The Persuasion Region: A Theory of Electoral Change*

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Abstract

Do candidates win elections by mobilizing new voters or by persuading existing voters? Despite its simplicity, this question is not straightforward to answer. I begin with a simple theory of electoral change, derived from the spatial model of voting, from which I introduce the *persuasion region*, a segment of the electorate "up for grabs" by both parties between one election and the next. To illustrate the theory's explanatory power, I use a new Bayesian model to leverage the information contained in precinct-level election returns by merging these data with 36.6 million individual-level voter registration and turnout records across four years, three elections, and two states. I show that in election pairs with large persuasion regions both-election voters who switch between the parties are a larger influence on election outcomes. In elections with smaller persuasion regions, new voters are a greater influence on the outcome. I then demonstrate the power of the persuasion region, and the mechanism at work, using individual-level panel data from the American National Election Studies. Fundamental characteristics of competing candidates structure the relative contribution of persuasion and mobilization to election outcomes.

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Despite the polarization of the national political parties and the contemporary classification of states as "red" and "blue," elections in America remain volatile. Across only four years, the same state can swing from a Democratic landslide to a Republican landslide and back to the Democrats. What can explain such large vote shifts between elections? Election outcomes change through two processes: changes in the choices of habitual voters and changes in the number and types of voters who turn out in one election or another. I call these phenomena *changing votes* and *changing voters* and develop a model to explain when each is more likely to sway election outcomes. Understanding when changing votes and when changing voters matter is not purely academic: billions of dollars are spent in each election cycle by campaigns and parties trying to change minds and turn out the base. Yet no consensus exists about when to focus on persuasion and when to focus on mobilization.

Based on the spatial theory of elections, my model identifies a *persuasion region*. This region is defined by the difference in the cutpoints between the candidates in successive elections. When changes in the locations of party candidates create a large persuasion region, the model predicts that electoral change will be due more to vote-switching by continuing voters than to changes in who votes. When, however, candidate locations define a small persuasion region, the model predicts that electoral change will be due more to changes in the composition of the electorate.

I develop a novel Bayesian ecological inference model to test these predictions on the individual-level turnout records of 36 million registered voters and the aggregate partisan outcomes in the 33 thousand precincts in which they are registered. Results from pairs of elections in California and Florida strongly support predictions from the model: party switching by voters is more frequent when the ideological space between competing candidates differs across elections. The Florida presidential race in 2008 is particularly interesting: Repeat voters from 2006 favored McCain in 2008, but the persuasion region was small and newly mobilized voters were numerous enough to deliver the state to Obama. Using American National Election Studies panel surveys, I find additional support for the theoretical

claim that vote change will be more important when the persuasion region is large and turnout change will be important when it is small.

Before developing my main arguments, I first show that existing research on electoral change has not come to strong theoretical or empirical conclusions. I present a theory of electoral change, turning next to the elections that I study and the Bayesian model I develop to measure cross-election dynamics. I show that voter file records provide leverage in estimating how turnout influences changes in partisan vote margins, present the results of aggregate voting data and panel survey estimations, and finally offer concluding remarks.

Understanding Election Dynamics

Research on electoral change tends to focus either on changing votes or changing voters with little reference to the other. When efforts are made to measure both together (for example, Campbell 1960, DeNardo 1980, Shively 1982, Shively 1992, Ansolabehere and Stewart, III 2010), large assumptions are often required to infer individual behavior from aggregate election results. Identification of changing votes has focused more on the individual characteristics of citizens who report conflicting preferences about the political parties in opinion surveys. These efforts aim to identify what are now called *swing voters* but what have also been described as *switchers* (Key 1966) or *floating voters* (e.g. Daudt 1961).

Actually measuring which citizens change votes between the major parties is complicated by the reality of the cross-sectional opinion survey, where only self-reported attitudes and behaviors at the time of the survey are measured. Swing voters are identified using a variety of taxonomies usually within one election period, with only an implication that within-election swing is correlated with cross-election swing. Swing voters have been alternatively identified by cross-pressured group memberships (Berelson, Lazarsfeld, and McPhee 1954), by self-reported independent partisan identification (Campbell, Converse, Miller, and Stokes 1960), by self-reported recall of different party presidential vote (Key 1966, Lupia 2010), by self-reported ticket-splitting (De Vries and Tarrance 1972), by balance in affective evaluation

of the two competing candidates (Kelley 1983, Mayer 2007), by conflicts between voter issue preferences and the issue positions of the parties or candidates (Campbell et al. 1960, Hillygus and Shields 2008), or by traits relevant to a psychological model of persuasion such as low political information and media exposure (Converse 1962, Zaller 2004). Because of different definitions of swing and a lack of cross-time measurements, consensus on who the swing voters are or how much influence they have on changing partisan electoral fortunes is limited.

Measuring the effects of changing turnout on electoral change has also proceeded with a variety of measurement perspectives and conflicting empirical results. Structural variation in American turnout is relatively predictable across individuals (varying by education, interest in politics, age, income, residential stability, and civic resources, e.g. Rosenstone and Hansen 2003, Wolfinger and Rosenstone 1980) and context (varying across type of election, registration rules, and the availability of absentee and early voting, e.g. Key 1955, Campbell et al. 1960, Campbell 1960, Rosenstone and Wolfinger 1978, Highton 1997). Scholars have produced mixed results that even large differences in turnout have substantial partisan electoral consequences despite the dramatic variation at the individual level – for example the most educated are 30 percentage points more likely to turn out (Rosenstone and Hansen 2003).

Formal and empirical studies of *surge and decline* – the phenomenon that presidential elections engage millions more citizens than midterm elections (Campbell 1960, Burnham 1965) – sometimes identify partisan consequences of changing turnout (Campbell 1960, Campbell 1987) and other times do not (DeNardo 1980, Wolfinger, Rosenstone, and McIntosh 1981). Likewise, simulations and estimates of full turnout elections often fail to find partisan consequences (Erikson 1995, Highton and Wolfinger 2001, Citrin, Schickler, and Sides 2003), while others suggest that turnout may have had consequences prior to about 1965 but not after (Shively 1992, Nagel and McNulty 1996, Martinez and Gill 2005).[1] Despite individual characteristics such as income that correlate both with the decision to come to the polls and

[1] See Hajnal and Trounstine (2005) for potentially consequential turnout effects in lower-stimulus local elections.

with party preference, and the regularity with which the president's party loses seats at the midterm at the same time as a large decline in turnout, it is not clear how or when changes in turnout affect which party wins elections.

A second class of mechanisms, separate from structural causes of turnout such as education and registration institutions, exists through which changes in turnout might more specifically influence who wins elections. Campaigns and interest groups target registration and turnout efforts at specific groups of citizens whom they expect will support their cause (e.g. Holbrook and McClurg 2005). Through this targeted activity, mobilization can change the set of voters who come to the polls. If this change is successfully targeted at individuals who prefer one party more than the other, partisan outcomes could be influenced. Field experiments show that campaign activities commonly employed by election campaigns do stimulate turnout in real-world situations (e.g. Gerber and Green 2000), finding for example that mobilization techniques can stimulate turnout by 1.5 points through partisan leafleting of doors and up to 7.5 points through face-to-face canvassing (Green and Gerber 2004, p. 94).

In summary, existing research on changing votes and changing voters does not provide unified expectations for electoral change. Most measures of swing voters derive from cross-sectional surveys rather than the longitudinal view that might more accurately identify switching behavior. Despite large and predictable differences in turnout, empirical results are mixed on capturing a partisan effect of changing voters.

The Persuasion Region: A Theory of Electoral Change

My aim is to provide a theory that explains why some election outcomes might have more to do with persuading swing voters and others more to do with changes in turnout. I first ask a basic question: Why *should* election outcomes change? The dominance of cross-sectional opinion surveys as a measurement tool in the literature on American elections has led the discipline to focus either on within-election correlates of reported behavior, such

as that between partisan identification and vote choice, or on sweeping multiple-decade changes in the relationships between citizen characteristics and partisan vote choices, such as the fall of the one-party South. Non-survey studies have necessarily focused on aggregate relationships, such as that between economic outcomes and incumbent vote share. Yet aggregate relationships may be produced by persuasion, mobilization, or both, and the aggregate data are difficult to use to infer individual relationships. The single election cross-sectional view turns attention away from important cross-election dynamics such as voters who switch between the parties across two or four years, while the multi-decade approach abstracts away from election specifics such as candidate characteristics. These approaches have helped describe the stable characteristics of the voting process in the United States. But I believe we can learn more about this *instability* with good theory and new data.

At this point an example may help. California is a solid "blue" state. Its electoral college votes have gone to the Democratic candidate in every presidential election since 1988, its House delegation is dominated by Democrats, its two Senate seats have been held by Democrats since 1993, its state assembly and senate are consistently held by the Democrats, and most statewide elected offices are won by Democrats. Despite this, Republicans have held the governor's seat for all but four and one half years since 1983 (see for example, Fiorina and Abrams 2008). In fact, across only four years, the top-ticket partisan outcome in California swings from a 10 point Democratic presidential victory in 2004 (George W. Bush's 43.8 percent to John Kerry's 53.6 percent) to a 16 point Republican gubernatorial victory in 2006 (Arnold Schwarzenegger's 54.5 percent to Phil Angelides's 37.9 percent), to a 25 point Democratic presidential victory in 2008 (John McCain's 36.5 percent to Barack Obama's 60.2 percent). What is the nature of the citizen choices that lead to large swings even in a solid blue state? This is the puzzle I aim to resolve.[2]

Explanations abound for these outcomes: Kerry beats Bush because California is liberal,

[2] This example compares presidential and gubernatorial contests, and it may be that gubernatorial contests are of some different partisan class. In a later section, I consider change across consecutive presidential elections.

