheets (*actas)* that would be counted in the official count (*computo*) counted. On October 21, counting would resume at 18:29 PM after the OAS Electoral Observation Mission in Bolivia (OAS) requested a resumption of the quick count. After seeing an increase in favorable results for Morales's MAS-IPSP in the presidential race, the OAS would release a statement expressing concern about a "change in the trend" between results before and after the stopping of the *trep* on October 20[4].

At the cutoff of the *trep*, 5,152,979 votes had been cast, with Morales leading with 2,355,644 votes (a 7.78 percentage point margin). In the final tally of the *computo*, Morales's margin of victory would rise to 10.56 percentage points over CC candidate Mesa. Bolivian presidential elections require a 10 percentage point over the runner-up, and the change increase in the margin of victory in favor of Morales was taken as evidence by the OAS of fraud in favor of MAS-IPSP and to conclude that the change was "an irregularity on that scale that is a determining factor in the [Morales victory] outcome."[5]

We find that Morales's victory can be explained by his voter support before the quick vote count halted. Through three analyses of the vote prior to the cutoff at 84% of the vote count, we find the final result is explained by a trend in the vote count prior to the cutoff of the *trep*. Therefore, we cannot find quantitative evidence of an irregular trend or fraud as claimed by the OAS.

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[4] Organization of American States (OAS). 2019. "Statement of the OAS Electoral Observation Mission in Bolivia." https://www.oas.org/en/media_center/press_release.asp?sCodigo=E-085/19
[5] Organization of American States (OAS). 2019. "Electoral Integrity Analysis General Elections in the Plurinational State of Bolivia." October 20, 2019. https://www.oas.org/en/media_center/press_release.asp?sCodigo=E-109/19

Data Collection

The process for pulling the data was by scraping all the expected times and possible times in-between on the *actas* sites for both the *computo* and the *trep*[6]. Then, we went through each spreadsheet for the both vote counts and hashed the variables crucial to calculating vote totals. This allowed us to find each instances where *actas* were either deleted or votes were changed, which is documented in "all_switched_votes.docx" file included with the documents sent. In instances where multiple *actas* were verified at different times, we went with the *acta* that appeared the final data (the most recent *acta*).

As outlined in the original report, we see a cutoff in the quick count at around 83.85% of *actas* counted (around 84% of the final vote counted), which stopped reporting from 19:40:57 on October 20th to 18:29:53 on Oct 21st. While we see this drop in reporting in the quick count, it is not present in the official count, which only dropped between the 20th and 22nd during sleeping hours and a small drop at lunch.

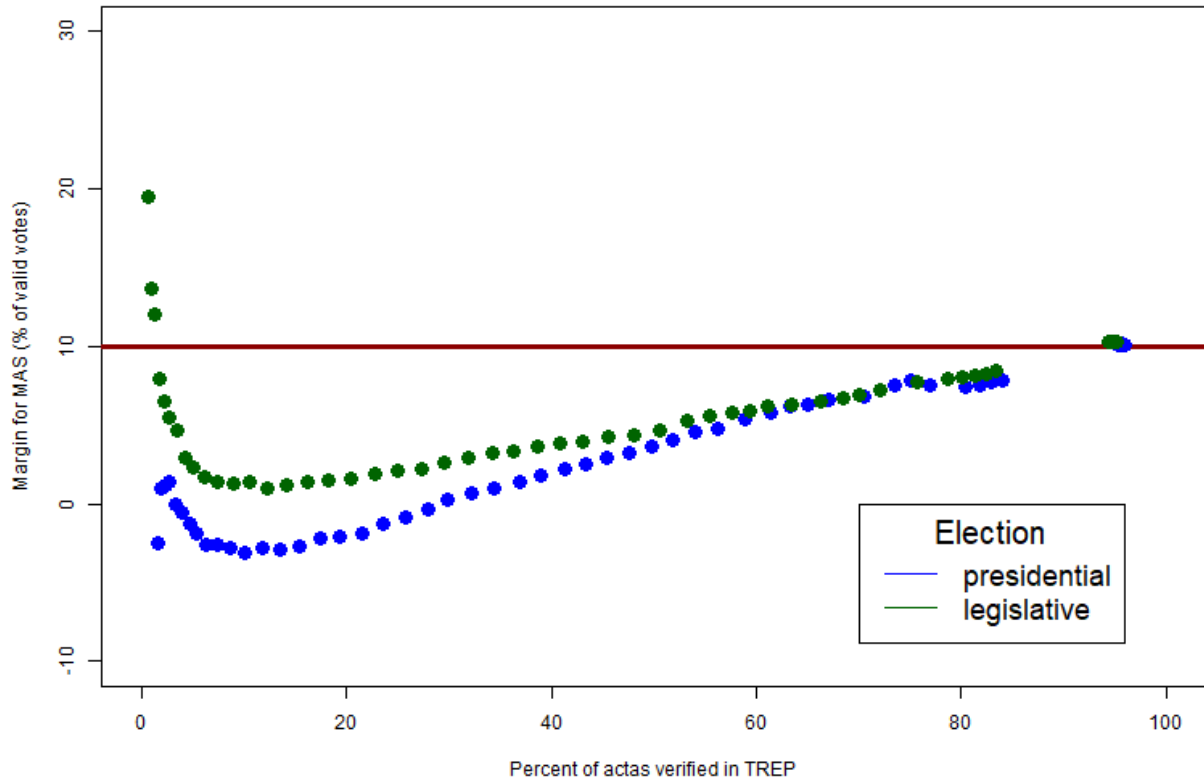## The Trend for MAS-IPSP before the Cutoff Matches the Final Count

