Partisanship and Elections: an Economic Model and Evaluation from the U.S. Senate

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Abstract

In light of recent political polarization in the United States Congress, this paper investigates an extension the Downsian model that allows for alienated voters' abstention. Candidates pick positions on a simple liberal-conservative scale, and voters in general vote for the candidate closer, up to a certain distance away. The results are highly specific to the particular distribution of voters; this paper explores a classic unimodal distribution as well as a bimodal distribution. In the latter model with an alienation distance, competing candidates' positions may diverge and be drawn away from the median and toward extremes. Some empirical evidence from the Community Population Survey and Senate elections is considered. The analyses suggest convergence rather than divergence, though limitations to the data prevent precise conclusions.

1 Introduction

The last few U.S. Congresses are widely believed to be the most polarized in recent history. For example, the DW-Nominate scores, which measure liberal-conservative voting, show wide divergence between Democrats' and Republicans' averages over time.[1] A number of popularly suspected sources of political polarization have been investigated across Political Science and Economics literature. For example David Lee's (2001) paper in electoral advantage; or McCarty, Poole, and Rosenthal (2009) investigating gerrymandering. Other proposed drivers include lower voter turnout in primary and midterm elections versus presidential elections.

Beyond these, it is worth investigating *how* might elections transmit voter preferences as legislators' behavior. Anthony Downs (1957) introduced the median voter theorem which, assuming a simple liberal-conservative continuum of electoral choices and single-peaked voter preferences, suggests that two candidates should converge in positions to the median voter. This paper investigates alternatives, in which voters behave similarly and will vote for the closer of two major candidates, but only up to a cutoff distance (alienation abstention), and in which the distribution of voters is not unimodal. The implication of these alternative models is that candidates may adopt positions away from the median in order to maximize expected vote share.

If the transmission of voter preferences is not assumed to drive to the median, but may act centripetally and pull candidates toward points away from the median, polarization can be an outcome of *more* competitive elections, rather than less (as the previously mentioned factors create).

This paper first builds models based on the original Downsian model while noting prior literature, then attempts simple empirical tests using data from the U.S. Senate. The results are presented and their importance discussed.

2 Model

This paper develops models in which two candidates choose optimal positions based on their expectation of electoral vote share. In the following, two candidates are symmetric and have the objective of maximizing expected vote share. Expectation of vote share is based on the candidates' positions taken, which are public. Voters generally choose the candidate closer to

[1] See Poole and Rosenthal; DW-Nominate scores. www.voteview.com

their own preferences. Four alternatives are developed and considered: a unimodal voter distribution, a bimodal voter distribution (with a liberal type and a conservative type), and both with and without a cutoff distance, past which voters abstain because the closer candidate is still too far away. In the proceeding, let the voter density function be noted as *f(x)*, where *x* is a liberal-conservative value ranging from -100 (most liberal) to 100 (most conservative). Let x_1 and x_2 denote the candidates' positions.

2.1.1 No cutoff abstention

The development in which voters do not abstain is simple regardless of the distribution and largely reflects Downs' original model. Candidate *i* captures all the vote on his side to the mean of the two positions: $\mu = \frac{x_1+x_2}{2}$. Assuming, without loss of generality, that candidate 1 is to the left:

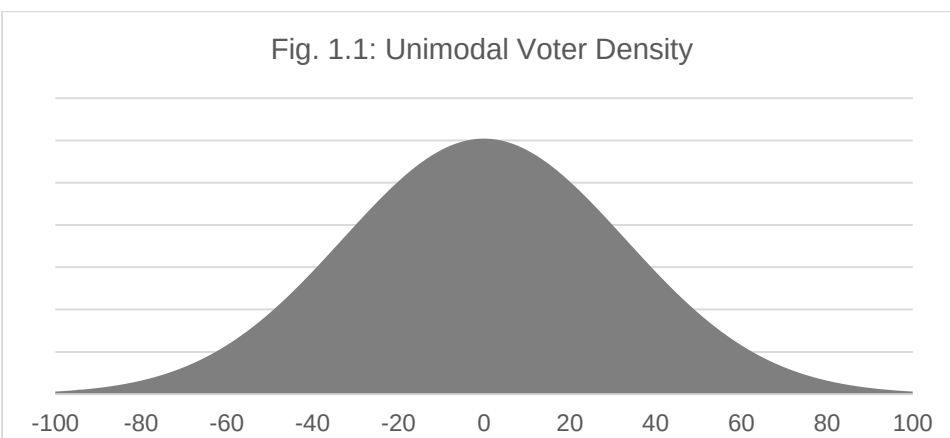
$$vote\ share_1 = \int_{-100}^{\frac{x_1+x_2}{2}} f(x_1)\,\partial x_1 = F\left(\frac{x_1+x_2}{2}\right) - F(-100) \cong F\left(\frac{x_1+x_2}{2}\right)$$

$$vote\ share_2 = \int_{\frac{x_1+x_2}{2}}^{100} f(x_2)\,\partial x_2 = F(100) - F\left(\frac{x_1+x_2}{2}\right) \cong 1 - F\left(\frac{x_1+x_2}{2}\right)$$