Schwarzenegger beats Angelides because he's not really a Republican, and Obama thumps McCain because of a tanking economy. But these explanations do not fit into a short-term theoretical model, instead making a somewhat ad hoc synthesis of political science knowledge from cross-sectional studies (party identification and candidate trait correlations with vote choice) and from longitudinal aggregate studies (the economy and the vote). I argue that we can also place these short-term election dynamics straightforwardly into the spatial model of voting. The spatial model provides a structure not only to explain these varying outcomes, but once so placed suggests predictions for when changing election outcomes are caused more by changing votes and when more by changing voters.

The spatial model of voting is developed in Hotelling (1929) and Downs (1957, Chapter 8). Each voter is assumed to have an *ideal point* in a policy space, often represented as a point on the real number line. This line may represent the desired amount of government intervention in the economy, for example with ideal points measuring each voter's ideal level of intervention. Voter A's utility from government policy is maximized when the implemented policy is at A's ideal point, and utility is assumed to decrease monotonically on both sides of the single ideal point. With single-peaked preferences and a utility curve that decreases monotonically and (close to) symmetrically, each voter maximizes utility by voting for the candidate whose policy position is closest to the voter's ideal point.[3] The full electorate can be summarized by a distribution of ideal points across the number line, which might be of any shape. To win elections, candidates and parties may move their policy positions in an attempt to locate themselves closest to a plurality of voters.

One interesting result from Hotelling (1929) and Downs (1957) is that under the spatial model with one dimension of competition, proximity voting, and fixed single-peaked voter ideal points, the competing candidates move their policy positions on the number line toward

[3] Competing candidates or parties offer not just one policy but a bundle of policies than can be summarized by a point on the same real number line as the voter ideal points. Work on the behavior of elected politicians finds that most issues collapse into a single dimension (e.g. Poole and Rosenthal 1997), at least since the 1970s. Because a single dimensional spatial model is also more tractable than having multiple issue dimensions (Hinich 1977), I assume a single dimension for this discussion.

the median voter until they reside at nearly the same point. If the driving motive for candidates is to win elections, the spatial model predicts candidate convergence to the median voter.

In American politics, most Democrats and most Republicans offer materially different sets of policies.[4] What are the implications for electoral change if candidates do not converge to the median voter? If voters prefer the candidate whose policy position is closest to their ideal point, then a *cutpoint* can be calculated halfway between the two candidate locations on the number line. This cutpoint divides the electorate into voters who are closer to the candidate on the left, and thus vote for the candidate on the left, and voters who are closer to the candidate on the right who thus vote for the candidate on the right, plus or minus any voting error. In American elections, although Democrat and Republican candidates on average differ from each other, the magnitude of the difference and thus the location of the contest cutpoint depends upon the specific candidates up for office.

If different candidates locate at different policy positions across elections, the location of the cutpoints in the elections can vary. When the cutpoint varies across elections, a set of voters who reside between the two cutpoints prefer the candidate from the left party in one election and the candidate from the right party in the other election. I term the range of voter ideal points between the two election cutpoints the *persuasion region*, and define those citizens who reside in the persuasion region as the swing voters.[5] The size of the persuasion region structures the potential effect of changing votes on electoral change. The persuasion region is a potential set of voters who might change votes; I say potential because not all voters are fully informed about the locations of the candidates, and the number in the persuasion region who actually change votes is a function of the information disseminated about the candidate locations.

[4] Many explanations for diverging candidate locations have been proposed, such as extremist abstentions (Downs 1957), multidimensional policy spaces (Hinich 1977), candidate policy preferences (Wittman 1983, Calvert 1985), candidate valence advantages (Groseclose 2001), or party activists and nominating procedures (Aldrich 1995, Cohen, Karol, Noel, and Zaller 2008).

[5] Krehbiel and Rivers (1988) use a similar logic to derive ideal points using multiple cutpoints for legislators in a committee vote setting.

As a graphical example of how candidate locations and cutpoints generate the persuasion region, consider the hypothetical example election pairs that I present in Figure 1. Two parties, A and B, contest two consecutive elections. At election one, party A nominates candidate a1 and party B nominates candidate b1. Candidate a1 is a standard conservative with a policy position at 0.30, and candidate b1 is a standard liberal with a policy position at -0.30. The cutpoint between these two candidates is 0.0, indicating that voters to the left of 0.0 prefer b1 and voters to the right of 0.0 prefer a1. Which candidate wins the election depends upon the distribution of ideal points of voters. Assume for discussion that a1 pulls out a narrow victory at election one.

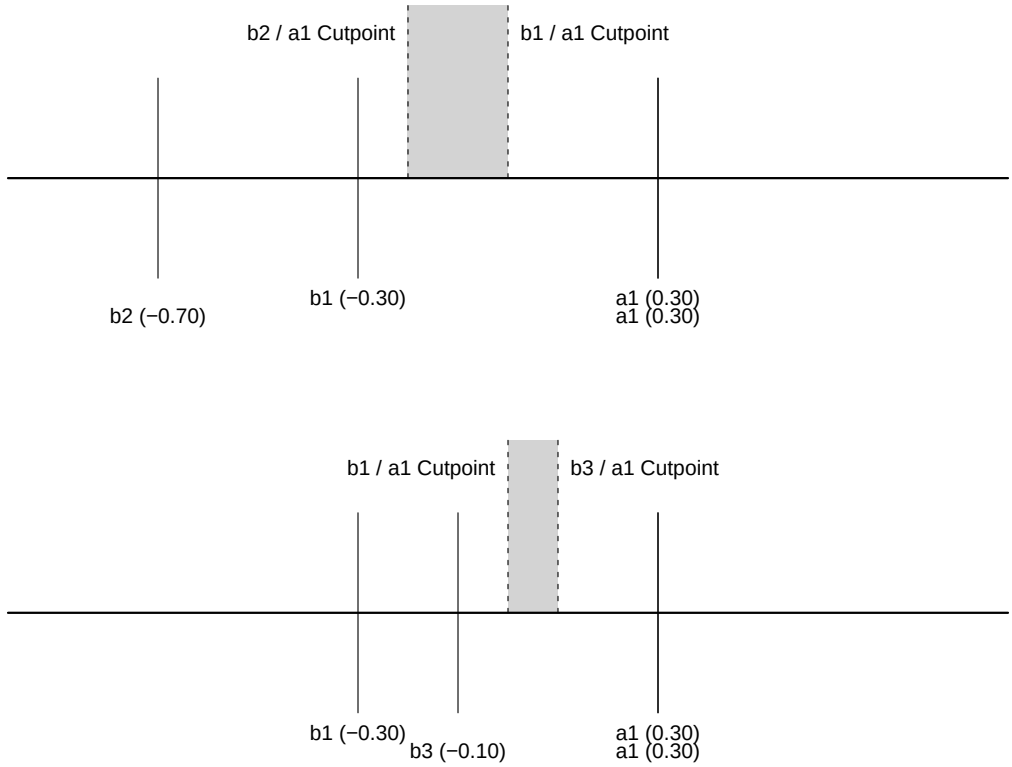
Many in party B advocate nominating a more moderate candidate in the next election to steal voters away from candidate a1, while others believe that b1 was not liberal enough, and that a more staid partisan should be nominated to clearly define the difference between the parties. Imagine that the partisans win out in the nomination at election two, and that liberal candidate b2 with a policy position at -0.70 contests candidate a1 in the second election. The cutpoint between a1 and b2 in election two is -0.2. If voter ideal points remain about the same at the second election as in the first, party B does worse in the second election as a1 wins reelection.

More importantly, notice the space between the election one and the election two cutpoints, shaded gray. This is the persuasion region: the set of voters who prefer party B's candidate in election one but party A's candidate in election two due to the changing location of election cutpoints. Readers who want to place this abstraction onto a historical set of contests might consider the American presidential elections of 1968 and 1972. In 1968 Richard Nixon (a1) defeated Hubert Humphrey (b1) in a close election. In 1972 the Democrats nominated a noticeably more liberal George McGovern (b2), who went on to a landslide defeat against Nixon.[6]

Imagine an alternative set of contests where the party B moderates win out in their

[6] This is a simplification that for now ignores economic performance and candidate characteristics.

Figure 1: Hypothetical Persuasion Regions With Different Contesting Candidates



Note: At election one candidate a1 contests b1. At election two, in the first frame, a1 contests b2, and in the second frame a1 contests b3. The dashed election cutpoints and corresponding shaded persuasion regions vary because of the different locations of candidates b2 and b3. Changes in the size of the persuasion region lead to changes in the number of voters who defect from one party to another election to election.

argument after the election one defeat, nominating b3, a candidate with a policy position at -0.10. I plot this alternative in the second frame of Figure 1. With b3 contesting a1 rather than b2, the election two cutpoint is 0.10 rather than -0.20. Having nominated a more moderate candidate, and if the ideal point distribution remains relatively constant, party B benefits from the persuasion region at election two, with some portion of the electorate preferring a1 to b1 but b3 to a1. In this case, party A wins the first election but party B wins the second. Readers who want to place this abstraction on a historical set of contests might consider the presidential elections of 1988 and 1992. In 1988 the Democrats nominated the liberal Massachusetts governor Michael Dukakis (b1) to face George H.W. Bush (a1), a loss, while in 1992 the Democrats nominated the more moderate Arkansas governor Bill Clinton (b3) to face Bush, leading to a victory.