At the cutoff of the *trep*, 5,152,979 votes had been cast, with Morales leading with 2,355,644 votes (a 7.78% margin). In the final official count, Morales's margin of victory would rise to 10.56% of the vote.

Figure 1 displays the cumulative margin of MAS-ISPS over CC divided by the cumulative vote total of the imputed vote for the quick count. As seen, the gap for the quick count is visible when points are aggregated by the minute reported, where the x axis is the imputed vote total of the *trep* divided by the final count of votes in the *computo*. The points are the reported vote totals aggregated by the minute. Further, the first 1% of points were aggregated to decrease the variability of the plots in the initial counting as small changes initially indicated too much variation.

Earlier in the vote count and prior to the stopping of the *trep*, there was a trend in the presidential vote count in favor of MAS-IPSP. As seen, the despite early results in favor of CC, the margin for MAS-IPSP began to rise as early as 10% of the vote count. Further, early vote reporting is highly variable as the number of actas is extremely low.
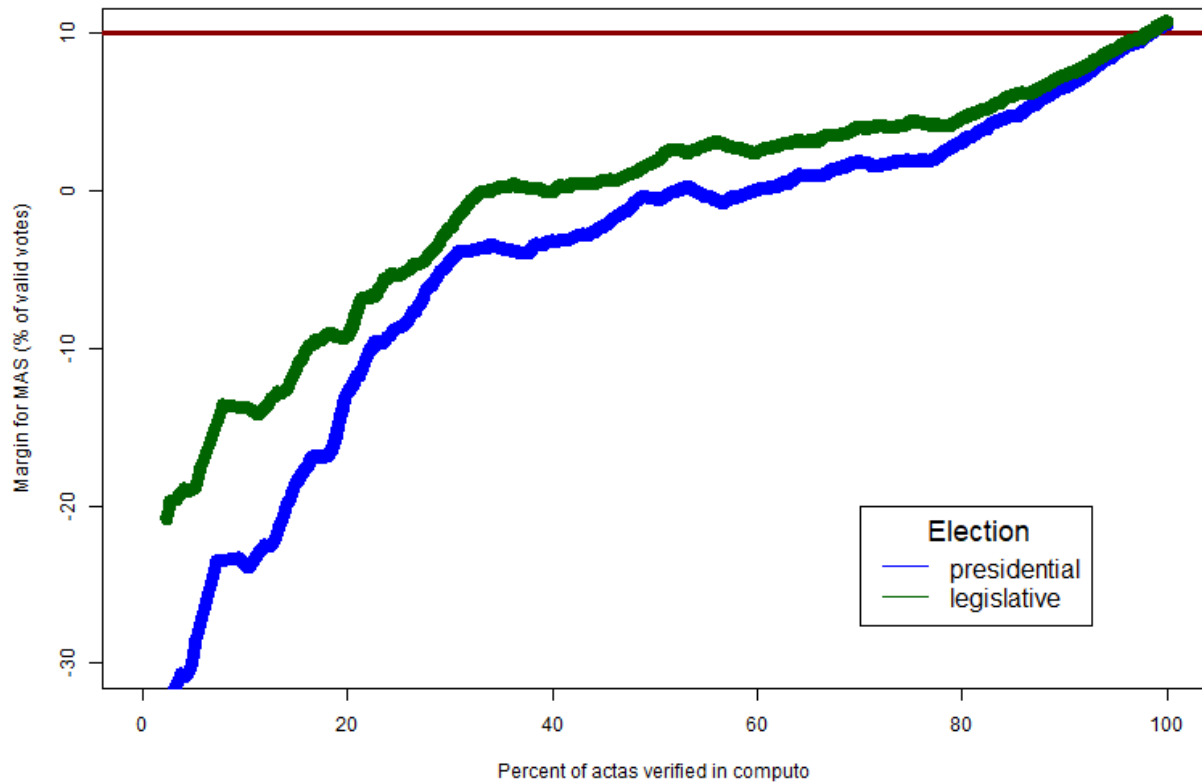
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[6] Located at https://trep.oep.org.bo/PubResul/ and https://computo.oep.org.bo/PubResul/ respectively

Figure 1: The MAS-IPSP margin increased steadily through most of the quick count (TREP) as more tally sheets (actas) were verified

The results seen in the *trep* are mirrored in the *computo*, which saw no interruption in the verification of vote totals. **Figure 2** plots the cumulative margin of MAS-ISPS over CC divided by the cumulative vote total of the cumulative vote total of the *computo*. The points are the reported vote totals aggregated by the minute. Further, the first 1% of points were aggregated to decrease the variability of the plots in the initial counting as small changes initially indicated too much variation.

