INSTITUTE for REPLICATION

No. 128
I4R DISCUSSION PAPER SERIES

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May 2024

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MAY 2024

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ISSN: 2752-1931

When do politicians appeal more broadly? A comment on Chin (2023)

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Abstract

Moya Chin's (2023) paper argues that politicians in two-round majoritarian systems have to appeal more broadly than those in single-round elections. The author uses data for mayoral elections in Brazil. The key findings of the paper conclude that of two-round systems (1) fostering inclusiveness, (2) resulting in higher levels and wider distribution of public goods, and (3) leading to better immediate societal outcomes in terms of drop-out and elementary literacy rates. The author uses regression discontinuity design to test her hypotheses.

We test computational reproducibility and successfully duplicate the key results of the study. We also test for result replicability by modifying the data sample used by Chin (2023) using the same method. In nearly all cases, we find that our results are very close (in terms of direction of effect, magnitude, and statistical significance) to those obtained by the original author with only some relationships losing statistical significance. We reproduce and then replicate all the three key empirical results obtained by the author, meaning that there is an effect on inclusiveness, distribution of public goods, and more immediate societal outcomes (although, our study does not find a statistically significant effect of a two-voter system on elementary literacy rates).

1. Introduction

The paper (Chin, 2023) that we attempt to replicate investigates whether two-round electoral rules create incentives for politicians to appeal more broadly to the electorate than single-round elections. The dichotomy of the voting rules themselves is an artifact of Brazilian constitution of 1988 (the study covers years 1996-2016). The unique setting of Brazil – municipalities with fewer than 200,000 eligible voters use single-round and municipalities with 200,000 or more eligible voters elect mayors using a two-round election – enables the author to use a Regression Discontinuity Design (RDD), a quasi-

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experimental tool for empirical evaluation. The study uses a window of 50,000 voters around the threshold of 200,000, but also modifies it to test for result robustness.

Chin (2023) tested the effect of electoral system on geographic concentration of voters, voter engagement, allocation of municipal resources (proxied by municipal schools), downstream education (drop-out, failing, passing, and elementary literacy rates) and economic (low-income rate, income per capita, unemployment rate, and night lights) outcomes, and selection and responses of candidates. The dataset is constructed using data from Tribunal Superior Eleitoral, School Census from Brazil's Ministry of Education. Using RDD, Chin (2023) finds that a two-round system vote concentration, electoral outcomes, distribution of public goods and societal outcomes.

In this comment, we assess the reproducibility and replicability of the study's findings. Since it covers a broad range of variables, we concentrate on those results that suggest a statistically significant effect of a two-round system. We first run the code provided by Chin (2023) to reproduce the results. Then, we remove from the sample municipalities that have always had a two-round system in the studied period and run the same analysis using the code developed by the author.

2. Reproducibility

Overall, the document was easy to replicate. The R script documents with all the code were provided and the commands ran smoothly. We identified no errors in coding and made no changes to it. When re-running the code, the plots and models generated corresponded with those of the author's paper.

3. Replication

In this section, we evaluate the robustness of author's empirical tests. We chose to apply robustness replicability – that is, we tested whether we could duplicate the results using the same data and models, but a different procedure in selecting the sample than that of the author. We limited the analysis to the key results of the original study, which identified an effect of a two-round system. We explored two approaches to such replications: (1) elimination of municipalities that experienced an electoral system change from a single-

round elections to a two-round system, and (2) keeping only those municipalities that experienced the transformation to a two-round system.

However, we could not perform the analysis using the first approach (which was the originally intended strategy) as we experienced a problem with degrees of freedom, as only 16 observations remain in municipalities that are using a two-round election system compared to 90 observations in municipalities that use a single-round election (39 such municipalities in the reduced sample). That is, there are only 16 observations (from 8 municipalities) having between 200,000 and 250,000 eligible voters in the reduced dataset. Even if we did not restrict our observations to coding rules defined in the article (50,000 registered voter window) the imbalance between the number of single-round and two-round systems remains. Changing the registered voting window to 100,000 does not fix the problem and models do not fully work. Therefore, we are not able to utilize this approach and have to rely on the alternative one.

The second approach was identified and chosen after failing to implement the first one. Here, we looked at the studied situation as a natural experiment and only including those municipalities that experienced electoral system change in the treatment group (the number of observations in the control group remained unchanged). That is, we excluded municipalities that have always been larger than 200,000 eligible voters and kept those that experienced change during at least one election cycle. If a municipality crossed the window of 50,000 (distanced from the 200,000 eligible voters) it was dropped from the sample for that election cycle.