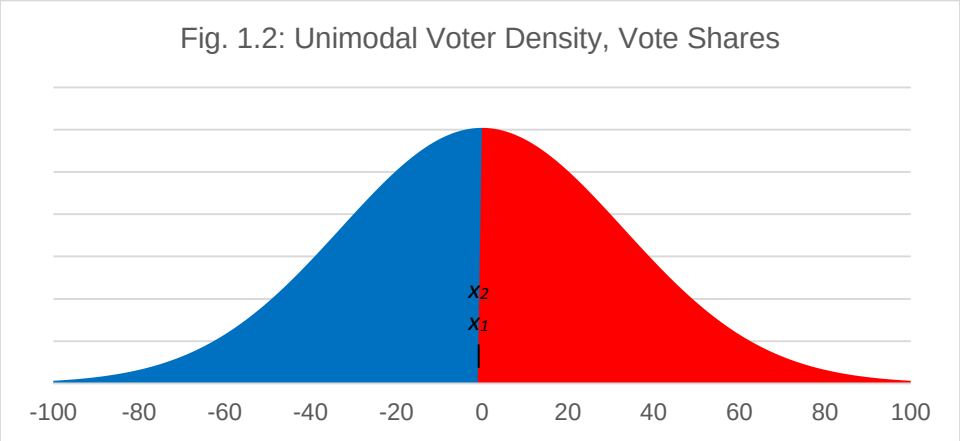
This implies that the candidates' positions should converge to the median and divide the distribution in half (regardless of the distribution's particular shape).

2.1.2 Unimodal

The case of a unimodal voter distribution (e.g., normal) is the classic one.

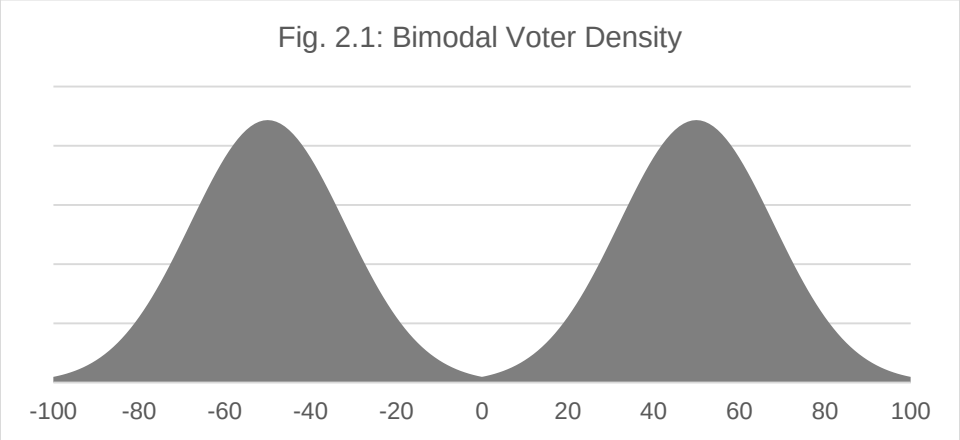


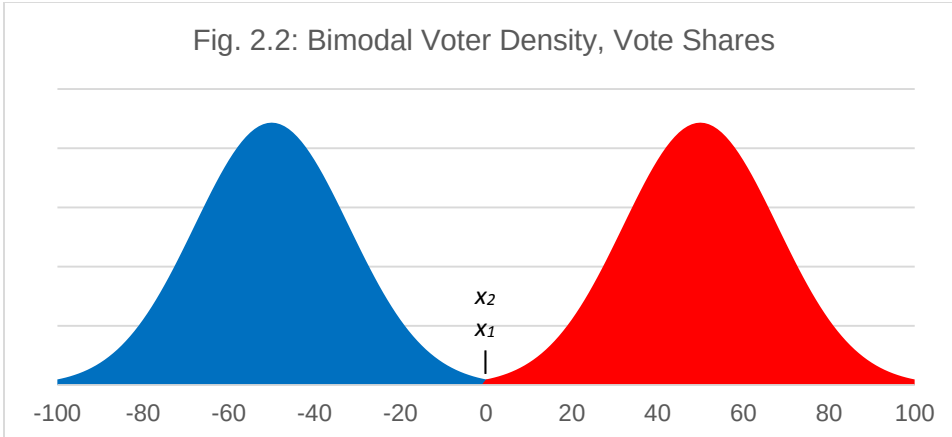
In this example, $x_1=x_2=0$ (with some infinitesimal difference), and each candidate captures their respective halves of the share:



2.1.3 Bimodal

The case of a bimodal distribution is similar. Here, there is a liberal type and a conservative type, with respective modes, and few are in the center. This can be interpreted either as that the voting population is truly distributed in two types, or median "voters" are in fact much less likely to vote. There is evidence in psychology and political economics for this. Medoff, Dennis, and Bishin (1995) present a case testing a bimodal distribution of voters, which may be prevalent dealing with individual issues (in this case, abortion). From a psychology standpoint, Hibbing, Smith, and Alford (2014) show unconscious differences in negativity bias, while Jost, Frederico, and Napier (2009) review other psychological determinants of self-reported ideology differentiating liberals and conservatives.





