Does the 1 Person
1 Vote Principle Apply?

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Abstract

In this essay we address the puzzle that exists in American politics based on the tension of convergence to the electoral mean because of the MVT (mean voter theorem) and the studies showing divergence in candidate positioning. We provide a model in which voters and states are not treated equally because of vast regional differences. In contrast with the MVT, candidates who campaign in each state may converge to the national electoral mean while adopting diverging positions in different states, as they take differences in voter preferences and valences across states into account. At the state level, we show that while candidates give maximal weight in their policy position to pivotal voters, they give minimal weight to those voting for them with almost certainty; and that in their national position while candidates give maximal weight to swing states they give minimal weight to nonpivotal states. Something that remains hidden when differences across states are ruled out as they are in MVT. Then we adapt the variable choice set logit model of Gallego *et al.* (2013) to study the 2008 Presidential election and find that even though Obama's and McCain's position in swing states differs from the national electoral mean, their national position are close but on opposite sides of the national mean. Given the differential treatment candidates give voters and states in their national position, incorporating the Electoral College vote in the model, the "one person, one vote" principle may fail to obtain in the 2008 US Presidential election when candidates' valences and campaign spending differ across states.

INTRODUCTION

The principle of "one person, one vote" has been a bedrock of representative democracy. There is a deep belief in the equality implicit in this principle. A central concern in constitutional law has also been that electoral outcomes reflect the desire of every citizen that their vote carries the same weight as that of others. For instance, in the landmark case, *Wesberry v. Sanders (1964)*,[1] the Supreme Court held that US Congressional districts were required to be

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1. Formally, this case is known as James P. Wesberry, Jr. *et al.*, Appellants, v. Carl E. Sanders *et al.*, 376 U.S. 1.

drawn such that each district contained (roughly) the same number of citizens. Justice Black, writing for the majority, wrote that the Founders, by using the term "by the people" to describe the way in which the governmental system should function meant to guarantee equality of representation.[2] The cases, addressing the Constitutional requirements for equality in electoral redistricting, highlight the belief that the "one person, one vote" principle is deeply embedded in the political history of the United States—to the point of being understood as a founding principle embedded in the US Constitution.

However, it is unclear whether US presidential elections exhibit the same level of equity across voters given the Electoral College system. Debates on how well the Electoral College represents "the will of the people" reemerged after the 2000 US election in which Bush defeated Gore for the Presidency even though Gore won the majority of individual votes. This electoral distortion induced distress among US citizens.[3] A reaction to the 2000 election prompted a movement in some states to commit to a compact in which once a coalition of states with a majority of Electoral College votes is amassed; those in the pact will dedicate their state electors to the candidate that wins the national popular vote rather than the vote in the individual state.[4]

In the Electoral College, each state is awarded presidential electoral votes equal to the number of representatives in the House plus the number of senators (2 for every state).[5] Given that the number of representatives in the House is calculated based on the state's population relative to the national, one could conjecture that this weighting embodies the "one person, one vote" principle—each state has presidential electoral power proportional to their respective population. As the East and West Coasts states often have distinct political leanings relative to those in the South or Midwest *and* a disproportionate mass of citizens reside on the coasts, the Electoral College may ensure that the smaller states voters (with different political preferences relative to those on the coasts) are not entirely "dummy players" in the electoral game. However, with strategic candidates, this may not be how the Electoral College system operates in practice.

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2. While this case hinged on equality in the election of members to the US House of Representatives, this general sentiment applies to Presidential elections as well.

3. The outrage with the result of the election was also partially directed at the Supreme Court for their intervention in the outcome. The outrage was likely disproportionately concentrated among Gore supporters. However, the discussion of equality and whether individual votes mattered has continued long past this particular election.

4. At the time of this writing, this compact, known as the "National Popular Vote Interstate Compact," has been signed (through laws passed by state legislatures) by California, District of Columbia, Hawaii, Illinois, Maryland, Massachusetts, New Jersey, Vermont, and Washington. These states carry a total of 132 electoral votes or 48.9% of the 270 votes needed to win a presidential election.

5. Maine and Nebraska use the "congressional district method" which selects one elector within each district by popular vote and the remaining two (associated with the two senators) by a statewide popular vote.

Recent research has shown that a candidate's valence[6] not only varies greatly across states but is also a major determinant of the electoral outcome (Schofield *et al.*, 2011a, 2011b). Consider the following example where valence differences across states are taken into account.

Example 1 Two candidates, L and R, compete for office where L is the left-wing and R the right-wing candidate. Now consider a voting public that consists of three states. State 1 has 1 000 voters while States 2 and 3 have 600 each. Further, let State 1 be such that L has a valence such that $\frac{3}{4} = 750$ voters prefer L while States 2 and 3 both support R slightly, say 51%. Now consider two possible electoral systems: (i) majority rule popular vote where every citizen has an equal vote; and (ii) an electoral college system in which a candidate must win a majority of electoral votes—allotted according to population—in order to win the election and assume that in all three states the winner takes all the state's electoral college votes. In case (i) R loses based on the "one person, one vote" principle. L receives 750 votes from State 1 and 294 from States 2 and 3 for a total of 1, 338 votes, while R receives 250 votes from State 1 and 306 from States 2 and 3 for a total of 862 votes. In case (ii), imagine that the states are weighted according to the number of voters living in the state. State 1 has, say 10 electoral votes, States 2 and 3 each carry 6 electoral votes because they are $\frac{3}{5}$ as large in terms of number of voters as State 1. In this case R wins the election because she receives a majority of votes in States 2 and 3, which garners her 12 Electoral College votes compared to L's 10 electoral votes from State 1.