The model derived from the spatial theory of voting I illustrate in Figure 1 has an important implication: if the distribution of voter ideal points remains relatively constant, then electoral change is solely a function of the appeal – by appeal I include potential valence advantages (Groseclose 2001) – of the competing candidates at the two elections. This construction does not require voters with stable attachments to parties (Campbell et al. 1960) or groups (Berelson, Lazarsfeld, and McPhee 1954) to deviate from their normal behavior. Rather, a set of voters find their ideal points closer to candidates from different parties across the two elections because of the changing appeal of the candidates on offer.[7]

A few key assumptions underlie this model. First, the candidates matter and voters know enough about the candidate pair to respond in systematic and predictable ways. Second, some voters choose different parties across elections. While partisan identification may lead many to mostly vote for one party or another, and may serve as a shortcut or heuristic for the candidate locations, some to many voters respond dynamically to the characteristics of the candidates and, depending upon these characteristics, may vote for one party or the

[7] Of course, because Democratic candidates tend to be liberal and Republican candidates tend to be conservative, American voters in the persuasion regions across different elections are likely to reside in the more moderate region of the ideal point distribution. Thus the idea of less-attached partisans being more likely to swing is not inconsistent with the spatial intuition I provide here.

other.

Once the candidates are selected, the persuasion region influences the campaign choices of candidates and their strategists. Most politicians do not appear as candidates for major political office *de novo*, but rather are already somewhat defined by their previous public experience and their personal characteristics and preferences. The candidates and their strategists assess how many voters they might persuade to change votes from the previous election given candidate characteristics, and allocate resources accordingly.[8] My definition of persuasion here is informational: persuasion is when the campaign informs voters of the candidate locations thus changing partisan votes from the previous contest (similar to Vavreck 2009). If the persuasion region is large, the candidate who benefits from the persuasion region should allocate resources to inform voters about the locations of the two candidates – to persuade swing voters. But what should a candidate do when the persuasion region is too small to swing the election, or when it benefits the opponent? The candidate should focus on mobilizing the base.

Up to this point I have described the ideal point line and how the locations of the candidates on that line create cutpoints that divide up the electorate. If the distribution of ideal points among voters stays fixed across time, then the changing location of the cutpoints causes changes in election outcomes. However, in addition to changing candidate locations, if turnout is less than universal the distribution of ideal points of the voters who come to the polls might also change. If electioneering techniques can be successfully targeted at potential voters with ideal points of a certain type, partisan election outcomes can be shifted by changes in turnout. Differences in turnout should have relatively more influence on outcomes as the persuasion region shrinks and the number of persuadable voters decreases. Not only are there fewer switching voters, but campaign resources may become more targeted at mobilization, increasing further the relative influence of changing voters. The effect of turnout increases

[8] Which previous election to compare to has implications for the persuasion region. I argue that most campaigns consider the most recent major and similar election contested in the relevant district. In practice they may consider multiple comparison offices to make a more nuanced determination about the persuasion region.

as the persuasion region shrinks.

The model also accommodates non-spatial causes of election outcomes. Issues such as scandals or the state of the economy may provide certain candidates with a valence advantage, which perturbs either the location of the candidate, the nature of the voter utility function, or the distribution of voter ideal points, depending on how one wants to incorporate valence (e.g. Groseclose 2001). Voter policy preferences may also change across elections (e.g. Erikson, MacKuen, and Stimson 2002), in the most simple case with a *uniform swing* to the left or the right that can be represented by a change in the location of the ideal point distribution. Both valence advantage or change in the ideal point distribution lead potentially to a change in the size and location of the persuasion region of voters who prefer different party candidates in the two contests.

Models and Data

Testing the explanatory power of the theory I have described requires a set of uncommon and difficult-to-measure constructs. The following list is one procedure to test the theory, and I attempt to execute each step as best as possible using multiple data sources. To test the theory of electoral change, I

- Enumerate the competing candidates across two elections.
- Locate each candidate on a major dimension of conflict, i.e. ideology.
- Generate the persuasion region given the candidate locations.
- Locate each potential voter's ideal point on the same dimension.
- Predict the relative influence of changing votes and changing voters from the persuasion region.
- Test the predictions of the persuasion region by tabulating the turnout and vote choices of the eligible electorate and measuring the relative effects on partisan vote share.
- Test that voters with ideal points within the persuasion region are the most likely to switch between the candidates.

Unfortunately many of these measurements are hard to come by. Measures of citizen turnout, vote choice, and ideal points often come from cross-sectional opinion surveys that are a small sample of the full set of eligible voters at only one snapshot in time. Candidate policy locations are most readily available from behavior in the legislature, which requires the candidates to have cast roll call votes in some legislature and may or may not map easily to the ideal point space of voters in surveys.[9] It is uncommon for competing political candidates to have served in the same legislature at the same time before their contest; deriving an ideal point for each on a common scale requires assumptions about mapping preferences across legislatures and across time (e.g. Carroll, Lewis, Lo, Poole, and Rosenthal 2009, Shor, Berry, and McCarty 2010), or the relatively uncommon survey of the candidates themselves (Sullivan and Minns 1976, Ansolabehere, Snyder, and Stewart, III 2001, Burden 2004). These measurement shortcomings make analysis of electoral change difficult.

I test the propositions of the theory of electoral change despite these measurement difficulties. To measure candidate locations and persuasion regions I use ideal points derived from roll call voting data. To measure voter ideal points I use survey data. To tabulate two-election voter behaviors, I use panel survey data for an individual-level test, and precinct-level election data for an aggregate level test. The goal of the tabulation is to construct a behavior transition matrix similar to the generic version I construct in Table 1, which follows Shively (1982) and Shively (1992). My empirical strategy is to estimate the count of the interior cells in Table 1 across a set of election pairs, and see if the relative influence of changing votes and changing voters corresponds systematically with the persuasion region generated by the set of competing candidates in each election pair.

Table 1 identifies the individual behaviors that aggregate into election dynamics across two contests. Each individual can make one of four choices at each election: vote Democrat, vote Republican, vote Other candidate, or not vote – which encompasses both purposeful abstentions and inability to vote due to movement in and out of the eligible electorate.

[9] See Bafumi and Herron (2010) for estimates of the distribution of *voter* and legislator preferences on the same scale using 2006 survey data and roll call votes.

Table 1: Electoral Change Behavior Transitions Across Two Elections

	$\mathbf{Dem}_1$	$\mathbf{Rep}_1$	$\mathbf{Oth}_1$	$\mathbf{NoVote}_1$
$\mathbf{Dem}_2$	*DemDem*	*RepDem*	*OthDem*	*NoVoteDem*
$\mathbf{Rep}_2$	*DemRep*	*RepRep*	*OthRep*	*NoVoteRep*
$\mathbf{Oth}_2$	*DemOth*	*RepOth*	*OthOth*	*NoVoteOth*
$\mathbf{NoVote}_2$	*DemNoVote*	*RepNoVote*	*OthNoVote*	*NoVoteNoVote*

The interior cells count each two-behavior combination for citizens at the two elections. Partisan vote totals in the two elections are the row and column marginals. The nature of the change in vote shares depends on the size of the changing votes and changing voter effects. The changing votes effect is the vote shift from the six off-diagonal behaviors of both-election voters in cells *DemRep*, *DemOth*, *RepDem*, *RepOth*, *OthDem*, and *OthRep*. The changing voter effect is the vote shift from single-election voters in the six cells *DemNoVote*, *RepNoVote*, *OthNoVote*, *NoVoteDem*, *NoVoteRep*, and *NoVoteOth*.

Across election pairs I measure the relative influence of changing votes and changing voters through the *changing voter ratio*, which allows comparison across elections with structural differences in turnout. I calculate the net change in votes for the Democrat from election one to election two through two pathways: changes in turnout of single-election voters and switched party votes of both-election voters. The changing voter ratio is the ratio of the net turnout effect to the sum of the net turnout effect and the net switching effect. The first quantity is the net effect of changing voters for the Democrats: *NoVoteDem* - *NoVoteRep* - *NoVoteOth* + *RepNoVote* + *OthNoVote* - *DemNoVote*. The second quantity is the net effect of changing votes: *RepDem* + *OthDem* - *DemRep* - *DemOth*. I put the first quantity in the numerator and the sum of the first and the second quantities in the denominator.[10] The ratio measures the proportion of electoral change attributable to changing voters relative to changing votes. It varies from zero to one, with zero meaning that all electoral change is due to changing votes and one meaning that all electoral change is due to changing voters.

[10] I use the absolute value of each quantity in case the two changes operate in different directions. In some cases, the two effects may partially cancel each other out in the net size of electoral change.