Figure 2: The MAS-IPSP margin increased steadily through most of the official count (computo) as more tally sheets (actas) were verified
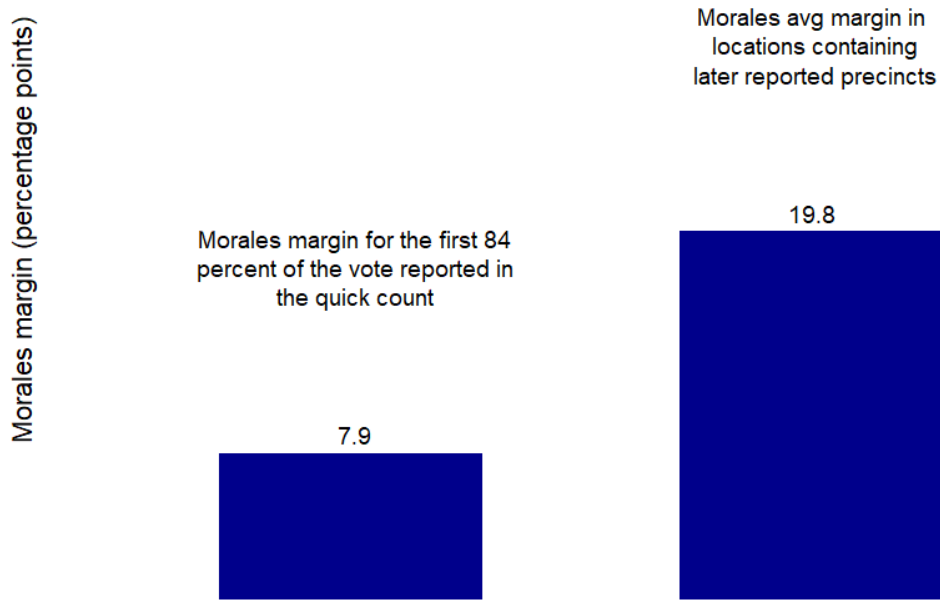
Precincts with *Actas* Remaining Favored Morales's MAS-IPSP

The goal of this analysis is to determine the extent to which the final vote results for Morales can be explained from analyzing the first 84% of precincts alone. In this analysis, we would expect that if the margin of victory for Morales would be similar in *actas* within the same precinct whether they were verified before and after the closing of the quick count.

Figure 3 shows that precincts with *actas* remaining to be counted after the halting of the trep on average had a margin favoring Morales by 19.8 percentage points before the cutoff. When plotted out, we see that in precincts with *actas* left uncounted in the *trep* but included in the final vote, the average margin for Morales was much higher than the overall margin for Morales at the cutoff. If we include *actas* remaining to be counted when the quick count ended, the margin shrinks mildly to an average of 21.2 percentage points.

Figure 3: Before the close of the quick count, Morales had high margin in precincts with unverified actas

The margin in the right column of **Figure 3** is an average by precinct and does not account for the varying size of precincts, nor does it account for the small percentage of precincts with no *actas* counted before the interruption. Given that, we thought it would be useful to see individual trends in reporting for precincts before and after the halting of the *trep*. 58.11% (N=2805) of precincts reported all *actas* before the cutoff, 11.29% (N=545) of precincts reported no *actas* before the cutoff, and 30.59% (N=1477) of precincts reported *actas* both before and after the cutoff. **Figure 4** below displays the correlation in Morales's margin between actas reported before and after the cutoff for precincts that reported *actas* after the 84% cutoff.

As seen, while there is a strong relationship between the margin for Morales before and after the cutoff, the 545 precincts with no reported votes before the cutoff bias the results. We therefore included **Figure 5,** which analyzes only those precincts that reported both before and after the halting of the *trep*.

There is a strong relationship within precincts between voting margins reported before and after the cutoff, with the change in the trend nearly intersecting at zero in **Figure 5**. This provides a strong indication that within precincts there was no clear change in favor of a single party after the *trep* interruption.