2.2.1 Cutoff abstention

An alteration to this simple model is the addition of an alienation abstention behavior for voters. I.e., if either candidate is too far away from a voter's preference, he will refuse to vote for either and will defect to a third-party candidate or abstain. There has been some evidence found for this type of behavior. For example, Fedderson (2004) investigates a model of strategic voting in which there is abstention due to both indifference and alienation.

Let *d>0* denote this cutoff distance. Again, assuming that candidate 1 is to the left, the candidates' vote shares are:

$$vote\ share_1 = \int_{\max\{-100,\, x_1-d\}}^{\min\{\frac{x_1+x_2}{2},\, x_1+d\}} f(x_1)\, \partial x_1$$

$$vote\ share_2 = \int_{\max\{\frac{x_1+x_2}{2},\, x_2-d\}}^{\min\{100,\, x_2+d\}} f(x_2)\, \partial x_2$$

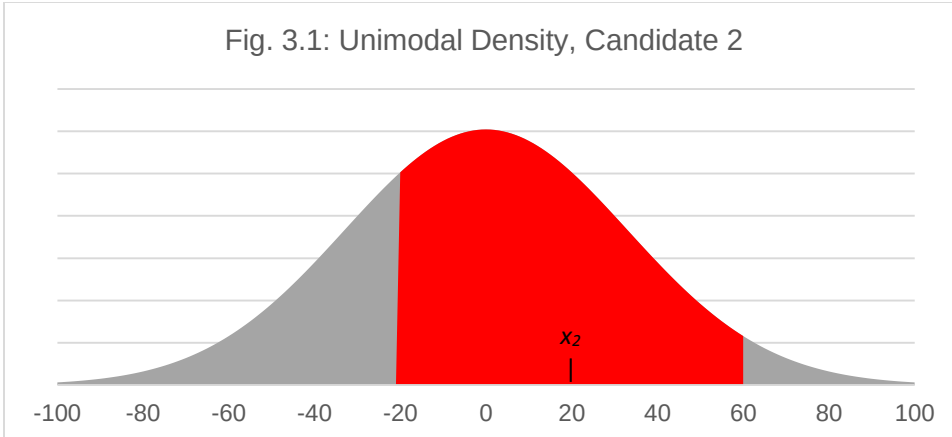
So, considering candidate 1:

$$vote\ share_1 = \min\left\{F\left(\frac{x_1+x_2}{2}\right), F(x_1+d)\right\} - \max\{0, F(x_1-d)\}$$

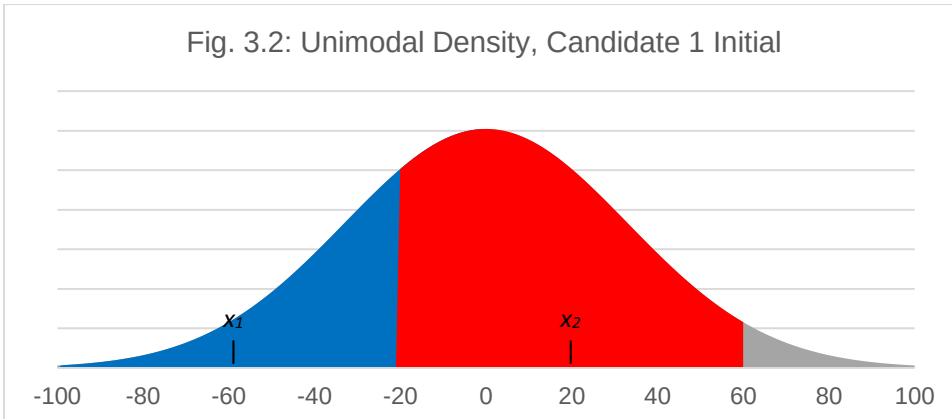
2.2.2 Unimodal

To develop the result, the above will be applied to a unimodal distribution to investigate the behavior of candidate 1 given candidate 2's position.

In the proceeding figures, *d=40* is used. Supposing candidate 2 has chosen a position:



Starting at x_1=*-100+d*:



Now, if candidate 1 moves rightward some infinitesimal amount *dx*, there are two direct effects: he loses $f(x_1 - d) * dx$ and gains $\frac{1}{2} f\left(\frac{x_1+x_2}{2}\right) * dx$ (ignoring the case in which the two shares do not yet meet). There are two aggregate effects: candidate 2 loses $f\left(\frac{x_1+x_2}{2}\right) * dx$, and the total vote decreases by $f(x_1 - d) * dx$. In the following, let $\frac{x_1+x_2}{2} = \mu$.