This example, a highly stylized representation of the 2000 presidential election, highlights the tension between equality of voting power for each citizen and the Electoral College system. The example illustrates that under a pure majority vote system L wins the election quite handily, but that under the Electoral College vote, R wins because of her valence advantage in a majority of states. Thus, the heterogeneity of valence across states can affect electoral outcomes in the Electoral College vote and may actually harm the fulfillment of the "one person, one vote" principle. In this note we explore how well the

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6. The voting literature has identified that voters assess candidates in various ways. In every election candidates identify their position along multiple policy dimensions. One way voters evaluate candidates is by examining how close or far is each candidate's position from theirs along different dimensions. But candidates also differ in other respects such as their popularity and charisma. There is now substantial empirical evidence that voters' choice of candidate is equally influenced by both voters' non-policy evaluation of candidates and by how far candidates are in policy terms from a given voter. In our context, valence refers to voters' non-policy assessment of candidates.

"one person, one vote" principle applies in US presidential elections when candidate's valence varies across states.

This concern is further exacerbated when discrepancy in candidate valences is also large for a substantial number of states. For instance, in recent presidential elections the media was quick to identify "swing" states. These pivotal states, identified using polls carried out prior to and throughout the electoral campaign, are determined from permutations that allow a candidate to win a majority of Electoral College votes. Usually only a handful of states put a candidate over the 270 Electoral College vote threshold to win the election. Pivotal states are those in which the partisan make-up of the electorate seems evenly divided between Republican and Democratic candidates in campaign polls. As voters' preferences change over time—because of changes in candidates, the salience of the issues over which the election is fought, or the candidates' valence—swing states differ between elections. In the 2008 Presidential election, Colorado, Florida, Indiana, Missouri, Nevada, New Hampshire, North Carolina, Ohio, Pennsylvania, and Virginia were considered swing states. While Obama was expected to win with near certainty in California and Massachusetts; in Texas and Oklahoma it was McCain. In these non-pivotal "safe" states, their Electoral College votes were not "up for grabs" as the valence advantage for the state's preferred candidate was so high that the disadvantaged candidate had little chance of winning. In swing states, polls show uncertainty as to which candidate will win. It was no accident that in the summer of 2008 Democrats held their nominating convention in Denver (Colorado), a battleground state.

We now illustrate how the Electoral College and the swing states affected the 2008 and 2012 electoral campaigns.

THE 2008 AND 2012 US PRESIDENTIAL ELECTIONS

As voter preferences and election issues vary across states, different electoral outcomes emerge in different states. These differences influence the outcomes at the national level.

Figure 1 shows the 2008 US electoral map.[7] Obama won the blue states and McCain those in red. Were we to look only at this map, we would conclude that McCain won the election as there are more red than blue states, yet it is Obama who won. This visual distortion is as a result of the fact that the US map does not reflect the distribution of the population by state. To account for population differences across states the cartogram in Figure 2 scales

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7. This map was taken from Cole's NPR website http://www.npr.org/blogs/itsallpolitics/2012/11/01/163632378/acampaign-map-morphed-by-money accessed on October 4, 2013.
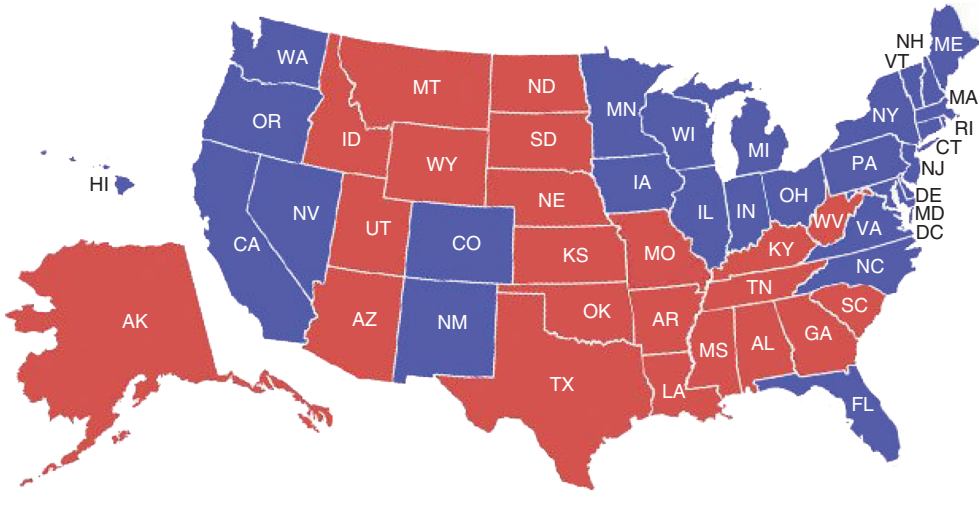
Figure 1 The 2008 US presidential election map. Obama won the blue states, McCain those in red. Retrieved from NPR, http://www.npr.org/blogs/itsallpolitics/2012/11/01/163632378/a-campaign-map-morphed-by-money
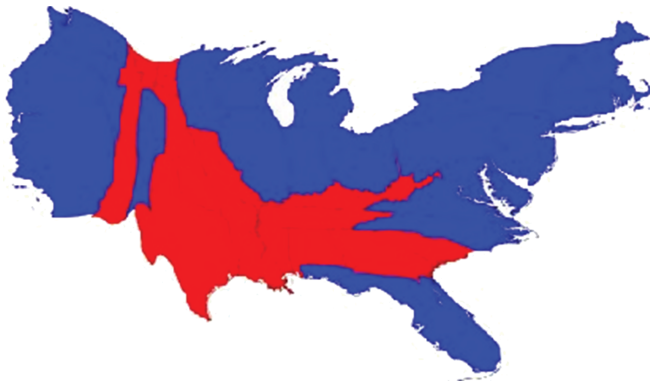