Despite no change in party's margins before and after the cutoff, we do see an increase in the overall margin for Morales in this group from 7.29 percentage points before the cutoff to 20.12 percentage points after the cutoff. This results from three precinct trends in the group reporting before and after the cutoff. First, CC-favoring precincts on average reported 41% more votes than Morales-favoring precincts prior to the cutoff, while those Morales-favoring precincts reported 7% more after the cutoff. Of the 1477 precincts that reported before and after the cutoff, 66% of those precincts favored Morales. Finally, precincts favoring Morales supported him on average by 46 percentage points, while those favoring CC did so only by around 28 percentage points before and after the cutoff.
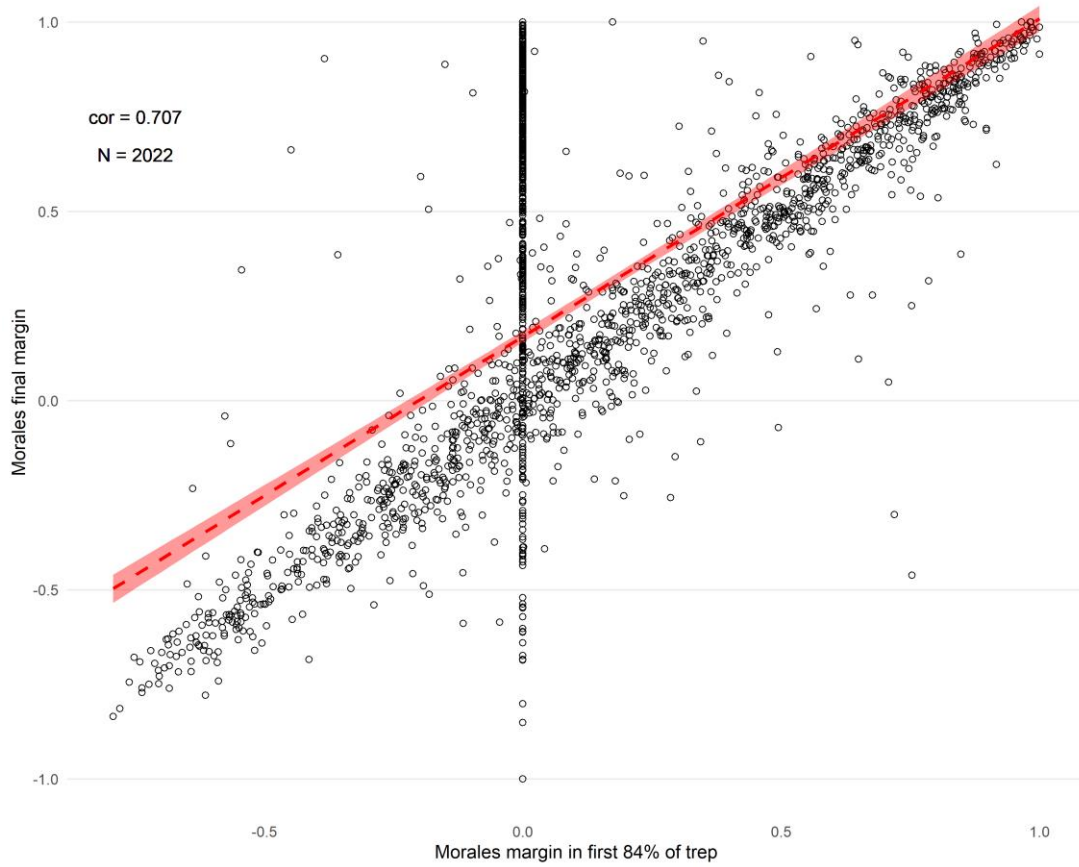
Considering the strong relationship between precinct margins, we can confidently estimate the margin of votes verified after the interruption based on the *actas* that were counted before the interruption from the same precincts. We estimate Morales' margin in the 13.78% of votes in those *actas* to be 19.12 percentage points. We can therefore confidently attribute an increase in Morales' margin by 1.59 percentage points, from 7.87 at 84% of final vote counted to 9.46 percentage points at 97.78% of vote counted[7].

