The Effect of Gerrymandering, Cracking, and Packing on Trust in Government

1 Abstract

Previous literature has looked into the effect of the improbability of gerrymandering on people's politics, theorizing that lower voter turnout by those affected by gerrymandering is the result of less trust in government (Jones et al. 2023). I test this theory by developing a threshold for determining the presence of gerrymandering in a binary manner, using various quantitative measures of gerrymandering held against an ensemble of plans created by the ALARM redistricting group to accurately determine the improbability of districts' efficiency gap, seats-votes curve, and declination. I also develop a method of coding cracked and packed districts and I test the "alignment" of a respondent with their gerrymandered district, another factor that affects voter turnout (Fraga et al. 2022). I use OLS regressions to test the effect of gerrymandering on trust in federal and state government. I find that trust in government is not substantively affected by solely living in a gerrymandered state, that negative effects on trust in government are almost exclusively directed towards state governments and that those who are misaligned with their district are more likely to trust the state government than those who are aligned with their district. This study casts doubt on the theory that trust in government causes lower voter turnout in gerrymandered areas or that election "winners" have higher trust in government. Future research should be directed towards examining other effects of gerrymandering on public opinion and political behavior, such as efficacy, or campaign donations.

2 Introduction and Literature and Hypotheses

If someone is gerrymandered by the government, are they more or less likely to trust the government? Previous literature has found that gerrymandering has a negative effect on voter turnout, with more improbable gerrymandering being correlated with lower turnout (Jones et al. 2023). The quasi-experiment from (Jones et al. 2023) not only finds that gerrymandering has a negative and scalable effect on turnout, it also finds that after gerrymandering is removed, voter turnout jumps back up, suggesting that gerrymandering has some effect on people's willingness to engage with the political system. As noted in that piece: "gerrymandering may have a general depressive effect on turnout throughout an impacted state by reducing trust in government and the elections process," (Jones et al. 2023). The study (Jones et al. 2023) cite to support this finding, compares trust in parliament with voter turnout for European countries and finds that that higher trust in parliament makes a person more likely to vote at both the macro and micro level, (Gronlund and Setala 2007). Taken together, if less trust in government depresses voter turnout, and those in gerrymandered districts are less likely to vote, then gerrymandering may also have an effect on trust in government. This is my first hypothesis:

H1: Gerrymandering decreases trust in government.

One complication with this view is the effect of party identification. (Fraga et al. 2022) find several effects related to party turnout and gerrymandering. When a redistricting happens in a gerrymandered system, those who move from a district they are not aligned with to one that they are aligned with have higher voter turnout

(Fraga et al. 2022). Also, as a district becomes less competitive, people who are in the majority in that district are more likely to turn out to vote (Fraga et al. 2022). Given that gerrymandering takes the form of cracking and packing, I also look for the following in my analysis:

H2: The negative effect on trust in government will be greater for those living in cracked districts than packed districts.

H3: The negative effect on trust in government will be greater for those in the district minority (the misaligned) than for those in the district majority (the aligned).

Finally, as gerrymandering is done by state governments, rather than the federal government, I also look for the following:

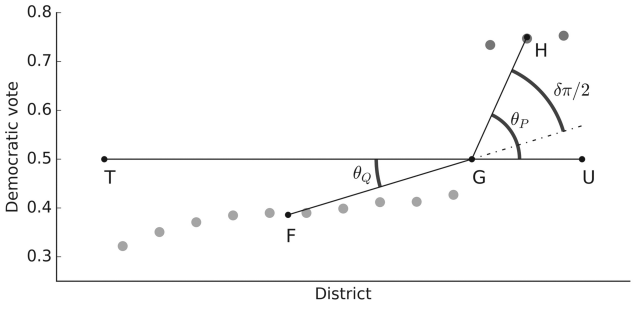
H4: Any negative effects from the previous three hypotheses will be greater in magnitude for trust in state governments than for trust in the federal government.

3 Variables

The simplest way to call out gerrymandering is by pointing to it on a map. This is what the lay do when they want to point out gerrymandering, as seen in the court filing by the Fair Maps for Texas Action Committee (Fair Maps Texas Action Committee 2021). Instead of running any computerized analysis, they point at the squiggly lines on the map, and show what communities those lines break apart. This paper, however, takes a different approach.