The theory of electoral change suggests that the changing voter ratio should be larger in contest pairs with a smaller persuasion region, and smaller in contest pairs with a larger persuasion region. To test the theory I estimate the changing voter ratio across a set of election pairs and compare it to the size of the persuasion region in each pair. To construct the ratio from individual level panel data, I need only tabulate the vote and turnout choices of each individual across each election pair, yielding the counts in Table 1. Although panel survey data are rare, where available they lend themselves easily to the construction of the changing voter ratio, if the sample of individuals is representative of the electorate. To construct the ratio from aggregate data requires assumptions because the individual level transitions are unobserved.

Model for Aggregate Election Data

To estimate the cells of Table 1 from aggregate election data, I develop a novel Bayesian model. The model exploits variation in votes and turnout to estimate the unknown quantities. Because of the secret ballot, we do not observe the vote choices made by each individual in the electorate, and so the problem is one of ecological inference. I use election precinct vote returns for two races across two elections to construct the table vote and non-vote marginals for each precinct – the marginal totals place bounds on the interior counts (Duncan and Davis 1953). I then use statewide files of registered voters to assist in estimation of the unknown interior counts. The state voter files record the turnout choice along with party of registration and precinct for each registered voter. Because some voters move residences across elections and the voter files often record only the current voter address, I use two voter files, one contemporary to each election. I merge the millions of voters together across the two files based on first name, last name, and date of birth so that I know in which precinct each registrant resided at each election, whether they turned out at each election, and with what party they were registered at each election.[11]

[11] I use PostgreSQL for voter file data management, matching, and aggregation, `http://www.postgresql.org/`.

The merging of individual voter file records across elections is an important empirical advance. Consider a precinct that casts 100 ballots at each of two elections. Cross-sectional election data do not reveal if these 200 ballots were cast by the same 100 voters in each election, by 200 different voters who each voted only once, or by any number in between. These differences are of central importance to our measurement of the effect of changes in turnout versus changes in partisan vote choice. If we know that only 100 individuals participated in the two elections, then we can say with certainty that any change in the partisan vote was due to the same individuals changing their party vote choice. But as the two electorates have less and less overlap, attributing change in partisan vote to changing votes versus changing voters becomes more complicated. Measuring how many of each precinct's electorates participated in both elections and in only one or the other allows a better estimate of how many citizens made which two choices across elections.

I bring the data from the vote returns and from the voter file together into one Bayesian ecological inference model to make a best-guess at the counts of each behavior combination. For each precinct in each election, I estimate the counts for each cell of the electoral transition matrix. I present a formal description of the model in the Appendix (see page 36), which follows recent developments in ecological inference models with covariates and for $R \times C$ tables (e.g. King, Rosen, and Tanner 2004, Wakefield 2004, Greiner and Quinn 2009), but provide here a basic summary. My observed data are the candidate and non-vote counts for each election, which are the row (election two) and column (election one) marginal totals. I model unobserved interior cell counts measuring the behavior of each individual in each election, given the number of votes cast for that row's choice and estimated probabilities for each column choice. I constrain the interior cell draws to sum to the observed column candidate totals. I collapse the Republican and Other candidate choices into one row and one column to increase the tractability of estimation, changing the four-row and four-column table presented in Table 1 to three-row and three-column with three choices in each election Dem, NotDem, and NoVote. I let the cell probabilities vary with the characteristics of the

registrants in each precinct relevant to that row's choices.[12]

In summary, I estimate the count of each two-election behavior cell in each precinct in each election pair. Though Monte Carlo tests I have implemented suggest the precinct-by-precinct cell counts are estimated with a good amount of uncertainty, as might be expected in a complicated ecological inference problem, I find that the election-level behavior counts aggregated across precincts are captured with low variance and proper coverage. With good estimates of each election cell, I can then make statements about the nature of electoral change in that election pair, calculate the changing voter ratio, and assess the relative contributions of changing votes and changing voters across the elections I study. I first present results of my aggregate analysis before turning to the individual level analysis.

California and Florida Elections 2004-2008

For a test of the theory using aggregated data, I consider electoral change in three state-election pairs: Florida from 2006 to 2008, California from 2006 to 2008, and California from 2004 to 2006. I use precinct returns from each state-election across more than 33 thousand precincts to measure the partisan vote, and use more than 36 million individual voter turnout records from the voter files to measure changes in turnout.[13] I consider the partisan vote change from John Kerry (Democrat for president) in 2004 to Arnold Schwarzenegger (Republican for governor) in 2006 in California, from Schwarzenegger in 2006 to Barack Obama (Democrat for president) in 2008 in California, from Charlie Crist (Republican for governor) in 2006 to Barack Obama in 2008 in Florida.[14] In each of these three election pairs, the top-ticket victor is from a different party across consecutive elections. The basic question I ask: how much did changing votes and changing voters contribute to partisan vote change in these elections, and how does the relative contribution of each square with the persuasion

[12] I also allow the noisiness of the cell probability's relationship to the voter file measures to vary with the quality of the voter file records for that precinct.

[13] Precinct returns from California come from the Institute of Governmental Studies at Berkeley. Precinct returns from Florida were compiled partially by the author and partially by Jeff Lewis and Michael Herron (Frisina, Herron, Honaker, and Lewis 2008) from each county election clerk.

[14] I have been unable to locate a circa-2004 Florida voter file or 2004 Florida precinct returns to estimate the model on 2004-2006 Florida.

regions created by the candidate ideal points?

I present state-level election results for the three California and two Florida elections in Appendix Table A6. In California between 2004 and 2008, there are large shifts in party vote share, from the Democrat receiving 54 percent (Kerry) to 38 percent (Angelides) to 60 percent (Obama). In Florida, in contrast, partisan vote changes are smaller, with the Democrat winning 44.6 percent in 2006 (Davis) and 50.6 percent in 2008 (Obama). The state-level partisan vote totals in Appendix Table A6 are the dependent variables in my analysis. I estimate the electoral transitions across each two-election pair in each precinct to understand how much the changing partisan outcomes are due to changing votes and how much to changing voters.

I choose these cases to provide variation on key propositions of the theory. In each case there is a change in the party who wins the top-ticket race across the two elections. Across these contest pairs, there is also variation in the size of the persuasion region. In California, the candidacy of Arnold Schwarzenegger leads to a large persuasion region across election pairs. Normally Democrats nominate similar Democrats and Republicans nominate similar Republicans for major offices. Schwarzenegger was able to bypass the normal selection procedures through the California recall, creating a major party candidate with a notably divergent policy agenda. In contrast, the Florida election pair provides two contests with similar cutpoints and a smaller persuasion region, suggesting the possibility of a greater relative effect of turnout.

To approximate candidate policy locations, I use DW-NOMINATE scores (Poole and Rosenthal 1997, Carroll et al. 2009) for each candidate and plot the implied persuasion regions for each election pair in Figure 2. Because presidential candidates John Kerry, John McCain, and Barack Obama all served in the United States Senate, Florida Democratic gubernatorial candidate Jim Davis served in the House, and George W. Bush served as president stating preferences on legislation before Congress, an estimated ideological location for each of these candidates on a relatively common scale is available. This leaves me without

a location for candidates Schwarzenegger, Angelides, and Crist. Based on my knowledge of the contests, I place Schwarzenegger at a moderate 0.05, Angelides at -0.37 near to Kerry and Obama, and Crist at 0.3, less conservative than McCain but more conservative than Schwarzenegger.[15] All of these locations, whether estimated from roll calls or other data, are approximations and should be interpreted generally.

The candidacy of Arnold Schwarzenegger leads to persuasion regions that span a large amount of the middle of the ideological space. The theory of electoral change predicts that elections with a large persuasion region should generate greater amounts of cross-election partisan vote switching, assuming a non-trivial number of voters possess ideal points in the region. In other words, there should be a large number of Californians who vote in both elections and switch their vote between Schwarzenegger and Obama or Kerry. In contrast, the two Florida elections I compare have relatively similar cutpoints, a small persuasion region, and thus should produce less switching. In fact, to the extent these candidate locations are accurate, Obama is predicted to do worse among both-election voters.

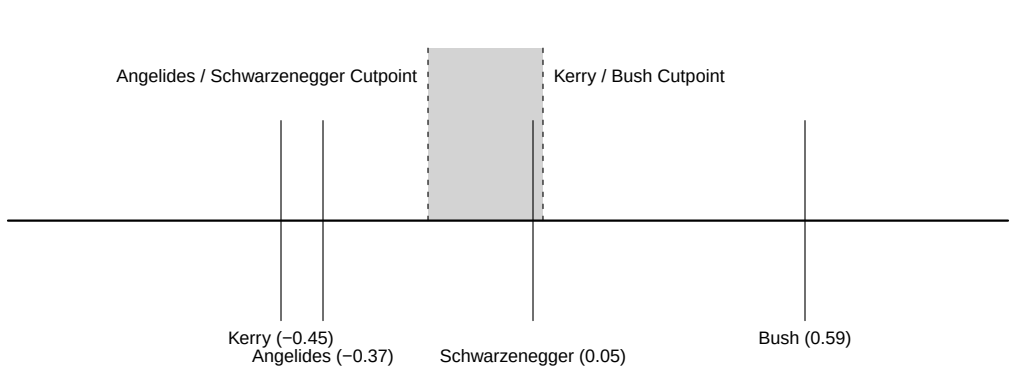
Registration Transitions Across Elections

One central contribution of this article is the matching of registrants across voter files. Finding the same person in two files allows me to locate them in different precincts, if they have moved, and measure changes in party of registration, if they have changed. This turns the cross-sectional single voter file into a more longitudinal record of turnout in each precinct across the entire state. Variation across precincts in electorate turnover and party of registration helps the Bayesian model estimate the measures needed to assess electoral change.