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[7] This is the arithmetic for solving the change in the overall margin:
all reported before cutoff (margin = .08853, votes = 1922419)
unfinished reported before cutoff (margin = .07288, votes = 3230560)
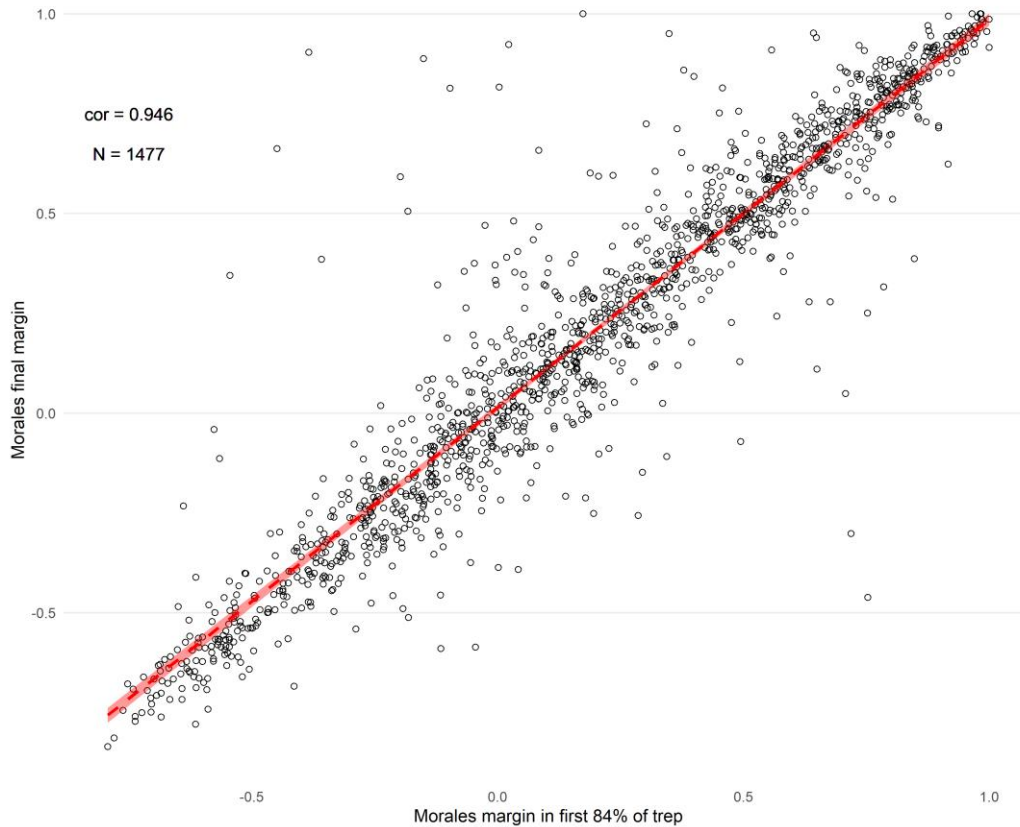unfinished reported after (predicted margin = 19.12, votes = 845560)

$$margin\ at\ 97.78\%\ count = \frac{(.08853 \times 1922419 + .07288 \times 3230560 + 19.12 \times 845560)}{(1922419 + 3230560 + 845560)}$$

$$margin\ at\ 97.78\%\ count = 0.09457$$

Figure 4: Correlation between margin for Morales before and after cutoff
(by precincts that reported after cutoff)

Figure 5: Correlation between margin for Morales before and after cutoff
(by precincts that reported before and after cutoff)

Unfortunately, we cannot make this comparison for precincts that had no *actas* reported at the time the *trep* stopped. If we isolate the results from precincts that were reported only after the 84% cutoff, we arrive at a dataset that is 2.22% of the vote remaining in the presidential vote. If we add the 2.22% of vote remaining in the final count to our calculated margin, we find that Morales needed a 27.68 percentage point margin over Mesa in that final 2.22% to surpass the 10 percent margin and avoid a runoff[8].

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[8] This is the arithmetic for solving the required margin to surpass 10 percentage points:
   all reported before cutoff (margin = .08853, votes = 1922419)
   unfinished before cutoff (margin = .07288, votes = 3230560)
   unfinished after cutoff (margin = .201184, unfinished after votes = 845560)
   all reported after cutoff (margin = ?, votes = 136286)

$$\frac{(a \times a_n + b \times b_n + c \times c_n + d \times d_n)}{(total\ vote)} = margin$$

$$a = \frac{(total\ vote \times .10 - b \times b_n - c \times c_n - d \times d_n)}{a_n}$$

$$a = \frac{(6134825 \times .10 - .08853 \times 1922419 - .07288 \times 3230560 - .201184 \times 845560)}{136286}$$

$$a = 0.2768113$$

As the precincts that reported only after the cutoff are small and had no more than 2,694 total votes, we subset precincts to the 73.39% (N=3533) of them that reported votes before and had no more than 2,694 total votes. We split the precincts into those that favor Morales or favor Mesa, and impute the total number of votes for both based on the change in the votes cast by precincts from the dataset in **Figure 5**. Using any precinct with less than the maximum number of votes cast in the last 2.22% of vote remaining, we can predict a 29.42 percentage point margin for Morales in the last 2.22% of the vote and a final margin above the 10 percentage point requirement to avoid a runoff.

Morales Could Expect at Least a 10.5 Percentage Point Margin Based on the Results before the Cutoff

Synopsis: The goal of this analysis is to determine the extent to which the final vote results for Morales can be explained by chance alone for the quick count vote. It should be noted that the quick count would be useful as fraud detection if conditions are met:

1. The majority party in power decide to not ballot stuff leading up to the election, due to
2. The majority party's belief that their existing base of support among likely voters is sufficiently strong so as to achieve victory
3. The majority party realizes that they overestimated their own support relative to the opposition, and
4. The majority party seeks to commit election fraud part way through the election
5. The majority party does not believe they could bear the costs of a runoff election
6. The majority party in power does not have the means to change the quick vote counts

If the above conditions are met, then the quick vote would be useful as a means to track discrepancies between the official vote, controlled by the government, and the less biased quick vote. It should be noted that given conditions one and two, the quick vote only works for governments largely incompetent in election fraud.