In terms of the analysis methods, we used identical methods to those of the author, using the same code. All the tests are presented in tables in the text that follows with both results from the original study and our findings. While the original study only discussed p-values in-text, we include them in tables here for easier comparison. As the original code does not provide p-values in the tables, they were extracted separately from the *output* lists generated by the R code by calling numeric variable *cpval*. The values of this variable were compared against the original text to see if these are the values used to assess the results in the original study.

3.1 Geography of votes (Chin 2023, 16–19)

How broadly does the candidate appeal to the voters (testing the hypothesis that two-round voting systems foster inclusiveness)? Our results closely match those of the original study and do not indicate any issues.

Table 1 below measures the concentration by the coefficient of variation, fractionalization index, and entropy index. In the original paper the results are reported as Panel A in Table 2 (see Chin 2023, 19). We first report the results of the original study, and then, in the next column the results that we received using modified data (see Table 1). The results are nearly identical.

Table 1 – Effect on the geographic concentration of voters (Panel A: Concentration indices of voters for specific candidates): Modifying the sample

RDD	Coefficient of variation Original Study	Coefficient of variation	Fractionalization Original Study	Fractionalization	Entropy Original Study	Entropy
TwoRound	-0.009***	-0.008***	-0.012**	-0.011**	-0.008*	-0.008*
	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)
	[0.008]	[0.009]	[0.014]	[0.023]	[0.078]	[0.087]
Potential bias	0.0008	0.0008	-0.0002	-0.0002	-0.0923	-0.0923
Single-round mean	0.019	0.019	0.027	0.027	0.030	0.030
Observations	264	256	264	256	264	256
Municipalities	89	84	89	84	89	84

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

The same can be said about the effect of two-round electoral rules on the geographic concentration of voters for the top 4 candidates. Our replication supports the original results and show similar tendencies across the board, but we lose statistical

significance ($p<0.1$) for the 2nd place taker. That being said, the scope and direction of the effect is nearly identical for all candidates (1st, 2nd, 3rd, and 4th place takers).

Table 2 – Effect on the geographic concentration of voters (Panel B: Standard deviation in vote shares for each candidate): Modifying the sample

RDD	1st Place Original Study	1st Place	2nd Place Original Study	2nd Place	3rd Place Original Study	3rd Place	4th Place Original Study	4th Place
TwoRound	-0.017**	-0.015**	-0.014*	-0.012	-0.005	-0.003	0.004	0.005
	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.004)	(0.004)
	[0.021]	[0.036]	[0.087]	[0.162]	[0.501]	[0.659]	[0.379]	[0.316]
Potential bias	-0.0011	-0.0011	-0.0010	-0.0010	-0.0004	-0.0004	-0.0002	-0.0002
Single-round mean	0.080	0.080	0.075	0.075	0.042	0.042	0.023	0.023
Observations	264	256	264	256	251	243	216	210
Municipalities	89	84	89	84	89	84	84	81

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

Next, we replicate the results on the vote share for top two candidates only. The coefficients and their sign remain very close to the original study but lose statistical significance for the coefficient of variation. For fractionalization and entropy, the results remain statistically significantly different from 0, but now at a 10% level (see Table 3). In the original study the results were presented as Panel C, Table 2 (see Chin 2023, 19).

Table 3 – Effect on the geographic concentration of voters (Panel C: Using vote shares from top two candidates only): Modifying the sample

RDD	Coefficient of variation Original Study	Coefficient of variation	Fractionalization Original Study	Fractionalization	Entropy Original Study	Entropy	Standard Deviation of 1st place candidate	Standard Deviation of 1st place candidate
TwoRound	-0.015**	-0.013	-0.018**	-0.016*	-0.013**	-0.012*	-0.015	-0.012
	(0.008)	(0.009)	(0.009)	(0.009)	(0.007)	(0.007)	(0.009)	(0.009)
	[0.079]	[0.121]	[0.040]	[0.064]	[0.048]	[0.067]	[0.108]	[0.200]
Single-round mean	0.036	0.036	0.038	0.038	0.029	0.029	0.088	0.088
Observations	264	256	264	256	264	256	264	256
Municipalities	89	84	89	84	89	84	89	84

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

The previous tests show support for author's hypothesis that two-round systems foster inclusiveness – that's voters from more geographical areas are represented in such systems. The author also tests inclusiveness hypothesis by looking at voter engagement (see Chin 2023, 17–18). Chin presents her findings in Table 3 in the original study.