Figure 2 The 2008 presidential election results weighted by state population. In blue the areas won by Obama and in red those by McCain. Retrieved from Marc Newman's University of Michigan's Web site http://www-personal.umich.edu/~mejn/election/2008/

(i.e., weights) each state according to its population.[8] This time the blue area dominates the red one and gives a better representation the electoral outcome: Obama getting 52.92% and McCain 45.66% of the popular vote, with the remaining votes going to other candidates. Yet Figure 2 is also not an accurate depiction of the electoral outcome as the President is not directly elected by voters but rather by the Electoral College. The cartogram

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8. This map was taken from Newman's website http://www-personal.umich.edu/~mejn/.
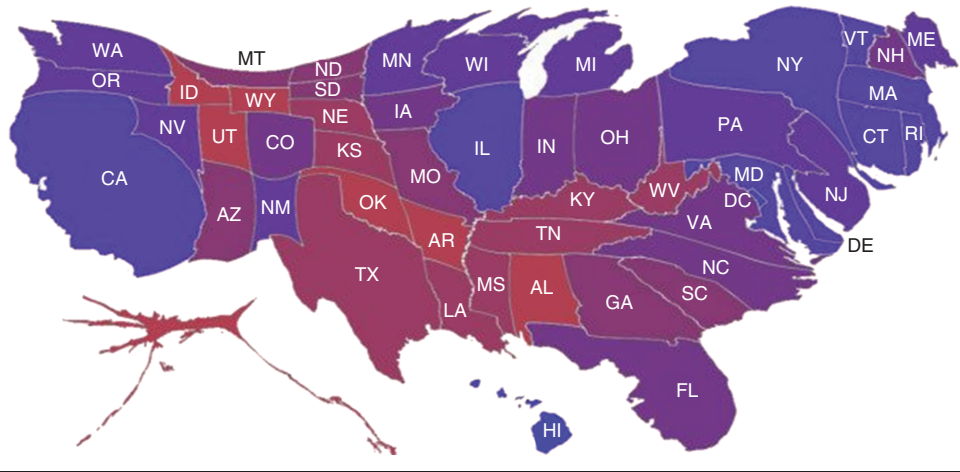
Figure 3   Cartogram of the 2008 US Presidential election map scaled by Electoral College votes. Obama in blue, McCain in red, in purple states with a 50–50 split in the popular vote. Retrieved from NPR, http://www.npr.org/blogs/itsallpolitics/ 2012/11/01/163632378/a-campaign-map-morphed-by-money

in Figure 3 shows the US electoral map scaled by the Electoral College votes showing Obama's blue states to McCain's red with swing states in purple. Figure 3 illustrates that Obama won 365 of 538 electoral votes to McCain's 173. Figures 2 and 3 are not identical as Figure 3 illustrates the explicit bias the Electoral College votes gives states with small populations (e.g., Wyoming has twice the size in Figure 3 than it does in Figure 2).

These cartograms do not reflect the importance of each state during the electoral campaign. Given the Electoral College vote, candidates strategically spend more time and resources campaigning in swing states than they do in safe states. Figure 4 shows the map of the 2008 election scaled by advertising spending *per state* (in millions of dollars). Even though this cartogram includes all continental states, we can only see swing states. The reason is simple: candidates spent substantially more dollars in swing than in safe states. Even though states in which few advertising dollars are spent are almost invisible to the eye, they are there. The more purple a state is, the greater the advertising dollars spent by *both* Obama and McCain in these states. Similarly, Figure 5 gives the US map scaled by advertising spending by state *per voter* (in dollars). Again, only purple colored swing states are visible. Ad spending per voter was highest in Nevada and New Hampshire.

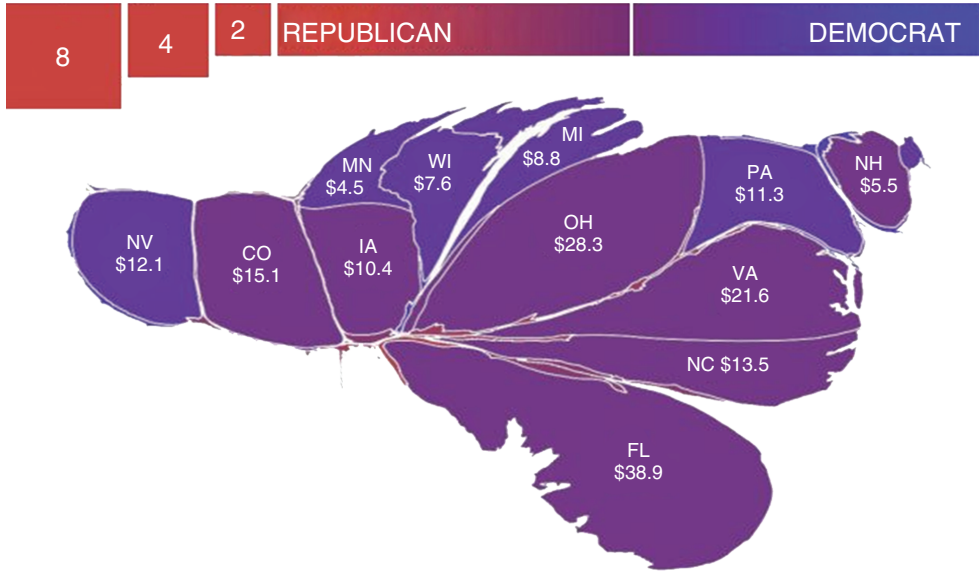Ad Spending Per State In Millions of Dollars