There are several statistical measures of gerrymandering that can be used. One of the more common is the efficiency gap (EG), which is a measure of the effect of each party's wasted votes on the number of seats a party gets (McGhee

2020). As a formula: $\omega = S_{marg} - 2 * V_{marg}$ where S_{marg} is the share of excess seats and V_{marg} is the share of excess votes as a percentage (McGhee 2014, 68-69). The efficiency gap essentially finds the *efficiency* of the two parties' votes and measures the gap between them. This measure is reasonably useful as a measure of gerrymandering as it does not rely on counterfactuals and considers both cracking and packing as part of its analysis. The main limitations of the efficiency gap are that uncompetitive plans can still be evaluated as *not gerrymandered* (Cover 2018), that given certain plans, it can find a plan that gerrymanders for a minority party as fairer than a plan that gerrymanders for the majority party (Chambers et al. 2017), and that the cutoffs for determining *gerrymandering* are essentially arbitrary. Another common measure of gerrymandering is the seats-votes curve (also known as partisan bias, SVC) which measures the asymmetry between the number of seats that two parties will gain from increasing their vote share by the same amount (McGann et al. 2015). This counterfactual analysis is another way of evaluating the extent to which a party's votes are diluted.



Another measure of gerrymandering that does not rely on counterfactuals is declination. The declination measure is best explained using this graphic from (Warrington 2018, 42). This measure geometrically measures the angle caused in a graph of party vote by district when districts

are cracked or packed. The declination, δ is a measure from -1 to 1, where when multiplied by 90° or $\frac{\pi}{2}$ gives the angle at which the districts' distribution *jumps* (or *drops*). This measure also accounts for both cracking and packing as the two endpoints for $\overline{FGH}$ are affected by cracking and packing. However, this measure is difficult to calculate and possibly invalid with low numbers of districts, so it will not be calculated for states with five or fewer districts.

Another way to do gerrymandering analysis is to create an ensemble of randomly generated maps as a counterfactual and compare the party vote share of the ensemble's districts with that of the current districts. An analysis like this was done by Herschlag et al. (Herschlag et al. 2020) to compare several proposed redistricting plans against an ensemble of randomly generated plans for the state of North Carolina. There are several possible sampling methods for this analysis including Sequential Monte Carlo (SMC) (McCartan and Imai 2023) and Markov chain Monte Carlo (MCMC) (Fitfield et al. 2020). SMC has lower standard errors, has more diverse (while still plausible) samples, and is far more computationally efficient (McCartan and Imai 2023).

4 Data and Methods

The analysis is made up of two components: gerrymandering compared against an ensemble, and regressions to test trust in government.

Ín order to make "gerrymandering" an independent variable, I must figure out which states are gerrymandered and which states are not and code all 50 states as gerrymandered or not gerrymandered. Because (for some bizarre reason) no political

science professor has done this already, I must do it myself. SMC Ensembles for each state are derived from the ALARM 50-State Simulation project (McCartan et al. 2024). I choose to use their data over generating my own ensembles because their ensembles account for state gerrymandering laws, have cleaner shapefile data, and because generating the ensembles myself would be computationally taxing (McCartan et al. 2024). Next, because current measures of gerrymandering are continuous and because some contain no thresholds (Warrington 2018)(McGann et al. 2015), and others' thresholds are arbitrary (Chambers et al. 2017)(McGhee 2014), instead of using the measures themselves, this analysis uses percentile rank against the ensemble to determine the existence of gerrymandering. This is done because, on their own, these analyses can fail to catch "natural gerrymanders", such as those in urban centers like Madison, Wisconsin (Roberts 2018). In contrast, an ensemble of reasonable districts would generate similar natural gerrymanders, and as such, an ensemble analysis can look for *improbability* of bad scores on gerrymandering measures, rather than relying on the measures themselves without context. The improbability of the gerrymander was one of the factors considered by (Jones et al. 2023). For each of the three measures, a "fail" is coded as a map having a higher (or lower) score than 90% of the ensemble. This number is chosen as arbitrarily as (McGhee 2014) chooses eight percent. To be classified as gerrymandered, a state must fail at least one of these three tests, and have at least one district beyond the interquartile range for improbability. These rules are derived because there is a higher likelihood of district improbability in states with more districts. Though these thresholds are arbitrary, so are all others, and this test should overcome differences in methodology between