Table 4 – Effect on other electoral outcomes: Modifying the sample

RDD	Turnout Original Study	Turnout	Blank/ invalid ballots Original Study	Blank/ invalid ballots	# candidates Original Study	#candidates
TwoRound	0.006	0.002	-3.821**	-3.767**	1.273***	1.534***
	(0.008)	(0.008)	(1.670)	(1.749)	(0.339)	(0.357)
	[0.436]	[0.801]	[0.023]	[0.032]	[0.0002]	[0.00002]
Single-round mean	0.843	0.843	16.524	16.524	4.604	4.604
Observations	296	281	296	281	296	281
Municipalities	92	84	92	84	92	84

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

3.2 The allocation of municipal resources (Chin 2023, 19–22)

As in previous regression tables, our test results are presented alongside the results from the original study. Our findings are nearly identical to those of the author.

The table below shows the effect of two-round systems on the allocation of public goods. Chin (2023) proposes that broader support for a politician under a two-round system will shape the provision of public goods positively, which the results and our replication support (see Table 5). More specifically, we evaluate the empirical tests of the hypothesis that two-round systems promote higher levels and wider distribution of public goods. The replication shows similar results to those of the original article (Chin 2023, 20).

Table 5 – Effect on resources in municipal schools: Modifying the sample

RDD	Mean level of resources Equipment Original Study	Mean level of resources Equipment	Mean level of resources Infrastructure Original Study	Mean level of resources Infrastructure	Standard deviation in resources Equipment Original Study	Standard deviation in resources Equipment	Standard deviation in resources Infrastructure Original Study	Standard deviation in resources Infrastructure
TwoRound	0.081**	0.069*	0.057*	0.061*	-0.018*	-0.018*	-0.021	-0.029*
	(0.035)	(0.037)	(0.033)	(0.034)	(0.009)	(0.010)	(0.016)	(0.015)
	[0.021]	[0.061]	[0.084]	[0.074]	[0.060]	[0.078]	[0.190]	[0.051]
Single-round mean	0.738	0.738	0.731	0.731	0.121	0.121	0.157	0.157
Observations	820	785	912	857	820	785	912	857
Municipalities	79	71	79	71	79	71	79	71

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

Additionally, the author tests how resources for schools are distributed at different municipalities and finds that the increased level of resources (equipment) are distributed at the 1st and 2nd quartiles (see Table 6). In the original study, these findings are reported in Table 5, Panel A (see (Chin 2023, 22). We replicate these results – our findings are nearly identical.

Table 6 – Effect on resources in schools at different parts of the municipal distribution (Panel A: Equipment - Mean level of resources in schools at different quartiles): Modifying the sample

RDD	1st quartile (Bottom 25%) Original Study	1st quartile (Bottom 25%)	2nd quartile Original Study	2nd quartile	3rd quartile Original Study	3rd quartile	4th quartile (top 25%) Original Study	4th quartile (top 25%)
TwoRound	0.082**	0.073*	0.066*	0.066*	0.069*	0.068	0.038	0.036
	(0.035)	(0.039)	(0.037)	(0.038)	(0.042)	(0.042)	(0.029)	(0.030)
	[0.021]	[0.059]	[0.077]	[0.083]	[0.099]	[0.107]	[0.202]	[0.222]
Single-round mean	0.652	0.652	0.733	0.733	0.781	0.781	0.856	0.856
Observations	700	672	728	704	760	736	748	724
Municipalities	74	69	75	71	74	70	73	69

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

The findings for the infrastructure resources quite similar to those reported above. Schools in the 1st and 2nd quartiles experienced gains in infrastructure resources under two-round systems. Originally, findings are reported in Table 5, Panel B (see Chin 2023, 22). We replicate these results – our findings are nearly identical. See the table below.