Figure 4 Cartogram of the 2008 US Presidential election map scaled by ad spending per state (in millions of dollars). Retrieved from NPR, http://www.npr.org/blogs/itsallpolitics/2012/11/01/163632378/a-campaign-map-morphed-by-money
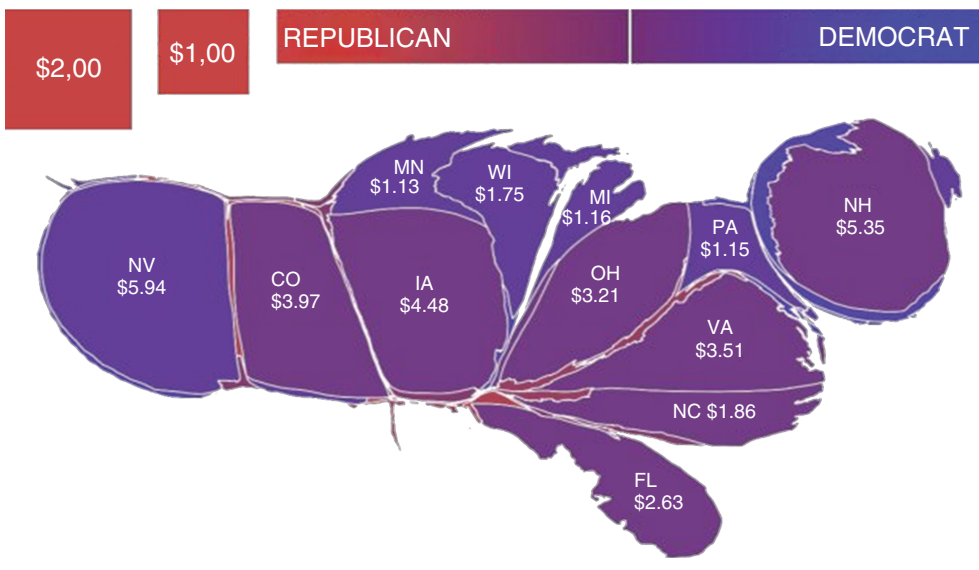
Ad Spending Per Voter In Dollars

Figure 5 Cartogram of the 2008 US Presidential election map scaled by ad spending per voter (in dollars). Retrieved from NPR, http://www.npr.org/blogs/itsallpolitics/2012/11/01/163632378/a-campaign-map-morphed-by-money
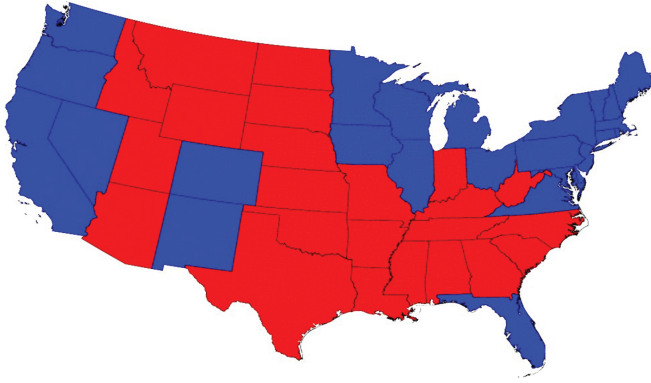
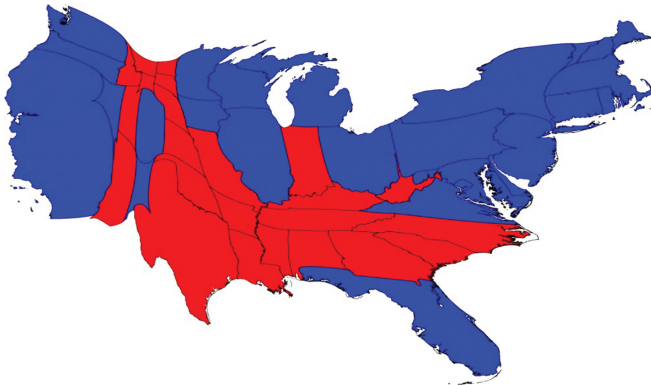**Figure 6**   The 2012 US Presidential election map. Obama in blue, Rumney in red. Retrieved from Marc Newman, Dept. of Complex Systems, University of Michigan: http://www-personal.umich.edu/∼mejn/election/2012/

Figure 7   Cartogram of 2012 US Presidential election map scaled by state population. Obama in blue and Rumney in red. Retrieved from Marc Newman's webpage, Dept. of Complex Systems, University of Michigan: http://www-personal.umich.edu/∼mejn/election/2012/