Moving rightward is advantageous so long as candidate 1's relative vote share increases, i.e.:

$$\frac{F(\mu) - F(x_1 - d) + 0.5f(\mu) * dx - f(x_1 - d) * dx}{F(x_2 + d) - F(x_1 - d) - f(x_1 - d) * dx} > \frac{F(\mu) - F(x_1 - d)}{F(x_2 + d) - F(x_1 - d)}$$

Cross-multiplying:

$$\begin{aligned}
&\big(F(x_2 + d) - F(x_1 - d)\big)\big(F(\mu) - F(x_1 - d)\big) \\
&\qquad + \big(F(x_2 + d) - F(x_1 - d)\big)(0.5f(\mu) * dx - f(x_1 - d) * dx) \\
&\qquad > \big(F(\mu) - F(x_1 - d)\big)\big(F(x_2 + d) - F(x_1 - d)\big) \\
&\qquad - \big(F(\mu) - F(x_1 - d)\big)(f(x_1 - d) * dx)
\end{aligned}$$

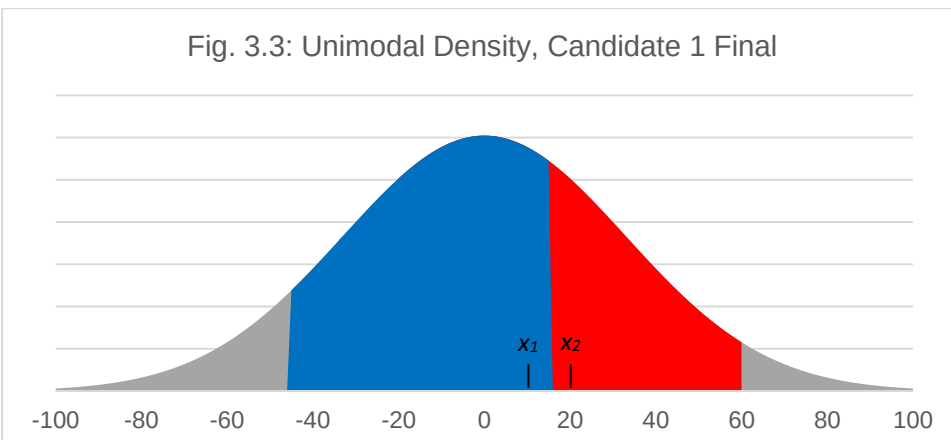
Subtracting identical terms:
$$\big(F(x_2+d)-F(x_1-d)\big)(0.5f(\mu)*dx-f(x_1-d)*dx) > -\big(F(\mu)-F(x_1-d)\big)(f(x_1-d)*dx)$$

Distributing and moving the last term on the left:
$$\big(F(x_2+d)-F(x_1-d)\big)(0.5f(\mu)*dx)$$
$$> (f(x_1-d)*dx)\big(F(x_2+d)-F(x_1-d)\big)-\big(F(\mu)-F(x_1-d)\big)(f(x_1-d)*dx)$$

Grouping the *f(x₁-d)dx* term:
$$\big(F(x_2+d)-F(x_1-d)\big)(0.5f(\mu)*dx) > (f(x_1-d)*dx)\big(F(x_2+d)-F(\mu)\big)$$