 It should also be noted that the validity of the quick vote has yet to be tested within the elections science literature. Although there has been some evidence of incorporating time into detecting fraud (Mebane and Kalinin 2009, 2010), such research also incorporated political geography and the second-digit Benford law test in order to distinguish potential fraud from strategic voting. Additionally, Atkeson and Mann (2020) in their in depth investigation of potential election fraud given irregular voting patterns over time ultimately could not find any quantitative evidence of fraud. Further, Foley (2015) finds evidence that latter votes tend to trend Democratic within the United States due to reasons other than fraud.

Therefore, any results should be read with caution, as especially given that the false positive rate is unknown. However, if one accepts the utility and validity of election return timing, then Bolivia is an interesting case. The vote count halted at around 7:40 PM Bolivian time on October 20th 2019, and then later continued with President Morales ultimately claiming an over ten percentage point victory over the nearest opposition. It is alleged that the halt of the vote permitted Morales to commit election fraud and achieve electoral victory. The OAS report in particular implies the halt is an

exogenous treatment in which the votes that arose after were distinct and different from the vote returns earlier in the election.

If these claims of election fraud centered around the halt in voting, then we should expect the following hypotheses:

Hypothesis 1: A discontinuity exists, separating in a distinct manner vote percentages for and against Morales before and after the cutoff.

Hypothesis 2: Other covariates associated with support for Morales cannot explain selection of precincts into or outside of the time cutoff, demonstrating exogeneity.

Hypothesis 3: The decisive over ten percentage point margin for Morales cannot be explained by local voting trends before the cutoff.

Given these hypotheses, we run the following analyses.