   The 2012 US electoral map is shown in Figure 6. Comparing Figures 1 and 6 we see that even though Obama was reelected in 2012, the two elections differ (e.g., while Obama won North Carolina in 2008, Romney won it in 2012). As a consequence when the 2012 US map is scaled by population (Figure 7) or by Electoral College vote (Figure 8), these cartograms differ from the corresponding ones in 2008. We also include the cartograms of the 2012 US map by county scaled by population (Figure 9) and the fine grained map by county (Figure 10).
   As the 2008 and 2012 US Presidential election cartograms show, when modelling elections in the US we must take into account that voter preferences
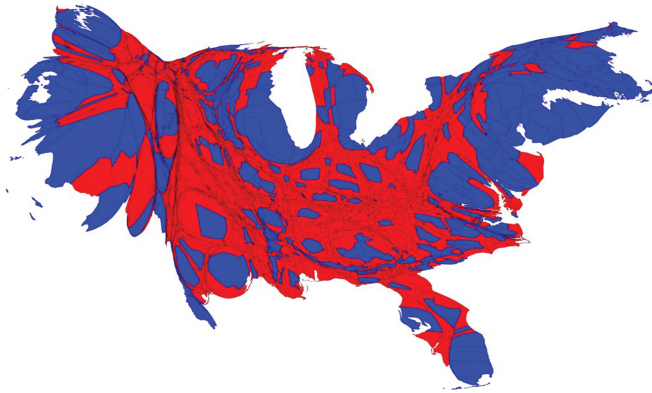
Figure 8 Cartogram of 2012 US Presidential election map by county scaled by population. Retrieved from Mark Newman's website, Dept. of Complex Systems, University of Michigan: http://www-personal.umich.edu/~mejn/election/2012/
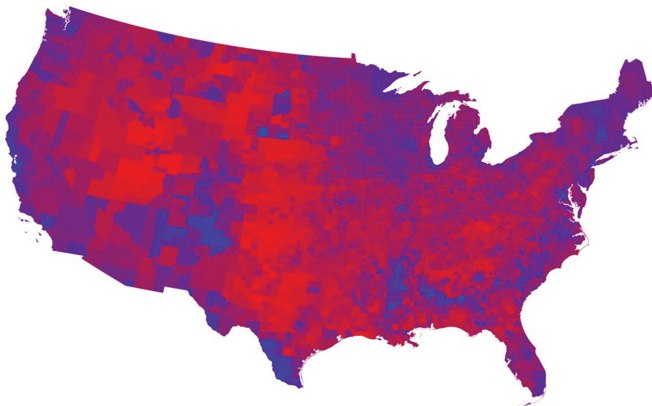

Figure 9 Fine grained 2012 US Presidential election map by county. Retrieved from Mark Newman's Web site, Dept. of Complex Systems, University of Michigan: http://www-personal.umich.edu/~mejn/election/2012/

vary by state as well as taking into account the role that swing states and campaign spending play in the election.

MODELING US PRESIDENTIAL ELECTIONS

During the campaign, candidates may make policy promises that they believe will win them a majority of voters in swing states, promises that may not reflect the preferences of the overall national majority. This possibility is related to the likelihood of candidate's platforms converging. As Hotelling
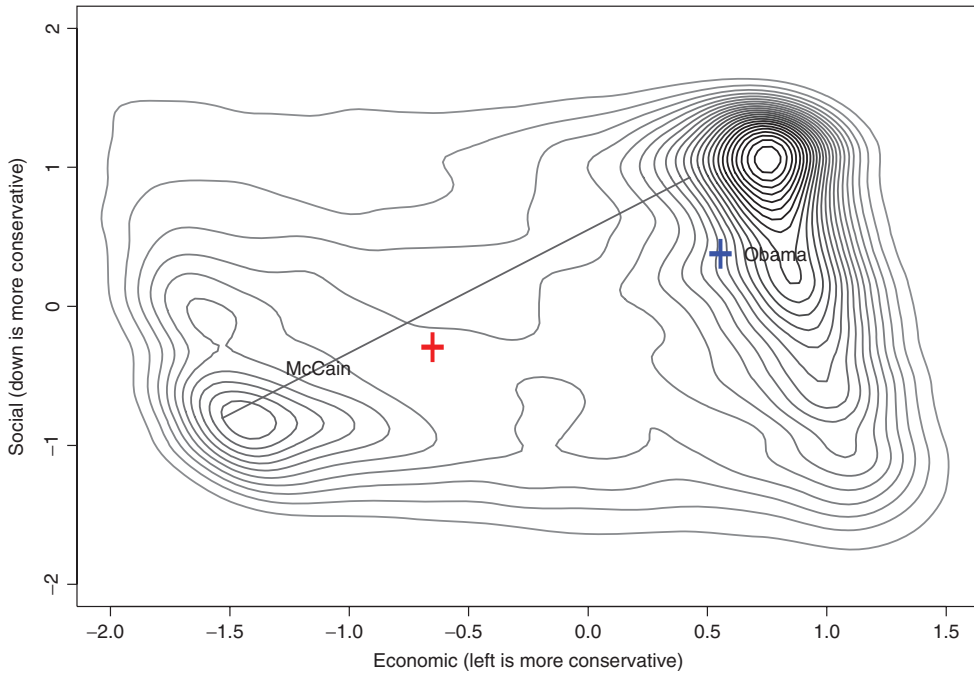
Figure 10   Candidate locations and voter densities in the 2008 US presidential election.

(1929) and Downs (1957), the median voter theorem[9] (MVT) has provided a powerful rationale for strategic candidate position choices located at the electoral median (the median voter). However, models that exhibit convergence to the median often assume unidimensional policy spaces and deterministic (as opposed to probabilistic) voting. When extended to multiple dimensions[10] pure-strategy Nash equilibria[11] often do not exist

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9. The multidimensional version of the MVT derives the conditions under which candidates strategically locate at or converge to the electoral mean. The electoral mean is the mean of voters' positions dimension by dimension. Basically, the theorem shows that if one candidate locates close to the electoral mean, other candidates must also locate near the mean. Candidates who fail to locate close to the mean increase the changes of losing votes and the election. Schofield (2007) shows that candidates may not converge to the electoral mean when valence differences, that is, nonpolicy differences across candidates, are incorporated into the model.