I match registrants across the voter file pairs by first name, last name, and date of birth. To minimize multiple matches, although the three variables mostly identify unique

[15] Small deviations from these assumed locations would not materially change the persuasion regions. Carroll et al. (2009) find that uncertainty in DW-NOMINATE score for each legislator spans about 4 percent of the policy space.

Figure 2: California and Florida Persuasion Regions given Candidate Locations



Note: Locations of Schwarzenegger, Angelides, and Crist are best guesses, Davis score is from Common Space and others are Senate DW-NOMINATE scores from the Congress prior to the election contested, all from `http://www.voteview.com` *(Carroll et al. 2009). Scores are approximate ideological locations derived from roll call voting and presidential behavior. Shaded areas represent the persuasion regions for each election pair.*

individuals, I first look to see if there is a match within the same precinct.[16] I then take those registrants who do not match to themselves in the same precinct and try to match them within the same county, and then again take the unmatched remaining individuals and match within the state. I successfully match around 90 percent of registrants across the files, with failed matches caused by new registrants in the later file, purged registrants from the earlier file, recording errors, or changed names or dates of birth.

I present in Table 2 registration behavior combinations from the first election (columns) to the second election (rows) for each election pair. The tables represent four behaviors at each election. The voting categories are Dem, Rep, and Oth, representing individuals who vote in that election and are registered Democrat, Republican, or Other, and the non-voting category NoVote, representing an individual who does not vote in that election either because they are registered and do not vote, or because they are new or purged registrants and thus do not have a match in the other file. I shade each interior cell corresponding to how many registrants fall into that behavior combination category, with darker cells holding more individuals. For example, the top left cell of the first table counts the 2,976,540 Californians who I match across the 2004 and 2006 voter files, are registered Democrat in both files, and vote in both elections. The off-diagonal cells in the voting region of the matrix count individuals who change party of registration across elections, a small but perhaps non-trivial number. I suppress the NoVote-NoVote cell in the bottom right as it is a large category that distracts from the trends in cells that are directly relevant to electoral change – single-election and both-election voters.

How large of an effect changing voters might have on election outcomes depends on how much turnover there is in the electorate. Table 2 shows that large numbers of the voters in each election consist of individuals who do not participate in the other election: the cells in

[16] Because precinct boundaries change across elections, due to different turnout sizes and sets of contested offices, I first create common precincts between the two elections. Using precinct shape files in California from the Institute of Governmental Studies, and voter file records in Florida, I aggregate overlapping precincts from each election up to larger common precincts until the same sets of addresses reside in a common geographic area where vote returns and turnout can be matched across time. For details and results of this procedure, see Hill (2010, Chapter 4).

Table 2: California and Florida Registration Behavior Combinations

California 2004-2006

	$\mathbf{Dem}_1$	$\mathbf{Rep}_1$	$\mathbf{Oth}_1$	$\mathbf{NoVote}_1$	Total
$\mathbf{Dem}_2$	2,976,540	21,570	32,166	648,585	3,678,861
	56.6%	0.5%	1.3%	45.1%	27.4%
$\mathbf{Rep}_2$	18,613	2,553,853	15,339	449,598	3,037,403
	0.4%	58.8%	0.6%	31.3%	22.6%
$\mathbf{Oth}_2$	30,254	28,528	1,127,060	339,443	1,525,285
	0.6%	0.7%	46.9%	23.6%	11.3%
$\mathbf{NoVote}_2$	2,232,223	1,739,714	1,226,369		5,198,306
	42.5%	40.1%	51.1%		38.7%
Total	5,257,630	4,343,665	2,400,934	1,437,626	13,439,855

California 2006-2008

	$\mathbf{Dem}_1$	$\mathbf{Rep}_1$	$\mathbf{Oth}_1$	$\mathbf{NoVote}_1$	Total
$\mathbf{Dem}_2$	3,201,051	46,292	68,831	2,778,096	6,094,270
	87.3%	1.5%	4.5%	45.7%	42.6%
$\mathbf{Rep}_2$	24,804	2,615,578	40,843	1,601,183	4,282,408
	0.7%	86.4%	2.7%	26.3%	30.0%
$\mathbf{Oth}_2$	24,930	31,377	1,186,574	1,706,178	2,949,059
	0.7%	1.0%	78.2%	28.0%	20.6%
$\mathbf{NoVote}_2$	416,248	334,413	220,387		971,048
	11.4%	11.0%	14.5%		6.8%
Total	3,667,033	3,027,660	1,516,635	6,085,457	14,296,785

Florida 2006-2008

	$\mathbf{Dem}_1$	$\mathbf{Rep}_1$	$\mathbf{Oth}_1$	$\mathbf{NoVote}_1$	Total
$\mathbf{Dem}_2$	1,726,227	27,530	41,348	1,754,803	3,549,908
	85.3%	1.3%	5.6%	43.0%	39.7%
$\mathbf{Rep}_2$	31,241	1,826,109	29,264	1,324,101	3,210,715
	1.5%	87.1%	4.0%	32.5%	35.9%
$\mathbf{Oth}_2$	14,788	17,784	567,190	998,612	1,598,374
	0.7%	0.8%	76.9%	24.5%	17.9%
$\mathbf{NoVote}_2$	251,706	224,531	99,329		575,566
	12.4%	10.7%	13.5%		6.4%
Total	2,023,962	2,095,954	737,131	4,077,516	8,934,563

Note: Percentages are calculated to the column while cells are shaded as a proportion of the table. Labels Dem, Rep, and Oth indicate voters and their party of registration, NoVote collapses individuals who abstain and individuals who are new or purged registrants across files. Counts derived from matched statewide files of registered voters across each election pair.

the NoVote rows and columns are non-trivial dark gray. The size of the NoVote population follows the pattern of surge and decline, with more non-voters in the midterm elections.

Although the two California election pairs show large changes in turnout, and a notable shift towards Democratic registrants in 2008, Florida shows an important change in turnout. Of the 2008 electorate registered Democrat, more did not vote in 2006 than did (1,754,803 versus 1,726,227). Many of these individuals are newly registered voters. The Republicans did not do a poor job of getting 2006 non-voters to the polls themselves – more than 1.3 million registered Republicans came to the polls anew in 2008. This, however, is not as impressive as the Democratic showing, either in gross numbers (where the Democrats gain a net 430,000 registered voters), or relative to 2006 turnout. Notably, these turnout figures change the party of registration advantage in Florida from more registered Republicans voting in 2006 (2,095,954 to 2,023,962) to more registered Democrats voting in 2008 (3,549,908 to 3,210,715). Similar relative shifts in partisan turnout do not occur in California, despite larger partisan change in vote share.

The behavior counts in Table 2 are state-level. My method, however, allows me to construct these same behavior tables for each precinct in each state. I use these tabulations to help estimate the precinct-level vote behaviors across election pairs, exploiting variation across precincts in turnout and vote shifts to gain a better estimate of the unobserved two-election behavior combinations in each precinct. I present results from the Bayesian electoral change model with the voter file covariates in the next section.

Estimated Election Behaviors in California and Florida

I take measurements from the matched state voter files and use them as covariates to predict the counts of voters in each precinct who made each two-election behavior: if they voted in one election, both, or neither, and when voting, for which party. For efficiency of estimation I collapse Republican and other party voters into a Not Democrat row and column, yielding a 3×3 electoral change table rather than the 4×4 table presented in Table 1. I present

Table 3: Electoral Change Behavior Table Counts Estimated in Each Precinct

	$\mathbf{Dem}_1$	$\mathbf{NotDem}_1$	$\mathbf{NoVote}_1$
$\mathbf{Dem}_2$	?	?	?
$\mathbf{NotDem}_2$	?	?	?
$\mathbf{NoVote}_2$	?	?	?

Note: Table quantities to estimate using the Bayesian 3×3 *electoral change model described in the Appendix, for each precinct in each election pair. Each question mark represents an unknown precinct count to be estimated.*

the precinct counts I actually estimate in Table 3. I model each cell count in Table 3 using voter file measures relevant to each cell.

For example, the top-left cell of Table 3 is the count of citizens in the precinct who turned out to vote in each election and voted for the Democrat in each election. I measure from my matched voter file data the proportion of registrants who turn out to vote in both elections who are registered Democrat, and use this proportion to predict the count in that precinct, expecting both-election Democratic voters to increase in the proportion of the precinct voting in both elections as a registered Democrat. I include a similar covariate measuring the proportion of both-election voters registered Republican, expecting the both-election Democratic voter count to decrease as this second precinct proportion increases.[17] I describe fully the set of measures I use to estimate the count in each cell of Table 3 in each precinct in each election in the Appendix (see page 38). The measures enter what is essentially a multinomial logit model for each two-election behavioral choice. Because the measures and their multinomial logit coefficients are not of central interest to the argument, I also present the coefficient estimates in the Appendix.