$$\frac{0.5f(\mu)}{f(x_1-d)} > \frac{F(x_2+d)-F(\mu)}{F(x_2+d)-F(x_1-d)}$$

$$\frac{gross\ gain}{gross\ loss} > 2\frac{share_2}{share_1+share_2}$$

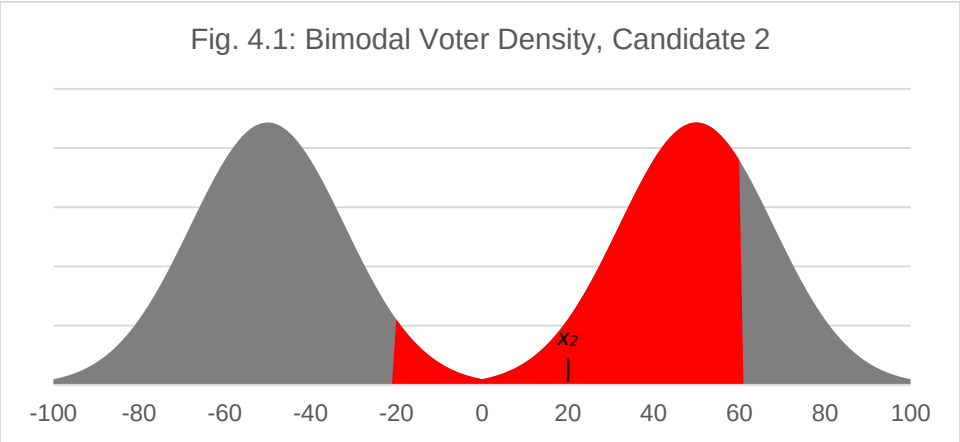


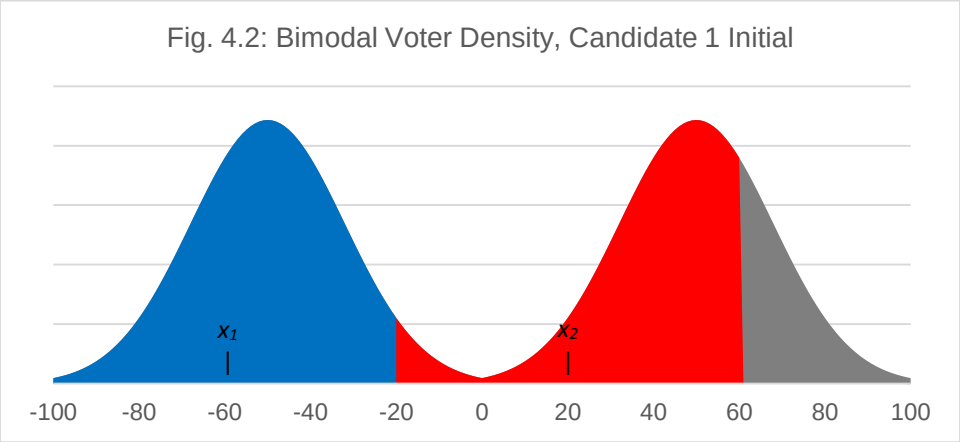
In practice, this is highly dependent on the particular distribution, but it is not necessary that this conditions occurs until the median. If this game is played iteratively, it is possible to settle on an equilibrium in which the candidates split the shares without converging totally (as is shown in the next section).

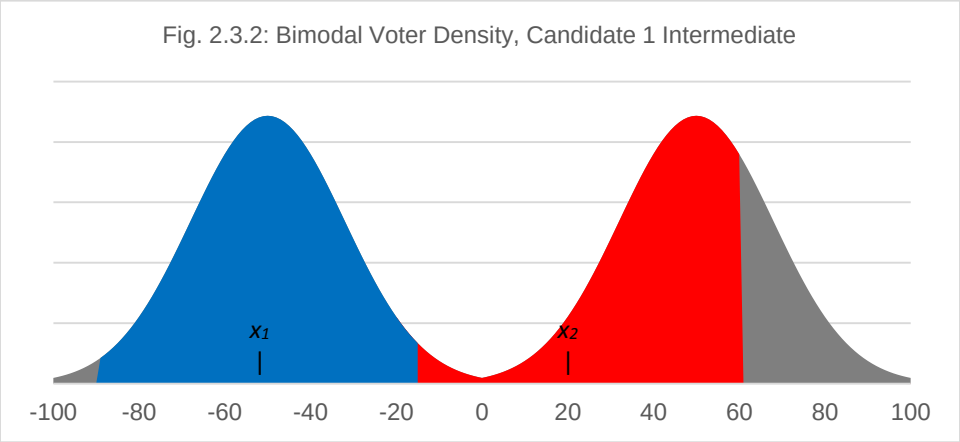
In the case in which voters, instead of completely abstaining, defect to a third party, the arithmetic is simpler. For a move rightward, candidate 1 loses $f(x_1-d)*dx$ and gains $f\left(\frac{x_1+x_2}{2}\right)*dx$, and there are no effects to the total vote share. Then this move is advantageous as long as $f(x_1-d) \leq \frac{1}{2}f\left(\frac{x_1+x_2}{2}\right)$.

2.2.3 Bimodal

A similar development occurs for a bimodal case, with a wider variety of possibilities, again highly dependent on the specific distribution. An example is shown with the same steps as previously







There is a choice at the median – whether to continue past it until the slope is upward again, or to stay. (For this particular figure, it is not advantageous). As pictured, candidate 2 subsequently has incentive to move rightward.

2.3 Summary

We have considered two models of voter behavior: the first in which voters simply vote for one of two major candidates closer to themselves, and the second in which there is a cutoff after which voters abstain or defect to a third party. Within this framework, two distributions of voters are considered – a unimodal distribution, and a bimodal distribution. While the results are highly specific to the particular distribution, with the introduction of an abstention distance, it is not necessary that the two candidates converge to the median, but can instead diverge to points away from it.

3 Empirical Evaluation

Some empirical evaluation of the above model is attempted using data from the Community Population Survey and Senate elections. The objective is to link abstention due to alienation to politically divergent behavior. A number of challenges arises. Specification is presented first and the empirical choice of variables second.

3.1 Specification

This paper argues qualitatively that legislators react to alienation rates by their subsequent behavior, rather than anticipating alienation rates and behaving accordingly. First, it difficult to predict the overall alienation rate meaningfully in advance. Public campaigns and canvassing typically start around one year in advance of the November elections, very late for senators with six year terms. (The next section explains that data is available only for Senators, not Representatives.) The implication is that the alienation rate influences subsequent behavior in anticipation of future elections (legislators' best guess of the future is the past), and legislators adjust their records for future elections. Lee, Moretti, and Butler (2004) present evidence that the electorate votes based on historical evidence rather than legislators' promises of future behavior. This suggests a regression of the change in liberal-conservative position (for simplicity, the congress prior the election to the congress post the election) on the alienation rate, controlling for

time trends and by party. It also makes sense to introduce a restriction to competitive elections (arbitrarily defined as a win share under 60%) and for retiring senators, so that only those under reasonable electoral pressure are considered.

This paper will also present a simple regression of liberal-conservative position (for simplicity, the congress post-election) against alienation rates with the same controls.