10. Multiple dimensions are relevant when there are vast regional or state differences as is the case the United States. Regions differ in their endowments of natural and economic resources and in the issues relevant in each election. Candidates must identify their positions along these multiple dimensions in each state.

11. John Nash's great insight—for which he won the Nobel Prize in 1994—was that in a game with few players, the pure (i.e., non-stochastic) strategies taken by one player affect the payoff of all others. A pure strategy Nash equilibrium of a game/model is the set of actions—one for each player—such that no player wants to change his strategy when all other players use their Nash equilibrium strategies. In the context of this essay, a pure strategy Nash equilibrium of the election is one where no candidate has an incentive to change his multidimensional position as doing so would lower the candidates' vote share, that is, if the candidate changes position the chances that some voters vote for the other candidate increase.

except when strong—largely unrealistic—conditions are met (Caplin & Nalebuff, 1991). When mixed-strategy Nash equilibria[12] exist, they are often located in the uncovered set[13] (Kramer, 1978). In this case the MVT may be salvaged in multiple dimensions because the electoral mean is often within the uncovered set (Adams, 2001; Adams & Merrill, 1999; Poole & Rosenthal, 1984). However, this seems contrary to Chaos Theorems[14] that predict (generally) instability in multidimensional policy spaces (McKelvey, 1976, 1979; McKelvey & Schofield, 1987; Schofield, 1978).

The tension between the stability (MVT) and instability (Chaos Theorems) results suggest that voting decisions be model as stochastic, with each voter voting for each candidate with some probability. Using this framework, Schofield (2007) shows that candidates may not converge to the electoral mean[15] when valence asymmetries across candidates are incorporated in the model. Nonpolicy valence asymmetries arise when voters differentially evaluate candidates: the *competence valence* is voters' common evaluation of a candidate's ability to govern effectively in the past and in the future (Penn, 2009) and generally differ across candidates; the *sociodemographic valence* reflects a candidate's appeal to specific portions of the electorate and since it depends on voters' sociodemographic characteristics varies across voters.[16] There is empirical evidence showing that both valences are important in determining the electoral outcomes, especially when there are large valence differences across many states.

Here we sketch how the multi-regional multidimensional model developed by Gallego, Schofield, McAlister, and Jeon (2013) can be used to study the "one person, one vote" principle in the 2000 US presidential election. In this stochastic electoral model, candidates understand the differences across states and choose their positions at both the state and national levels to maximize their expected vote share at the respective level. The model

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12. A pure strategy Nash equilibrium does not exist when players have an incentive to constantly change their strategies. The most famous example of a game where players always want to change their strategy is the children's game "Rock, Paper, and Scissors." When playing this game, children have always understood that if they were to always play the same strategy, say rock, they become predictable and always loose. As a consequence, in order not to become predictable, children randomize between rock, paper, and scissors. The equilibrium of games were players randomize among pure strategies is called a "mixed strategy Nash equilibrium." In the context of policy positioning games in elections, a mixed strategy Nash equilibrium exists when there is no pure strategy Nash equilibrium because candidates have an incentive to constantly change their position strategies to gain votes.

13. Informally, an uncovered policy is any alternative that can majority-defeat any other policy in two or fewer steps.

14. Chaos theorems here refer to the study of socio-political phenomena where the decisions of voters are stochastic rather than deterministic. The equilibrium of the model is the solution to a nonlinear system of equations. It has been shown that there are conditions under which voting can be essentially random.

15. The electoral mean is the mean of voters' ideal policies dimension by dimension.

16. For example, African-American voters are much more likely to vote for the Democratic candidate than they are to vote for the Republican candidate. Thus, it can be said that the Democratic candidate is of higher average valence among African-American voters than the Republican candidate is.

allows for the average competence and sociodemographic valences[17] as well as average campaign spending per state to affect voters' choice of candidate in a given state.

Candidates chose their *policies in state k* as a weighted average of the ideal policies of voters in state k. The weight that candidate j gives voter i in state k depends on the likelihood that i votes for j in state k relative to all voters in k which depends on the position adopted by all candidates in state k, on the average competence and sociodemographic valences and on the average campaign expenditure of candidate j in state k.

At the national level, candidate j's *national* position is a weighted average of j's position in each state where the weight given to state k depends on the likelihood that state k will vote for j, relative to all other states. The probability that state k votes for j depends on the aggregate probability that voters in k vote for j.

The weight that candidate j gives each voter in state k and to each state are endogenously determined as the probability that each voter votes for the candidate depends on the position of all candidates in that state. The theoretical results show that when the probability that voter i in state k (respectively state k) votes for j is close to a half, j gives swing voter i (correspondingly swing state k) the largest weight in its state (correspondingly national) policy position. Voters (correspondingly states) who are very likely to vote for j, and are thus considered safe, receive little or no weight in j's position.

This model determines the equilibrium conditions under which the state and national positions of candidates converge to the state and national electoral mean,[18] respectively. If a candidate's position does not meet the convergence criterion in at least one state or at the national level, this candidate will have an incentive to move away from the corresponding electoral mean. Other candidates may then also find it in their interest to move to another position. In this case, the state and national electoral means will not be a local Nash equilibrium of the model as candidates locate far from the corresponding mean. We adapt this multi-state model to examine the pivotalness of the state when the state is central to winning a majority of Electoral College votes.

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17. The average competence valence of a candidate is the average over voters' beliefs on a candidate's competence or ability to govern. As voters with certain sociodemographic characteristics may have preferences for the same candidate, the average socio-demographic valence captures the average valence that voters with certain sociodemographic characteristics have for a given candidate. Note this average sociodemographic valence may be positive or negative.