What is of central interest are the estimates of the electoral change counts in each cell in each precinct, and the relative size of the changing vote and changing voter cells across my three election pairs. I use Markov chain Monte Carlo methods to draw samples from the posterior density of the parameters of interest given prior densities, the Bayesian model,

[17] The direction of the effects are not assumed; the model coefficients could estimate the opposite effect or a null effect if the data so suggested.

and the data. As is commonly implemented in Bayesian analysis, a Gibbs sampler makes conditional exploration of the posterior densities, and I use these samples to summarize the magnitude and uncertainty of parameters of interest.[18] For each election pair, I run one chain of the sampler for 200,000 burnin iterations, and then draw 300,000 samples from the posterior distribution, saving every 150th sample for posterior summary. I put vague mean-zero, precision 1e-05 priors on all coefficients. Results are based on samples across 14,291 fully observed precincts in California 2004-2006, 14,272 fully observed precincts in California 2006-2008, and 4,656 fully observed precincts in Florida 2006-2008.[19]

Posterior Estimates

For each posterior sample and for each cell in the table, I sum across all of the corresponding cell estimates in each underlying precinct. This sum represents the election level count of citizens making that two-election pair of behaviors. In Table 4, I present the posterior medians for each state count. For example the median posterior sum of all precinct cell estimates for voters choosing Kerry and Angelides, the upper left cell in the first table, is 2.3 million voters, 20.6 percent of the electorate. For each table I calculate the table proportion and shade the cells corresponding to how many voters fall into that cell. I suppress the counts in the NoVote-NoVote category, because they are large and thus distract from focus on the cells directly relevant to electoral change. The counts in each cell describe the estimated nature of electoral change across each election pair, and allow me to construct the changing voter ratio to test the theory of electoral change.

The differences across tables support the predictions of the theory of electoral change. Recall from Figure 2 that I expected the greatest amount of switching to occur in the California elections involving the moderate Schwarzenegger, and the least amount of switching in the 2006-2008 Florida elections between candidates Davis and McCain. I estimate that 4.4

[18] I code and implement the model using `JAGS` (Plummer 2010*a*, Plummer 2010*b*) and the statistical package `R`.

[19] The Florida precincts do not represent the full state, as I was only able to collect precinct returns from 25 of 68 counties. These 25 are the larger counties and contain about 75 percent of the state population.

Table 4: Estimated Statewide Electoral Behavior Combinations

California 2004-2006

	Kerry	Not Kerry	NoVote
Angelides	2,354,460 20.6%	43,904 0.4%	343,222 3.0%
Not Angelides	506,003 4.4%	2,940,530 25.8%	862,671 7.6%
NoVote	2,686,070 23.5%	1,678,500 14.7%	

California 2006-2008

	Angelides	Not Angelides	NoVote
Obama	1,264,712 9.1%	1,283,672 9.2%	4,842,394 34.7%
Not Obama	117,604 0.8%	2,866,524 20.6%	1,875,180 13.5%
NoVote	1,411,934 10.1%	275,069 2.0%	

Florida 2006-2008

	Davis	Not Davis	NoVote
Obama	1,156,514 18.4%	50,552 0.8%	1,935,014 30.8%
Not Obama	251,432 4.0%	1,560,096 24.8%	985,562 15.7%
NoVote	167,082 2.7%	182,970 2.9%	

Note: Cell counts are the median posterior sum across all modeled precincts and represent the number of citizens estimated to have made that two-election behavior. Cells are shaded corresponding to the table percentage, also noted below each count.

percent of the full 2004-2006 California electorate votes in both elections and switches their vote from Kerry in 2004 to a non-Democrat, notably Schwarzenegger, in 2006. I find that 9.2 percent of the 2006-2008 California electorate switches from a non-Democrat in 2006 to Obama in 2008, and 4 percent of the 2006-2008 Florida electorate switches from Davis, the Democrat, in 2006 to a non-Democrat in 2008, notably McCain.[20]

To measure the relative effect of changing votes and changing voters on the election outcomes in a measure comparable across elections, I construct the changing voter ratio described above (page 15) for each election pair.[21] For example, referencing Table 4, in the Florida 2006-2008 election, the numerator is the net effect of changing voters for the Democrats: the 1.9 million new Obama voters minus the almost 1 million new non-Obama voters in 2008, minus the 167 thousand Davis voters who stay home plus the 183 thousand non-Davis voters who stay home in 2006, for a total changing voters gain of 965,340 votes for the Democrats. The denominator is that sum plus the absolute value of the 50 thousand voters who switch from a non-Democrat to Obama minus the 250 thousand voters who switch from Davis to someone other than Obama in 2008, for a total absolute net changing votes effect of 200,880. The changing voters ratio is then $\frac{965{,}340}{965{,}340+200{,}880} = .828$. The median cell count estimates suggest that about 80 percent of the absolute electoral change in Florida is due to changes in turnout.

As the changing voter ratio increases, more of the electoral change is due to changing voters. As the ratio decreases, more of the electoral change is due to change in the vote choices of voters participating in both elections, changing votes. I calculate this ratio on each posterior sample across the three elections; median posterior values and 95 percent credible intervals are .77 [.75,.78] in California 2004-2006, .61 [.60,.62] in California 2006-

[20] The percentages in the tables are calculated from the posterior median cell counts; I also measure the actual proportions on each posterior draw, with median posterior proportions 4.4 [4.3,4.6], 9.2 [9.0,9.5], and 4.0 [3.6,4.2], 95 percent credible intervals in brackets. Note, however, that these percentages depend to some extent on the gross size of the change in turnout across each election pair.

[21] This ratio somewhat ameliorates problems that lead to the incomparability of the turnout percentages in Table 4 such as different rates of residential movement across elections and geography, differences in file and match quality, and differences in the party of registration rates across states.

2008, and .83 [.82,.85] in Florida 2006-2008. Turnout is a larger part of the story in Florida – in fact, Obama does not win in Florida without the benefit he derives from single-election voters. Turnout appears to have been more relevant in California in the 2004-2006 pair than in the 2006-2008 pair.

In summary, I estimate the number of citizens who switched party votes across elections and the number of citizens who voted for each candidate after voting in only one election or the other. I find that electoral change is more a function of changing votes in election pairs with a larger persuasion region, such as the two elections involving Arnold Schwarzenegger. In the Florida election pair with a smaller persuasion region, I find more of electoral change attributable to changes in turnout than to changing votes.

Individual Level Test: ANES Panel Study Electoral Change

As a second, individual-level test of the theory, I use voter behavior combinations measured by American National Election Studies panel opinion surveys. In each panel survey the same respondents are tracked across elections, yielding measures of both vote choice and turnout in each election, and forming a similar accounting as I have estimated in the section above. I show that the implications of the theory of electoral change are supported by the tendencies in the data.

I compare turnout and vote choice in consecutive presidential elections in four panel studies: 1956 to 1960, 1972 to 1976, 1992 to 1996, and 2000 to 2004. Although specific and comparable measures of candidate ideal points in these elections are not readily available, one of the panels contains a candidate who should generate a large persuasion region in the same way Schwarzenegger did for my earlier cases. The contest pair with the most dramatic change in cutpoints is likely to be the 1972-1976 panel involving the 1972 candidate McGovern.[22] In the same way Schwarzenegger provides important variation in cutpoint

[22] The Rosenstone (1983, p. 176) survey of political scholars placing presidential candidates on an issue scale puts McGovern noticeably to the left of Stevenson, Kennedy, and Carter, with Carter in 1976 being the most conservative Democratic nominee in the 1948-1980 period of elections. Eisenhower, Ford, and all three Nixon candidacies are clustered together with similar issue positions.

locations due to his noted moderate policy positions in the section above, McGovern's noted liberal policy positions provide a nice contrast to Carter's more moderate and Southern Democratic stature. These two contrasting Democrats face relatively similar Republicans in Nixon and Ford. I thus expect the greatest amount of switching to occur in the 1972-1976 panel. None of the other three contests have clear cutpoint shifts given the candidate pairs.[23]

In Table 5, I present electoral change behavior counts for respondents from each ANES panel election pair. I follow the pattern I have with other tables, and add back in the other-party vote choices. With respect to changing votes, the 1972-1976 election pair has the largest proportion of the electorate switching between the major parties, with 16.2 percent of respondents voting for Nixon in 1972 and Carter in 1976, and a net gain for Carter of 11.7 percent across the six switching cells of the total two-election electorate. This level of switching is consistent with an excessively liberal ideal point of 1972 candidate McGovern leading to a large persuasion region; however, the Watergate scandal is a confounding influence that might also generate this observed pattern.

The election pair with the second greatest amount of switching is the 1956-1960 pair, with Kennedy gaining 13.6 percent of the two-election vote from 1956 Eisenhower voters, and with a total net swing from voters participating in both elections of 8.9 points. Much smaller net switching sizes benefit Clinton and Bush in 1996 and 2004. The Eisenhower-Kennedy level of switching might be due to Kennedy's hawkish campaign about the supposed missile gap with Russia, which may have led him to be perceived as notably more moderate than Stevenson.