Table 7 – Effect on resources in schools at different parts of the municipal distribution (Panel B: Infrastructure - Mean level of resources in schools at different quartiles): Modifying the sample

RDD	1st quartile (Bottom 25%) Original Study	1st quartile (Bottom 25%)	2nd quartile Original Study	2nd quartile	3rd quartile Original Study	3rd quartile	4th quartile (top 25%) Original Study	4th quartile (top 25%)
TwoRound	0.116**	0.111**	0.102**	0.102**	0.056	0.056	0.013	0.013
	(0.046)	(0.047)	(0.047)	(0.048)	(0.035)	(0.035)	(0.021)	(0.021)
	[0.012]	[0.020]	[0.031]	[0.033]	[0.110]	[0.115]	[0.539]	[0.548]
Single-round mean	0.540	0.540	0.689	0.689	0.814	0.814	0.914	0.914
Observations	776	748	764	740	784	760	780	756
Municipalities	75	70	74	70	75	71	75	71

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

3.3 Downstream outcomes (Chin 2023, 22–25)

The author of the original study also tests the effect of different electoral rules on educational outcomes of the students. We are able replicate the results – the effect goes in the same direction and is close to the original study in all cases. That is, two-round electoral systems produce lower drop-out and failing rates as well as higher passing and literacy rates than single round rules. However, only the effect on drop-out rates is statistically significant. The effect on the elementary literacy rate sees a value higher than 0.1.

Table 8 – Effect on downstream municipal outcomes (Panel A: Education outcomes): Modifying the sample

RDD	Drop-out rate Original Study	Drop-out rate	Failing rate Original Study	Failing rate	Passing rate Original Study	Passing rate	Elementary literacy rate Original Study	Elementary literacy rate
TwoRound	-1.649**	-1.262**	-0.758	-1.066	2.330	2.304	1.199*	1.263
	(0.667)	(0.622)	(1.114)	(1.108)	(1.459)	(1.446)	(0.710)	(0.775)
	[0.014]	[0.043]	[0.496]	[0.336]	[0.111]	[0.111]	[0.093]	[0.105]
Single-round mean	3.211	3.211	8.645	8.645	88.283	88.283	91.445	91.445
Observations	909	855	909	855	909	855	177	163
Municipalities	79	71	79	71	79	71	71	63

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

Finally, the article explores the effect of different electoral rules on socioeconomic outcomes (testing the hypothesis that two-round systems lead to lower poverty rates, higher income per capita, lower unemployment rate and more night lights). We do replicate most of the results – the effect goes in the same direction as in the original study in all cases. However, the scope of the effects is magnitudes lower than predicted by the author. For example, we find that the effect on income per capita is low and close to 0. On the other hand, the results are not statistically significantly different from 0. Note, the author of the original study did not find statistically significant results either (except for the population with low-income rate, which had a p-value < 0.1).

Table 9 – Effect on downstream municipal outcomes (Panel B: Economic outcomes): Modifying the sample

RDD	Low income rate Original Study	Low income rate	Income per capita Original Study	Income per capita	Unemployment rate Original Study	Unemployment rate	Nights light Original Study	Nights light
TwoRound	-5.186*	-3.726	64.667	0.075	-0.964	-0.685	2.715	0.902
	(3.079)	(3.153)	(61.782)	(65.049)	(0.635)	(0.630)	(3.306)	(3.394)
	[0.094]	[0.239]	[0.297]	[0.999]	[0.131]	[0.278]	[0.412]	[0.790]
Single-round mean	27.929	27.929	762.417	762.417	9.815	9.815	22.527	22.527
Observations	177	163	177	163	177	163	763	707
Municipalities	71	63	71	63	71	63	80	72

Note: Authors' calculations using original data and data with municipalities that used two-round electoral system and did not experience change in the studied period removed from the treatment group. Only data accompanying the original paper was used. An observation is a municipality-election. The sample is restricted to municipalities within the range of 150,000 and 250,000 voters, except those municipalities that had a two-round system across all observations. Standard errors are in parentheses. P-values are reported in brackets.
Significant at the ***[1%] **[5%] *[10%] level.

4. Conclusion

We were able to replicate the vast majority of the findings from Chin (2023). The data and documentation with the author's code is accessible and can be used both for reproduction of results and testing replicability. This allowed us to run all the tests presented in the article using the original data. Furthermore, we slightly modified the dataset to test the robustness of the original findings. After introducing the window 50,000 eligible voters around the threshold of 200,000, a reduced dataset included all municipalities with single-round electoral rule and municipalities that experienced population growth and transitioned to a two-round system. After running all the models again, we confirm that most of the results reported in the article are robust, with statistical significance lost only in several cases, most important of which is the positive link between a two-round system and elementary literacy rate found in the original study.

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