measures and be able to detect gerrymandering in small states. For a given map, both cracked and packed districts must fall outside the interquartile range. Cracked districts are those with below 55% minority party vote, and packed districts are those with above 55% minority party vote, to account for, for example, cracking a strong Democrat seat into a toss-up seat. The redist package is used for all of this (Kenny et al. 2022).

The regression models use the CES dataset because of its large sample size and inclusion and representative sampling of all congressional districts (Brian Schaffner 2023). Six OLS regressions control for race, gender, socioeconomic status, income, and party identification. The first regression is a state-level analysis of whether living in a gerrymandered state (as defined by the previous ensemble analysis) will have an effect on trust in the federal government, which tests for the first hypothesis. The second regression measures the effect on cracked/packed districts and the third measures aligned/misaligned respondents for trust in the federal government. These models test for the second and third hypotheses, respectively. The fourth, fifth, and sixth models are identical to the first, second, and third, with trust in state government as the dependent variable, in order to test the fourth hypothesis.

5 Preliminary findings

Starting with testing gerrymandering, it is found that more states gerrymander (n = 28) than don't (n = 16), and amongst those, 14 states failed one test, 8 states failed two tests, and 6 states failed three tests. There are more cracked districts (n = 162) than packed districts (n = 48). Both parties partake in gerrymandering at similar

rates (Democrat-leaning gerrymanders n = 13, Republican-leaning gerrymanders n = 15).

Table 1

	Trust in Federal Government		
	Gerrymandered State	**Crack and Pack**	**Alignment**
	Model 1	**Model 2**	**Model 3**
Constant	3.098^{***}	3.071^{***}	3.065^{***}
	(0.013)	(0.012)	(0.011)
Democrat	-0.654^{***}	-0.654^{***}	-0.657^{***}
	(0.009)	(0.009)	(0.010)
Republican	0.116^{***}	0.109^{***}	0.109^{***}
	(0.013)	(0.013)	(0.013)
	(0.009)	(0.009)	(0.010)
Gerrymandered State	-0.045^{***}		
	(0.008)		
Cracked District		-0.010	
		(0.007)	
Packed District		-0.019^{*}	
		(0.011)	
Aligned respondent			-0.002
			(0.010)
Misaligned Respondent			0.014
			(0.011)
N	49738	50619	50619
R-squared	0.194	0.193	0.193
Adj. R-squared	0.194	0.193	0.193
Residual Std. Error	0.774 (df = 49726)	0.774 (df = 50606)	0.774 (df = 50606)
F Statistic	1089.004^{***} (df = 11; 49726)	1008.980^{***} (df = 12; 50606)	1008.766^{***} (df = 12; 50606)

***p < .01; **p < .05; *p < .1

Table 2

	Trust in State Government		
	Gerrymandered State	**Crack and Pack**	**Alignment**
	Model 4	**Model 5**	**Model 6**
Constant	2.847^{***}	2.816^{***}	2.797^{***}
	(0.015)	(0.014)	(0.013)
Democrat	-0.367^{***}	-0.364^{***}	-0.362^{***}
	(0.010)	(0.010)	(0.011)
Republican	0.148^{***}	0.145^{***}	0.148^{***}
	(0.015)	(0.015)	(0.014)
	(0.011)	(0.010)	(0.011)
Gerrymandered State	-0.041^{***}		
	(0.009)		
Cracked District		-0.048^{***}	
		(0.008)	
Packed District		0.113^{***}	
		(0.013)	
Aligned respondent			-0.350^{***}
			(0.011)
Misaligned Respondent			0.453^{***}
			(0.012)
N	49652	50531	50531
R-squared	0.043	0.045	0.101
Adj. R-squared	0.043	0.045	0.101
Residual Std. Error	0.887 (df = 49640)	0.885 (df = 50518)	0.859 (df = 50518)
F Statistic	204.882^{***} (df = 11; 49640)	199.224^{***} (df = 12; 50518)	472.583^{***} (df = 12; 50518)