For the relative contributions of changing votes and changing voters, I calculate the

[23] Although some of the candidates for president served previously in Congress (Nixon, Kennedy, McGovern, Ford, H.W. Bush, Gore, and Kerry), others had not (Eisenhower, Stevenson, Carter, Clinton, W. Bush). Two of those who did serve in Congress, however, ran for president after eight years as vice president (Nixon and Gore), making it unclear whether to use the outdated congressional score, the termed out president's score, or something else. Although DW-NOMINATE provides locations for each president, the estimates are based upon public positions taken while in office rather than roll call votes as for Congressional members. In my three administrative data cases above, only W. Bush's location is derived from in-office presidential statements. Treier (2010) shows that when veto and bill signings are taken into account, presidential ideal points are more moderate; unfortunately, the Treier estimates are only available for presidents Clinton and Bush. Using Senate DW-NOMINATE scores, J.F. Kennedy is -.313 in the Senate, -.503 as president; Nixon is .136 in the Senate, .424 as president; using House DW-NOMINATE scores, Ford is .278 in the House, .5 as president; and H.W. Bush is .199 in the House, .613 as president.

Table 5: American National Election Studies Voter Behaviors in Four Panel Studies

1956-1960

	Dem_{56}	Rep_{56}	Oth_{56}	$NoVote_{56}$
Dem_{60}	265	132	4	54
	27.3%	13.6%	0.4%	5.6%
Rep_{60}	45	359	5	62
	4.6%	36.9%	0.5%	6.4%
Oth_{60}	5	4	1	2
	0.5%	0.4%	0.1%	0.2%
$NoVote_{60}$	15	19		
	1.5%	2.0%		

1972-1976

	Dem_{72}	Rep_{72}	Oth_{72}	$NoVote_{72}$
Dem_{76}	214	164	3	59
	21.2%	16.2%	0.3%	5.8%
Rep_{76}	41	371	2	42
	4.1%	36.7%	0.2%	4.2%
Oth_{76}	7	13	1	4
	0.7%	1.3%	0.1%	0.4%
$NoVote_{76}$	35	53	1	
	3.5%	5.2%	0.1%	

1992-1996

	Dem_{92}	Rep_{92}	Oth_{92}	$NoVote_{92}$
Dem_{96}	154	24	20	18
	33.7%	5.3%	4.4%	3.9%
Rep_{96}	10	114	26	14
	2.2%	24.9%	5.7%	3.1%
Oth_{96}	5	3	18	1
	1.1%	0.7%	3.9%	0.2%
$NoVote_{96}$	22	13	15	
	4.8%	2.8%	3.3%	

2000-2004

	Dem_{00}	Rep_{00}	Oth_{00}	$NoVote_{00}$
Dem_{04}	215	19	15	30
	32.8%	2.9%	2.3%	4.6%
Rep_{04}	37	259	4	42
	5.6%	39.5%	0.6%	6.4%
Oth_{04}	4	1	4	2
	0.6%	0.2%	0.6%	0.3%
$NoVote_{04}$	12	11		
	1.8%	1.7%		

Note: Cell counts are the number of panel respondents who report that two-election behavior. ANES panel survey weights used where provided (1992-1996 and 2000-2004 panels), weighted cell counts rounded to integers.

changing voter ratio with the net changing voters effect for the Democrat in the numerator and the sum of the changing voters effect and changing votes effect in the numerator. Across the ANES pairs, the value of the ratio is 0.07 [0.00,0.28] (1956-60), 0.21 [0.05,0.35] (1972-76), 0.24 [0.00,0.57] (1992-96), and 0.68 [0.08,1.00] (2000-04), bootstrap 95 percent confidence intervals in brackets. The small sample size of the ANES panels leads to wide uncertainty in the ratio across bootstrap resamples; none of the effects are statistically different from any other. Interpreting the point estimates, the lowest ratio value is in the 1956-1960 election pair. Kennedy actually does worse among single-election voters in 1960 than Stevenson, despite his improvement in vote share, though the changing voters effect is essentially zero (see Table 5): Kennedy wins through changing votes not changing voters. The McGovern pair has the second smallest ratio, with most of Carter's gain coming from the changing votes of both-election voters. To the extent Clinton improves on his 1992 share in 1996, it is also through changing votes, though the two Perot candidacies complicate the story and the change in outcome is not as dramatic as in the 1972-76 election pair.

The reputed get-out-the-vote efforts of the Bush-Cheney 2004 reelection campaign do appear to have mobilized voters on the Republican's behalf, with 6.4 percent of the two-election electorate voting for Bush in 2004 but not voting in 2000. The net shift to Bush accounts for almost 70 percent of the vote loss for Kerry relative to Gore in 2000 – though the change in vote margin was not large across the two contests and the bootstrap confidence interval spans almost the entire potential range of the ratio.

In summary, the ANES panel surveys provide support for the theory of electoral change, with the largest number of switching voters in the 1972-1976 election pair that involves the candidacy of George McGovern and a large change in vote share. Change in turnout is a relatively small contribution to change in vote share across each panel except 2000-2004. In this election the relative contribution is larger, but this is partially an artifact of the small change in total vote margin; in absolute terms, the turnout effect is small. Unfortunately, the small samples in the panels lead to large uncertainty around the central point estimates.

In concert with the behavioral election data results I present above, however, the two sets of evidence provide support for the thesis that the characteristics of the competing candidates across time structures how changing votes and changing voters influence change in election outcomes.

Who Switches?

To this point I have presented evidence that election pairs with larger persuasion regions lead to a larger contribution of changing votes relative to changing voters to electoral change. The theory has a more specific proposition that I test in this section: it is the voters who reside in the persuasion region who should be most likely to switch. As noted previously, the measurements necessary for a careful test of this proposition are difficult to come by: ideal point locations for a set of voters and candidate locations on the same scale so that a persuasion region can be created and voters placed in relation to the region. While I do not possess such specific measures in my data, I can make a general comparison using the reported ideology of respondents to the ANES panel surveys, and the relative size and location of the persuasion regions of the candidate pairs.

The ANES asks respondents to place themselves on a liberal conservative ideology dimension.[24] If this placement is related to the dimension on which the vote choice is made, then voters with self-placements inside the persuasion region should be more likely switch their votes across elections than voters with self-placements outside the persuasion region. Across the three panels with a measure of ideology, the 1972-1976 pair has the largest persuasion region due to the candidacy of McGovern, and so there should be more switching voters from a moderate range of ideal points who would prefer Nixon to McGovern but Carter to Ford. The 1992-1996 and 2000-2004 pairs have much smaller persuasion regions and so there should be fewer switching voters.

I present in Figure 3 the switch vote rate of both-election voters by election pair and by ideology. The 1972-1976 pair shows that the rate of a Nixon-Carter switch is greater the more

[24] The question was not asked in the 1956 or 1960 studies.

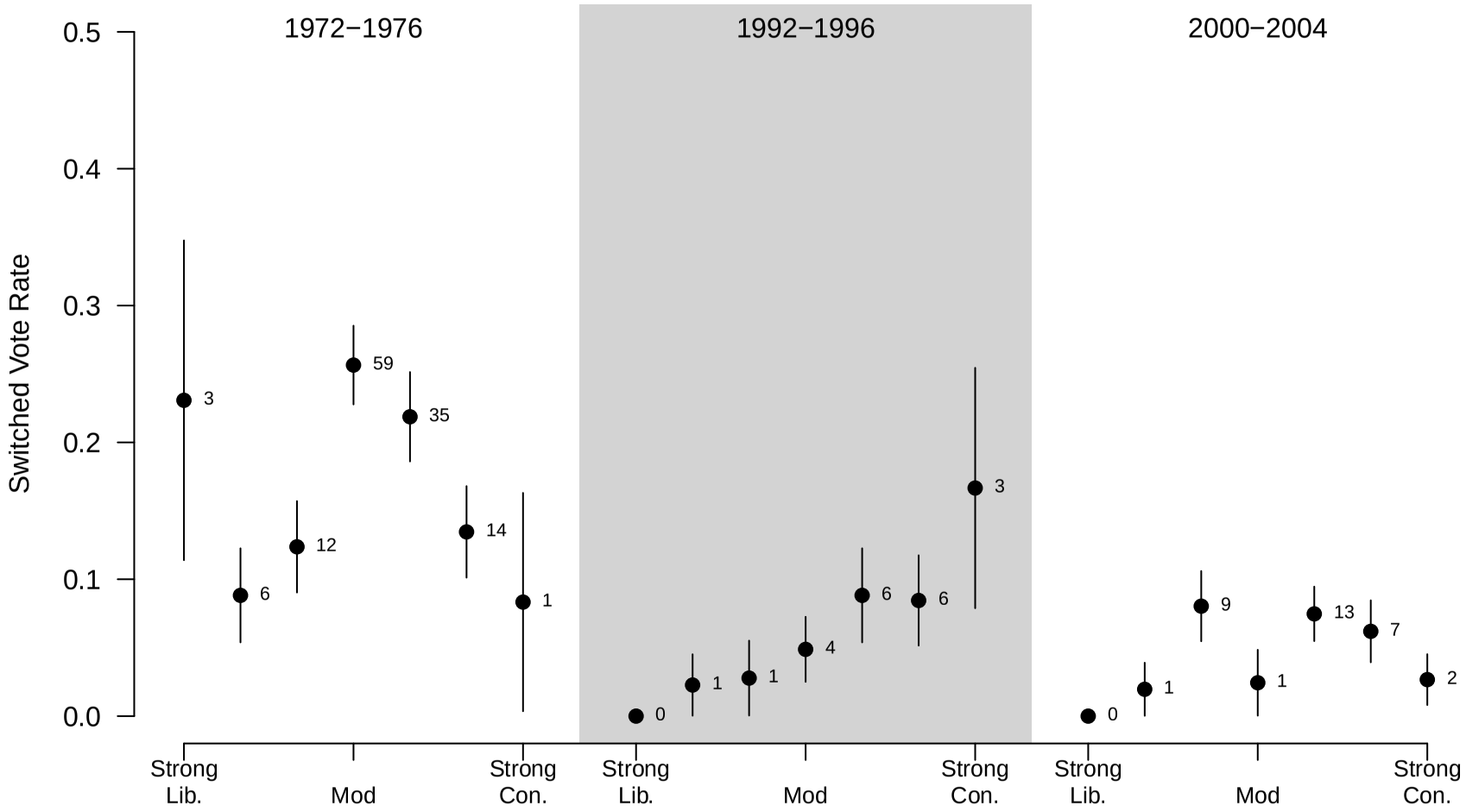
moderate the voter, with a slight departure in a small number of strong liberals. A similar pattern with lower overall switch rates holds in the 2000-2004 pair, which is consistent with the theory if Kerry is somewhat more liberal than Gore, though the number of switching voters in the panel is very small. In the 1992-1996 pair, in contrast, switching from Bush to Clinton is increasing in conservatism, though again the number of switching voters is sufficiently small to make inference uncertain.