3.2 Variables

A measure of liberal-conservative ideology, elections records, and a measure of abstention due to alienation are needed. For the first, this paper uses the DW-Nominate scores[2], which measure (among other things) the liberal-conservative voting of Representatives and Senators on a -1 (liberal) to +1 (conservative) scale, consistent over time and across individuals. Elections records are easily obtained; micro data such as vote shares and candidate names are readily available.[3]

A measurement of abstention due to alienation is much more difficult because abstainers' motivations and hypothetical votes are at best self-reported. Given this restriction, an ideal would have been the American National Elections Studies (ANES). This asks eligible voters to rank themselves on a 1 to 7 liberal-conservative scale; whether they voted; and for abstainers, the reason for doing so. This way, it is possible to identify the extremely liberal and conservative who abstain because of alienation. Unfortunately, the ANES is not statistically representative at any level beyond the national – for many years and states, in fact, there are fewer than ten respondents.

The Community Population Survey (CPS) provides similar measures better represented at the state level (observations' Congressional districts are not provided). Each respondent is asked whether he is registered to vote; whether he voted; and if he did not, the reason. This survey lacks ANES's ideological self-characterization and attempts less identification of voter eligibility. Respondents who abstain are asked to choose a reason for doing so among options, one being "Didn't like candidates or campaign issues".[4] This paper uses the percentage of those

[2] Nokken and Poole. I use the version of the scores which rates each legislator one congress (two years) at a time, in order to maximize the change over time. The original version of these scores use a legislator's entire history.
[3] I obtained records for Senate elections from the CQ Press Voting and Elections Library.
[4] The full questions and answers are included in Appendix 1, along with a brief discussion.

registered but abstaining due to this reason as the alienation rate, accounting for the CPS's demographic weighting variable to correct differential response rates.

This construction creates two problems: it excludes those who are eligible to vote but do not register (which probably includes mostly uninterested individuals, as well as some who are alienated); and it misses those who cast a ballot but do not vote in a particular race. It also not possible to identify the alienated as extreme or moderate (as it would be in the ANES). This leaves moderates who are alienated, which is possible under the model, but does not distinguish whether this alienation rate should prompt convergence or divergence. Additionally, the alienation rate and the overall abstention rate are very highly correlated – this response may be the most socially acceptable reason for abstention; more details are provided in Appendix 2. The final limitation is geographic – the CPS provides only respondents' states, so analyses are only reasonably done for the Senate. Intuitively, if there is truly an effect, Representatives may show greater effect due to more constant electoral pressure.

In the final dataset, one observation is a senator and election result, his DW-Nominate scores for the congresses before and after the election[5], and the constructed alienation rate for the election. This includes all senator-elections since the 2004 election (when the CPS began asking the reason for abstention).

3.3 Results

The evidence according to the specifications described is generally consistent with convergence. There are two major issues, as mentioned: this is still a consistent conclusion with the new model if alienation is primarily at the median (which is not distinguishable in the dataset), and the availability of data is limited (the dataset is restricted to senators and competitive elections).

A DW-Nominate score of -1 is most liberal, and +1 is most conservative; a positive change means a shift toward conservative and a negative one a shift toward liberal. The results are presented in table 1:

[5] Where available – first term senators do not have prior scores; occasionally, senators leave office for various reasons before the next congress's completion.

Table 1

Senator-election pairs such that the vote share < 0.6, since 2004

DW+1 - DW-1	Dem (n=24)[1]	Coefficient	SE	p<|t|
	Alienation Rate	3.812	1.833	0.050
	Year	-0.006	0.005	0.220
	Constant	12.073	9.646	0.224
	Rep (n=19)	Coefficient	SE	p<|t|
	Alienation Rate	-2.820	1.905	0.146
	Year	-0.005	0.007	0.118
	Constant	10.309	13.676	0.122
DW+1	Dem (n=48)[1]	Coefficient	SE	p<|t|
	Alienation Rate	2.471	2.160	0.259
	Year	-0.005	0.006	0.414
	Constant	9.033	11.478	0.435
	Rep (n=40)	Coefficient	SE	p<|t|
	Alienation Rate	-1.360	3.387	0.690
	Year	0.008	0.011	0.443
	Constant	-16.033	21.429	0.459

1. Includes Bernie Sanders (I-VT) and Joe Lieberman (I-CT)

Scatterplots for the four pairs are provided in Appendix 3.

The data show generally a relationship between convergence and the constructed alienation rate, and a stronger effect for Democrats than for Republicans. Again, a major flaw with the data is that it is impossible to distinguish alienation at the median versus the extremes. So while this does not provide evidence as desired for divergence, the result may still be consistent with the model if alienation due to abstention is happening around the median.

4 Conclusion

Based off the Downsian model, this paper explored a new model introducing a cutoff distance past which voters will be alienated and abstain. If either politician is too far from a voter, he will refuse to vote for either, either abstaining in the race or voting for a third party candidate. The result is that, for bimodal distributions of voters, depending on the particular

shape of the distribution and the cutoff distance, competition for vote can prompt divergence between the candidates, rather than convergence as the original Downsian model suggests.