REGRESSION DISCONTINUITY DESIGN

If the election fraud as centered around the halt of the cutoff in voting is true, then one would expect a distinct change in support for Morales before an after the cutoff. An illustration of what might be expected can be seen in Figure 1, with the time since the start of the election on the x-axis, and proportion of the vote for Morales on the y-axis. The plot demonstrates what a discontinuity would look like, where the vote prior to the cutoff is normally distributed about 0.4 with a standard deviation of 0.2, and post-cutoff a normal distribution about 0.7 and standard deviation of 0.2. Real life data would look more noisy, though some case of election fraud centered around the cutoff should approximate these results as a necessary condition to demonstrate election fraud.
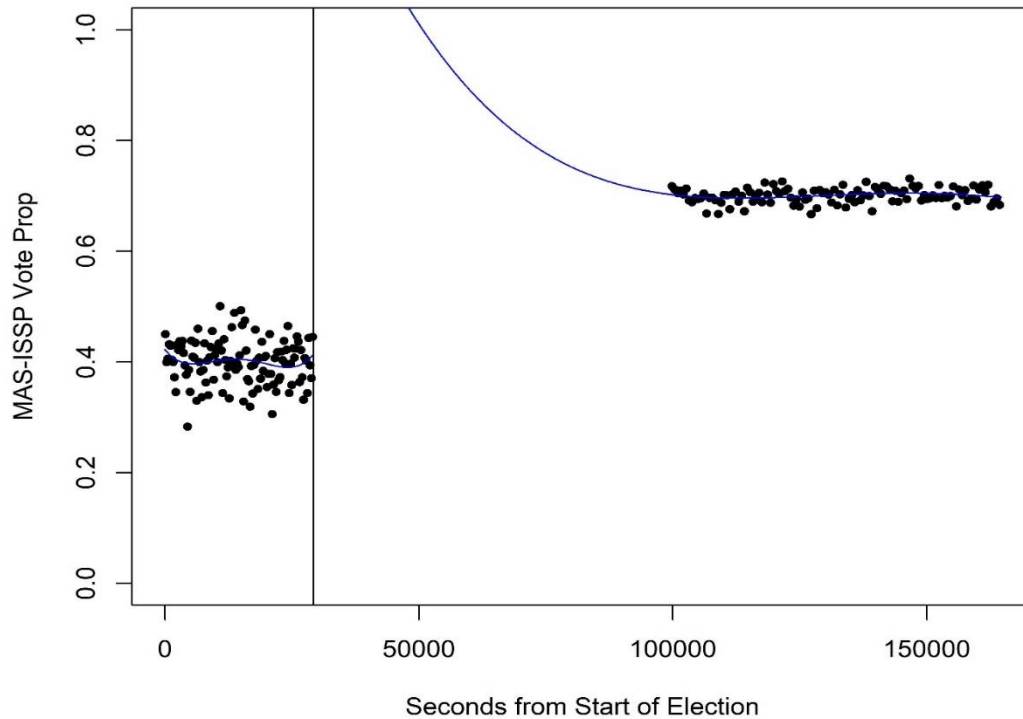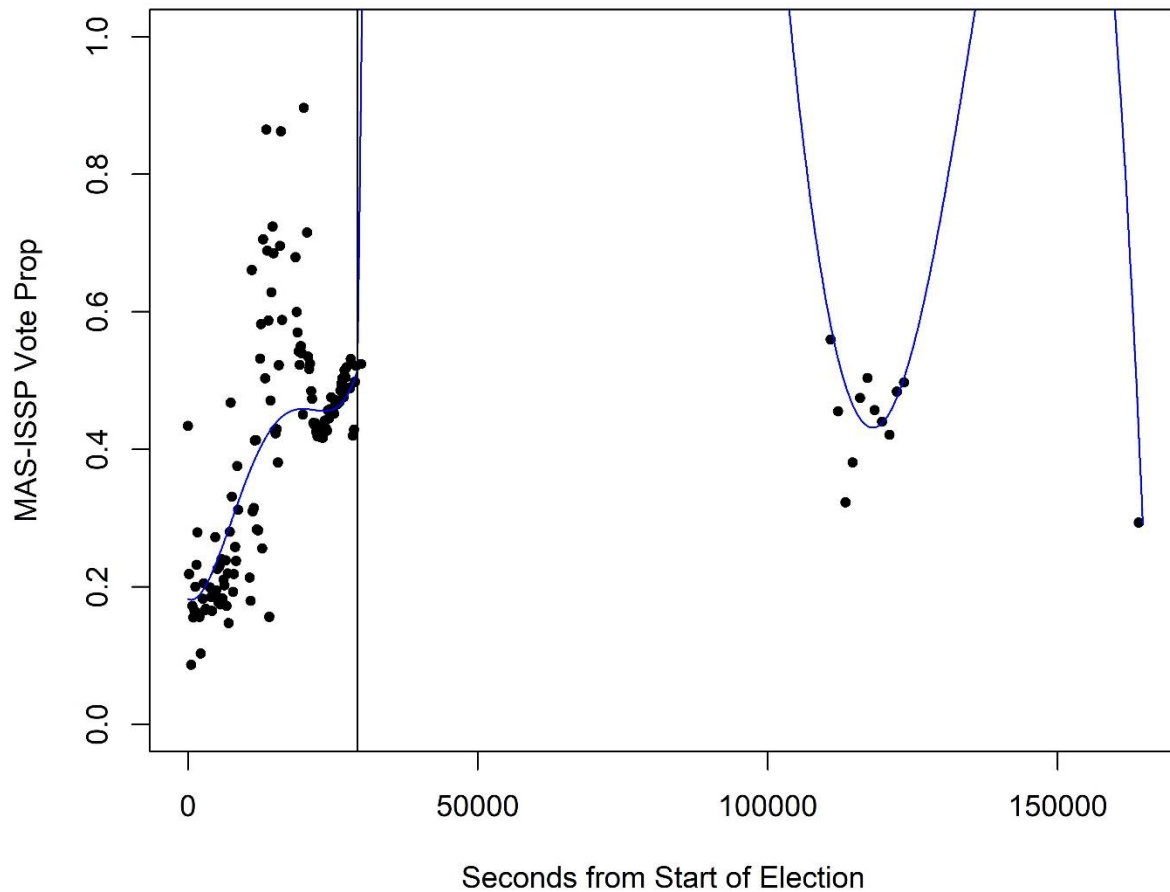
Figure 2 presents an RD plot, as created using the "rdrobust" package in R, with the Morales vote proportion on the y-axis and time on the x-axis. Unlike Figure 1, we see no significant break and discontinuity arising at the cutoff in reported vote. Insofar as there is an increase in the MAS vote, it is well before the cutoff, and instead returns to between 40 and 50 percent of the vote following the break. Even if one were to select upon the data, moving the discontinuity to where the Morales vote initially increases, there is no actual break that is required for an RDD to be demonstrated. Therefore, there is not sufficient evidence to reject the null hypothesis for hypothesis 1.