***p < .01; **p < .05; *p < .1

Created using stargazer (Hlavac 2022). These models have had control terms removed for space, full reproductions of the models are available in the appendix. Starting with Hypothesis 1, living in a gerrymandered state leads to lower trust in government, both sets of models find significant, negative, and weak effects for this claim. Though significant, other controlling variables, especially party ID, explain much of the variation. From models two and four, hypothesis two finds no support at the federal level, but some support at the state level. Though a small effect, those living in cracked districts are less likely to trust the state government, and those living in packed districts are strongly more likely to trust the state government. This suggests weak interactional support for hypothesis two and stronger support for hypothesis four. Similar to the crack and pack models, the alignment models lend support to hypothesis four. However, model six shows the opposite effect to what was expected in hypothesis three. It seems that those aligned with their district's party are less trusting in state government, whereas those misaligned with their district's party are more likely to trust their state government. Finally, hypothesis four seems to be strongly supported by models four, five, and six, but these models have far smaller R^2 than the corresponding federal models. This may, however, also be an artifact of the high number of variables in the CES dataset.

6 Discussion

The results of this study cast some doubt on the theory that trust in government is the driving factor behind low voter turnout in gerrymandered districts (Jones et al. 2023). "[I]t is conceivable that either gerrymandering reduces turnout on a

statewide (and not district-specific) level by reducing voters' trust and attachment to the democratic process, even if their districts are not personally impacted," (Jones et al. 2023, 566). Their study primarily focuses on competitiveness and the factors of gerrymandering that depress voter turnout (Jones et al. 2023), however, it seems that the impetus driving the decreased voter turnout is not necessarily trust in government. The statewide analysis in models 1 and 4 shows that even though there is a statistically significant negative effect on trust in government caused by living in a gerrymandered state, this effect is exceedingly small compared to other demographic factors. Furthermore, it appears that the strong effects are those directed at state officials, rather than national ones, suggesting that a broad withdrawal from democracy generally is unlikely.

Brunell, on the other hand, claims that non-competitive elections cause greater trust in government overall as there are more net winners than losers and that "voters' evaluations of government, including overall trust in government, are directly related to whether they cast a ballot for the winning candidate" (Brunell 2010, 30). However, from the alignment models, it seems that for those living in heavily gerrymandered districts, "winning" by means of being a majority voter in a non-competitive has no significant effect on trust in government at the federal level, though those in packed districts tended to trust state government more. Whatever the reason, it seems that "winners" in a gerrymandered system are not as happy with the government as Brunell would seem to think. Especially relevant is the fact that Brunell's analysis does not include trust in government. His H1 from that chapter, "Voter satisfaction (efficacy, incumbent approval, etc.) will be higher when the voter is a winner,"

(Brunell 2010, 32) is not very strong given that my model shows that winners in gerrymandered districts have less trust in government than losers. That is perhaps the most interesting finding of this study - winners either don't care, or reduce their trust in government in a gerrymandered system.

Perhaps the trust in state government of "losers" is driven by the same mechanism as African Americans in majority-White districts who prefer trustee representation, namely that as a political minority (Carman 2007), they have to hope in the state government to moderate the preferences of their imposed-majoritarian co-constituents. This is perhaps the same logic that governs the thinking of "packed" constituents who must hope that state government policy does not bend to sharply towards the legislative majority.

7 Conclusion

If someone is gerrymandered by the government, are they more or less likely to trust the government? The answer is ultimately: "It's complicated, but probably not." This study sheds light on the effect of gerrymandering on someone's trust in government by ultimately showing that it doesn't matter nearly as much as previously theorized (Jones et al. 2023). My study also suggests that those who benefit from gerrymandered elections don't necessarily end up more trusting in the government, contrary to Brunell's hypothesis. Though a null finding can sometimes be disheartening, this null finding shows that others' preconceptions about how gerrymandering affects the everyday American may be ultimately wrong.

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