18. The state (correspondingly national) electoral mean is the mean dimension by dimension of voters' ideal points at the state (correspondingly national) level.

APPLICATION TO THE 2008 US PRESIDENTIAL ELECTION

The National Annenberg Election Study (NAES) is used to study vote choice and candidates' position for the 2008 Presidential election. We perform factor analysis on the answers to questions given by 34,982 NAES survey respondents, and find a two-dimensional latent social and economic policy space.[19] Lower scores on the economic dimension (left on *x-axis*) reflect more conservative opinions on economic issues. More liberal social views on gay rights, abortion, stem cell research, and so on are located to the north on the *y-axis*. Using the factor loadings from the factor analysis we scale voter preferences along these two dimensions. Figure 11 gives the smoothed voter distribution along the economic and social dimensions and illustrates that voters positions along these two dimensions are correlated, as most voters are either economic and social liberals or vice versa. The polarized bimodal distribution of voters shows the conservative mode in the lower left and the liberal one in the upper right. The survey also asked for voting intentions where the election held that day and asked for voters' sociodemographic characteristics.

The 2008 US presidential election was ground-breaking in that it elected the first Black President. Black turnout was about 4% points higher than in previous elections with the rate of black voters—who vote disproportionately for Democratic presidential candidates—being higher than in previous elections. A dummy variable identifying whether the voter is black is included in the model.[20]

This election was also ground-breaking in that public financing of presidential campaigns was dispensed with leading to record donations and expenditures levels in the campaigns. Obama spent $740.6 million dollars, more than the combined spending ($646.7 million) of Bush and Kerry in 2004.[21] This campaign also marked the first time a candidate (Obama) used social media to directly canvass voters in its fundraising campaign. The media suggested that throughout the Democratic primary and general election campaigns a key aspect to Obama's emergence as a powerhouse

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19. It is common to find high correlations between the answers given by voters to certain questions in any pre-election survey. Questions that are highly correlated are considered to reflect different aspects of the same problem or dimension. For example, voters that are experiencing financial hardship because, having lost their job, will have similar answers to questions pertaining to different aspects of their economic circumstances. As such the responses to questions dealing with different aspects of a person economic conditions are usually highly correlated and are best treated as if pertain to a latent economic dimension.

20. A dummy variable is a variable that is coded as 1 of an event occurs and 0 otherwise. In this case, the dummy variable in question is coded as 1 if the person was African-American. While there may be some support for allowing there to be a dummy variable indicating whether or not a voter is Hispanic, we choose not to make this distinction within our model. Although Latino voters are quickly becoming a force in US elections, there is little evidence to date demonstrating that Hispanic voters vote in a specific manner that is inconsistent with the rest of the electorate. If there is a Democratic lean among Latino voters, the effect is nowhere near as dramatic as it is within the Black population in the United States.

21. These figures are according to FEC filings for the 2008 presidential election.
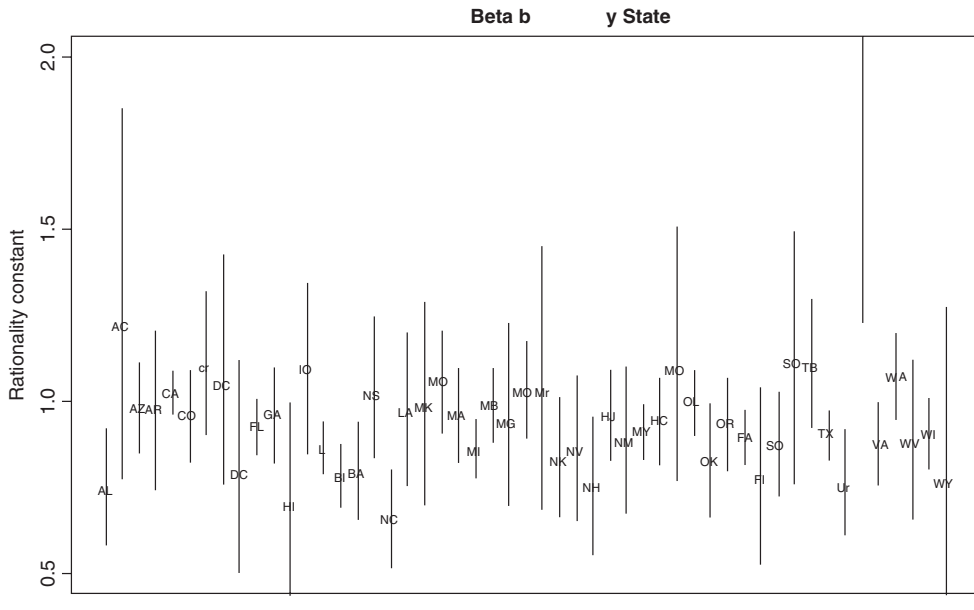
Figure 11   Estimates of the weights given to policy differences with candidates (Beta) by State.

candidate was his efficient and record-breaking fundraising abilities as well as his innovative use of social media. We assume activists not only systematically perceive candidate valence differently than non-activists do but that they also donate money to increase the chances of their candidate winning the election; in doing so they reveal their strong preference for that candidate. Moreover, activists may be more politically knowledgeable and, thus, may assess candidates in a different way than non-activist in the same state do. A dummy variable by candidate was created to differentiate those who responded that they had made political donations to that candidate from those making no donations.

We adapt the multiregional multidimensional variable choice logit[22] (VCL) model developed in Gallego *et al.* (2013) to estimate the weights given by voters to the policy differences they have with parties. Figure 11 shows the estimates of the weights (also called betas) given by voters to policy differences with candidates in each of the 50 states and their credible confidence

intervals.[23] These intervals show that voters in different states give different weights to policy differences with the candidates, a reflection of the vast political and economic differences that exist across states in the United States.