EXOGENEITY OF DISCONTINUITY

Related to hypothesis 2, it should be the case that socio-demographic factors and other covariates should not predict whether a precinct reported results before or after the deadline. The table below reports a multilevel logistic regression model, where the dependent variable is whether a precinct reported elections returns after the cutoff. Included are random effects by municipality, and sociodemographic factors that might be correlated with both support for candidates and whether a locality has the resources to quickly conduct elections. These factors include the percentage of the population that are Spanish speaking, percentage with indoor water access, percent that does not attend school, and percent without internet access. Each of these covariates are significantly associated with whether an area reported results before the cutoff. For example moving from the areas placing around the first quartile in water access to third quartile is associated with an eight percentage point increase in the probability that a precinct reports after the cutoff. The extent to which local resources predict election infrastructure capacity is a research worth pursuing, though for now we note that the exogeneity of the treatment is questionable, and should be treated with extreme caution given the other potential explanations of later election results.
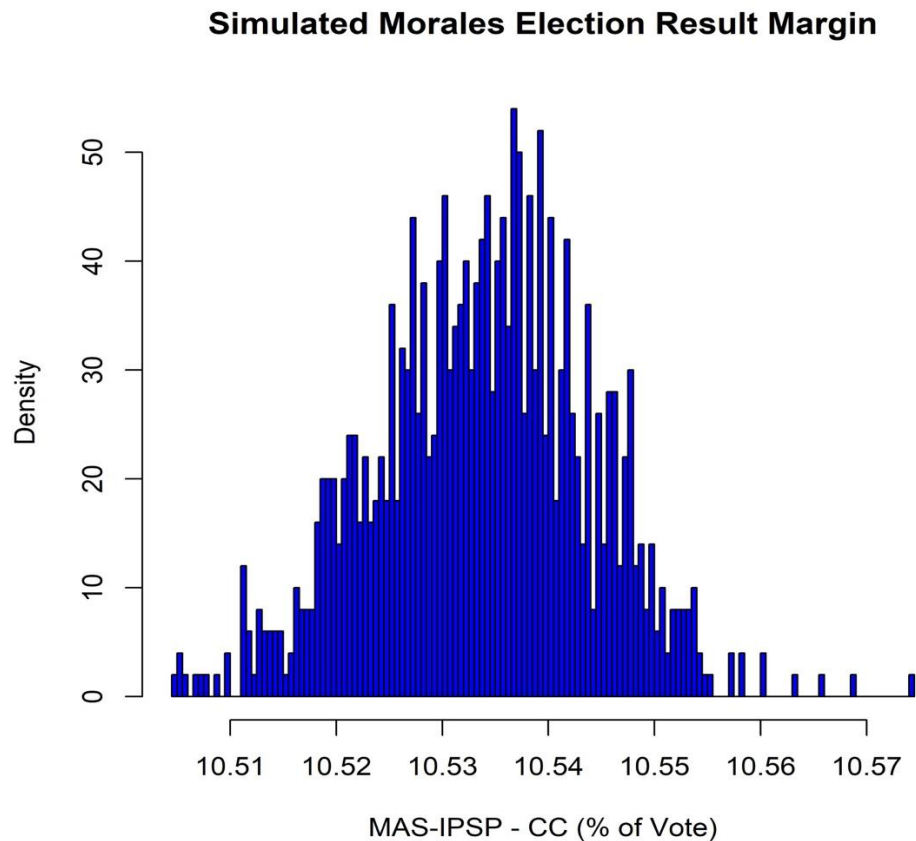
	Dependent variable: Report After Cutoff
% Spanish Speaking	-0.291[**]
	(0.121)
% Indoor Water Access	-1.572[***]
	(0.191)
% Does Not Attend School	-4.713[***]
	(0.570)
% No Internet	-1.149[***]
	(0.314)
Constant	2.906[***]
	(0.540)
Observations	31,588
Log Likelihood	-11,619.470
Akaike Inf. Crit.	23,250.940
Bayesian Inf. Crit.	23,301.100
Note:	[*]$p<0.1$, [**]$p<0.05$, [***]$p<0.01$

CONTINUATION OF VOTING TRENDS

The final hypothesis relates to whether the final election results can be explained by voting patterns that emerged before the quick vote count halted. To answer this, we conduct a Bayesian analysis where vote counts for MAS-ISSP, CC, and third parties are calculated for all of the precincts remaining after the cutoff. We run the analysis such that we sample from precincts first when data is available, localities when there is insufficient data before the cutoff by precinct, and finally by

municipality in the event of insufficient data by locality. We apply a weak improper prior[9] to the rate parameter for the randomly generated Poisson model, and run 1000 simulations. Following these simulations, we sum the respective vote totals, add to the election results before the cutoff, and compare the electoral margin for Morales relative to the second place winner, CC.

The simulations reveal a range of margin of victory for Morales that ranges from 10.5 to 10.58 percentage points over CC. No observations exist where the margin is less than the ten percentage points required to head off a runoff election.

Simulated Morales Election Result Margin

MAS-IPSP - CC (% of Vote)

Conclusion

The OAS's claim that the stopping of the trep during the Bolivian election produced an oddity in the voting trend is contradicted by the data. While there was a break in the reporting of votes, the substance of those later-reporting votes could be determined prior to the break.

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[9] Improper priors are useful insofar as there is some data that is being predicted onto that is worth preserving, though should contribute little information. In the case of the Bolivian elections returns data, this appears warranted given that areas after the cutoff seem to vary significantly by conditions that might be related to election results and support of candidates.

Therefore, we cannot find results that would lead us to the same conclusion as the OAS. We find it is very likely that Morales won the required 10 percentage point margin to win in the first round of the election on October 20, 2019.

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