An empirical evaluation is attempted, although serious limitations prevent a definite conclusion on the model. Overall, the Community Population Survey data from 2004 to present suggest convergence rather than divergence. Further refinement, such as differentiation of alienation at the median or extremes, offers avenues for further evaluation.

Acknowledgements

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Appendix 1 – Community Population Survey Questions

Respondents were asked these questions (among many others), and some were responding for others in their household but not present for interviews. “Don’t know” responses are also allowed, and respondents may refuse to answer questions (or end the interview early).

In any election, some people are not able to vote because they are sick or busy or have some other reason, and others do not want to vote. Did (you/name) vote in the election held on Tuesday, November X, XXXX?

1) Yes
2) No

(Were you/Was name) registered to vote in the November X, XXXX election? (only asked if answer to above was no)

1) Yes
2) No

What was the main reason (you/name) did not vote?

1) Illness or disability (own or family’s)
2) Out of town or away from home
3) Forgot to vote (or send in absentee ballot)
4) Not interested, felt my vote wouldn’t make a difference
5) Too busy, conflicting work or school schedule
6) Transportation problems
7) Didn’t like candidates or campaign issues
8) Registration problems (i.e. didn’t receive absentee ballot, not registered in current location)
9) Bad weather conditions
10) Inconvenient hours, polling place or hours or lines too long
11) Other

Appendix 2 – Alienation Rate and Abstention Rate

The presented regression shows that the abstention rate and alienation rate, as constructed, are highly correlated. The table below shows the average alienation rate in each year with data – note that it is higher in midterm years than in presidential election years.

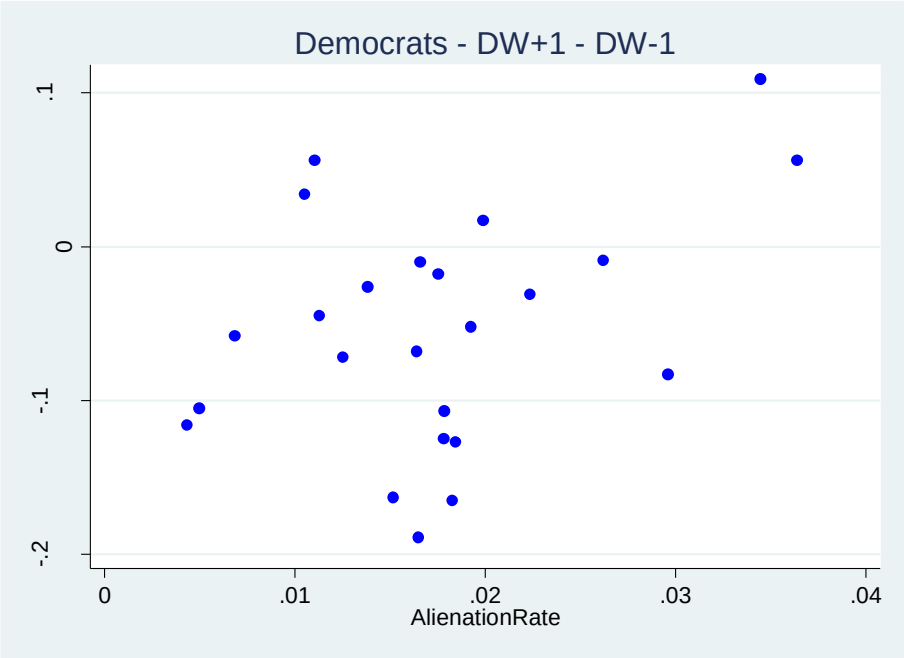
Table 2

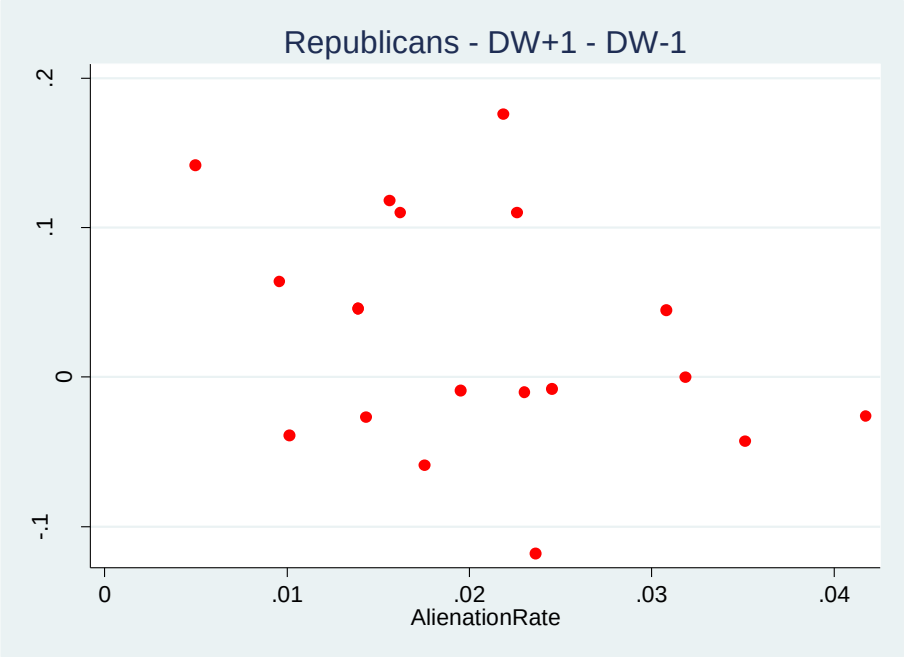
Alienation Rate		(n=167)	
	Coefficient	SE	p<|t|
Abstention Rate	0.0473	0.0061	0.0000
Constant	0.0080	0.0012	0.0000