Following the theoretical model, we use the policy weights and the estimates of the competence and sociodemographic valences plus the candidates' campaign expenditures by state to estimate candidates' position first at the state level, then using the state positions estimate the candidate positions at the national level. Estimating positions at the state level is important because US voters may sort themselves into areas where their political interests are best represented or into areas with like-minded individuals and because the political environment that an individual lives in can affect the person's political preferences. The political priorities of a voter in rural Kansas and a voter in New York City will likely differ. Whereas in Kansas, citizens care about policies relating to farms and small business; New Yorkers may care for programs to combat urban decay or gentrification of low socioeconomic neighborhoods. The differences on the social dimensions are likely to be stratified in the same manner. Thus, estimating positions at the state level will help account for *systematic* political differences that exist between states and regions (e.g., the Coasts being more liberal and the Midwest and South more conservative). The estimation procedure will then aggregate state positions (and their differences) to find the candidates' positions at the *national* level.

Given voter distributions, we use a variant of the VCL model used in Gallego *et al*. (2013) to estimate the competence and sociodemographic valences, that is, the valence advantage each candidate enjoys in each state. We also estimate the effect that average campaign spending per state has on the likelihood of voting for the candidate in that state. Then using these estimates we use the theoretical model to find the optimal candidate positions at the state and national levels which requires estimating the optimal weights given to each voter in each state and to each state by the candidates in their optimal position at the state and national levels.

Pivotalness of a state is determined by the likelihood a state is split evenly between candidates in terms of voting decisions. We modify the theoretical model to allow candidates to choose their positions to maximize their probability of winning the election given the Electoral College votes which is further conditioned on the underlying voter preference distribution in the state and the candidates' competence and sociodemographic valences and

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23. We used the Bayesian estimation framework described in detail in Gallego *et al*. (2013) to find the weights (or betas) voters give to policy differences with candidates. The credible confidence intervals are the Bayesian equivalent of the confidence intervals of the Frequentist approach and are shown in Figure 11.

their campaign expenditure in each state. We also extend this state pivotal-ness measure to compute *individual voter pivotalness* scores for voters in each state.

   We find that for the 2008 Presidential election the most pivotal voter is about three times more pivotal than the average voter and find that the most pivotal voter is *not* located at the national electoral mean. The results also show that candidates' position in swing states differ from the national mean, reflect-ing that candidates respond to voters' needs in swing states. Moreover, we also find that while the optimal weight given by both candidates to swing states is significantly positive, that of safe states not significantly different from zero, as predicted by the theory. At the national level, we find that the national electoral mean is still the optimal strategy for each candidate. This is because the optimal national position is determined by the optimal weighted state positions in swing states which give candidates an incentive to locate sufficiently close but on opposite sides of the national electoral mean (see positions in Figure 11). The results also suggest that, given the US Electoral College system, the "one person, one vote" principle may fail to obtain when the differences across states in candidate valences and campaign expendi-tures are taken into account. This is because many nonpivotal states (as well as voters in these states) are optimally given little or no weight in the can-didates' national policy position. Our results also indicate that candidates' national locations comport with the preferences of the overall national elec-toral mean as the distribution of voters' preferences in pivotal states is similar enough to that of the overall electorate.

CONCLUSION

Overall, we address the puzzle that exists in American electoral politics based on the tension of convergence because of the MVT and the studies show-ing divergence in candidate positioning. We provide a model in which states are not all treated equally and incorporate the Electoral College system into the model. The model shows that candidates may optimally give little or no weight to nonpivotal safe states such as California and Texas as happens in real life. This approach allows us to more readily assess how candidates choose their policy platforms in multidimensional spaces in an environment where state differences matter.

   The results highlight how endogenously and systematically account-ing for the pivotalness of states and campaign spending decisions by the candidates allows for a more complete picture of candidate electoral strategies at the state and national levels. Our model also provides a new mechanism—that contrasts with the MVT—where a candidate can converge to the national electoral median while adopting diverging positions in

different states. This is because of the fact that candidates take differences across states, in terms of voter preferences and valences and the pivotalness of the state into account when choosing their positions at the national level. Something that remains hidden when differences across states are ruled out as they are in MVT. As the assumptions of the MVT do not generally hold in the American electoral system, our theoretical model and empirical results give a better account of US presidential elections.

FURTHER RESEARCH

Note that the distributions of voters in states making campaign donations are qualitatively different than those in pivotal states where campaign funds are spent. In particular, large proportions of campaign contributions come from states such as California and Texas, which are decidedly *not* pivotal but are spent in swing states. This illustrates that new developments in this area will need to show how candidates simultaneously maximize the likelihood of winning in pivotal states while not alienating voters from non-pivotal states so that they can continue to receive contributions that further allow them to maximize the probability of winning.

This essay only briefly outlines how we might go about modeling elections in the United States, taking account both of the effect of the electoral system, the role of money and advertising and the vast political and economic differences that exist across states.

The essay highlights that to understand how candidates and parties chose where to locate in the policy space, account must be taken not only on the positions of other candidates but also on the vast differences that exist across states in a country as large and diverse as the United States. The empirical model found two underlying policy dimensions, one economic the other social. Yet vast differences across states in conjunction with the Electoral College vote may allow for states to differ in other less important dimensions as well.

In addition, the model can be extended to account for intra-party differences. Further research into inter-state differences across parties may allow us to understand how the Tea Party came into existence and how it functions within the National Republican Party.

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