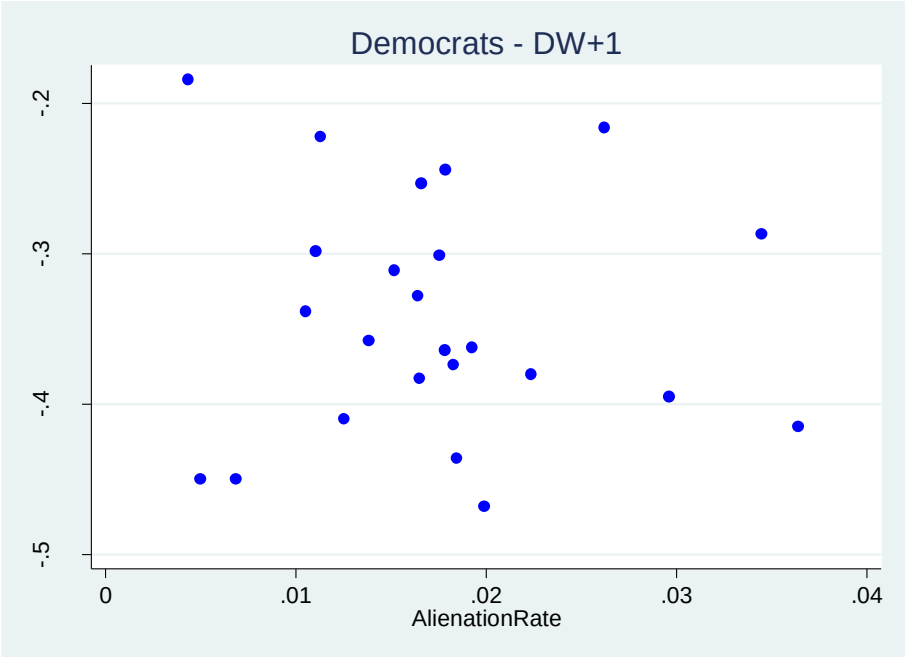
Table 3

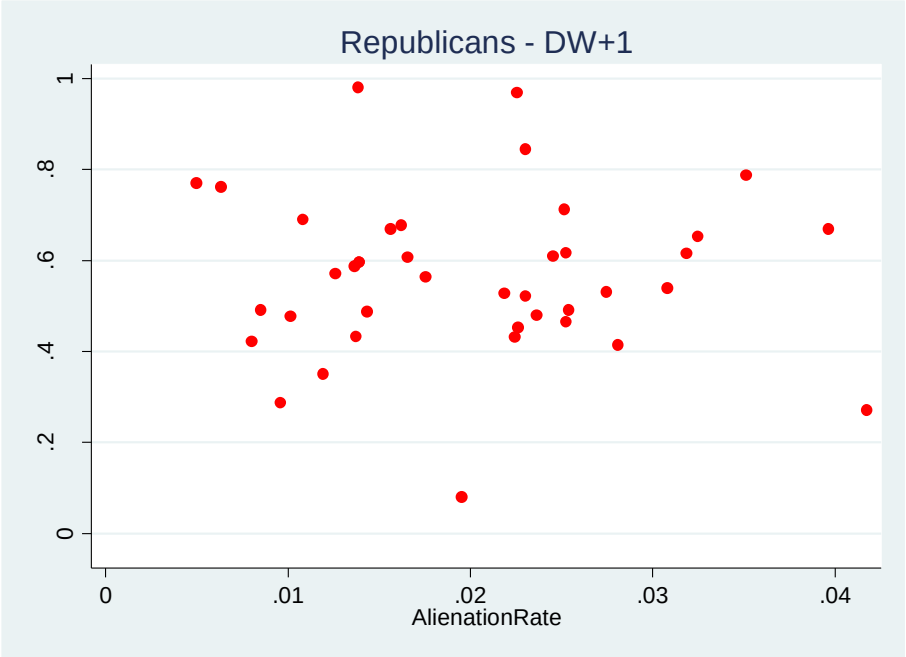
Year	Alienation Rate
2012	1.537%
2010	2.195%
2008	1.462%
2006	1.993%
2004	1.088%

Appendix 3 – Scatterplots of Senators' Scores versus Alienation Rates






Democrats - DW+1
-.2
-.3
-.4
-.5
0
.01
.02
.03
.04
AlienationRate


Republicans - DW+1
1
.8
.6
.4
.2
0
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.03
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AlienationRate