Discussion

In this article, I have presented a theory for when changes in turnout and when swing voters should more influence election outcomes. I show that the number of voters who switch between the two parties increases as the ideological distance between the two candidates in the two elections changes. I also provide evidence that changes in turnout are of relatively greater consequence as the persuasion region decreases in size. Finally, I use opinion surveys to show that switching between party candidates is more common with large persuasion regions, and by voters within the persuasion region.

I show that the moderate candidacy of Arnold Schwarzenegger led to a large persuasion region of voters who might prefer the Republican in one election and the Democrat in another. I confirm this effect empirically, finding that around one quarter of Californians who vote in both 2006 and 2008 vote for Barack Obama in 2008 after having voted for Schwarzenegger in 2006, and one in ten who vote in both 2004 and 2006 vote for Schwarzenegger or an other-party candidate after having voted for Kerry in 2004. My estimates suggest that electoral change in California is about 40 percent due to the changing votes of both-election voters between 2004 and 2006, and about 55 percent between 2006 and 2008. In Florida, Obama wins in 2008 due to changing voters overwhelming his losses among both-election voters. Across ANES panel studies, I find the greatest amount of switching in the election pair with the largest persuasion region, that involving George McGovern in the 1972-1976 pair, and the largest relative influence of turnout in the 2000-2004 election pair.

Figure 3: Switching Rate by Self-Reported Ideology for Both-Election Voters, ANES Panels



Note: Each point is the proportion of both-election voters who switched their partisan vote in the direction of the electoral change and reported the ideology category on the x-axis, with 95 percent confidence bars. Number who switch noted to the right of each proportion. Direction of electoral change is Nixon to Carter 1972-1976, Bush to Clinton 1992-1996, and Gore to Bush 2000-2004.

I have developed a novel Bayesian model to estimate directly the two-election citizen behaviors relevant to changes in election outcomes. Because each count is unobserved, I implement a variety of procedures to improve the estimate: bounding the counts by the margins, pooling across precincts, accounting for multinomial variation and differences in data quality, and including covariates. I develop measures of changing turnout and proxies for changing ideal points by merging together millions of records across voter files contemporary to each election, linking directly into the unobserved counts I estimate. This procedure works in Monte Carlo studies, and could also be extended to more offices in each election to gain greater traction on ideal point distributions at the precinct level.

The theory I have described provides a framework for analyzing electoral change. It generates testable predictions and provides guidance for campaigns and candidate decisions. The framework can be applied to different elections and different electoral systems as long as the vote decisions of individuals and the appeal of candidates can be summarized by spatial locations. One part of the theory I have not developed thoroughly in this exposition is a measure of the changing ideal point distributions of voters. As more elections and new data are brought to bear to understand the dynamics of electoral change, I see the careful measurement of voter ideal point distributions at each election as the important next empirical step, for example from vote returns (Snyder 1996) or ballot images (Gerber and Lewis 2004).

In addition to the lack of direct measures of change in the ideal point distribution of voters, a few other caveats should be considered with my empirical results. My state-level estimates are derived from most voters in each state-election, and are unbiased for the precincts that I do have. As more precinct-level data becomes available, any bias arising from missing precinct vote totals will become less of a concern. Second, I almost surely overstate the changing turnout effect due to within-state residential mobility: voters who move across precincts between elections count as single-election voters in my measures, but at the state-level they should be both-election voters. Measures of candidate locations are

also somewhat imprecise, and tests of the theory of electoral change moving forward will benefit from more careful measures or models of candidate characteristics.

Despite these potential drawbacks, a pattern emerges across my cases that begins to describe how short-term, dynamic, individual voter behaviors aggregate into changing election outcomes. When the candidates on offer differ, voters respond, and many appear willing to cross party lines despite polarization and strength of party identification. Turnout, especially in surge and decline election pairs, influences partisan outcomes, but the importance of this influence depends upon the size of the persuasion region. The interaction of voter preferences and candidate characteristics influences the way that citizens participate and vote, and changes in these factors across time influence the fortunes of the political parties in the electorate.

Appendix

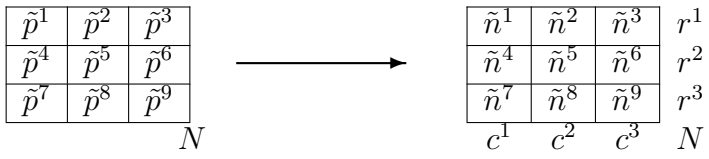
Bayesian 3×3 Electoral Change Model

Assume that each precinct i contains a total of N_i eligible voters across two elections. These N_i voters cast $c_i^1+c_i^2$ votes in election c and $r_i^1+r_i^2$ votes in election r for choices 1 and 2, with vote counts observed and $c_i^3 = N_i - c_i^1 - c_i^2$ and $r_i^3 = N_i - r_i^1 - r_i^2$ (observed) non-vote counts in elections c and r. Let the 9-vector $\tilde{\boldsymbol{p}}_{\boldsymbol{i}}$ describe the probabilities that each eligible voter in N_i chooses the two-election behavior represented by each interior cell, with $\sum_j \tilde{p}_i^j = 1$. The 9-vector $\tilde{\boldsymbol{n}}_{\boldsymbol{i}}$ is the set of counts realized in this election pair for each two-election behavior in precinct i, and are multinomial draws given probability vector $\tilde{\boldsymbol{p}}_{\boldsymbol{i}}$ and trials N_i.

I present in Figure A4 the structure of the assumed data-generation process for vote counts in each precinct. The left table is the latent probability table. Multinomial draws given $\tilde{\boldsymbol{p}}_{\boldsymbol{i}}$ and N_i yield the table on the right with interior counts and marginal totals. Due to the secret ballot, the interior counts are unobserved and the marginal counts are observed. I note quantities unobserved to the analyst with a $\tilde{}$, quantities estimated through the model with a $\hat{}$, and quantities observed to the analyst uncovered; $\tilde{n}_i^j$ is the true but unobserved number of eligible voters in cell j in precinct i, $\hat{n}_i^j$ is the estimated number of eligible voters in cell j in precinct i, and N_i is the observed number of eligible voters in precinct i. I develop the Bayesian 3×3 electoral change model to estimate $\tilde{\boldsymbol{n}}_{\boldsymbol{i}}$ and $\tilde{\boldsymbol{p}}_{\boldsymbol{i}}$ for each precinct using the observed election marginal totals N_i, r_i^1, r_i^2, r_i^3, c_i^1, c_i^2, c_i^3, and characteristics of the precincts.

I formalize the Bayesian model in a hierarchical structure. To maintain the observed row sums, draw the cell counts $\hat{\boldsymbol{n}}_{\boldsymbol{i}}$ from the estimated cell probabilities $\hat{\boldsymbol{p}}_{\boldsymbol{i}}$ by row in three

Figure A4: Assumed Data Generating Process, Two-Election Vote and No-Vote Choices



Note: Table index i suppressed from all quantities for presentation. Interior cell counts $\tilde{\boldsymbol{n}}$ generated from a multinomial distribution with probabilities $\tilde{\boldsymbol{p}}$ and trials N.

separate multinomial draws

$$
\begin{aligned}
(\hat{n}_i^1, \hat{n}_i^2, \hat{n}_i^3) &\sim \text{Multin}(r_i^1,\ (\hat{p}_i^1, \hat{p}_i^2, \hat{p}_i^3)) \\
(\hat{n}_i^4, \hat{n}_i^5, \hat{n}_i^6) &\sim \text{Multin}(r_i^2,\ (\hat{p}_i^4, \hat{p}_i^5, \hat{p}_i^6)) \\
(\hat{n}_i^7, \hat{n}_i^8, \hat{n}_i^9) &\sim \text{Multin}(r_i^3,\ (\hat{p}_i^7, \hat{p}_i^8, \hat{p}_i^9))
\end{aligned}
$$

and constrain the column totals c_i^1, c_i^2, and c_i^3 generated by $\hat{\boldsymbol{n}}_{\boldsymbol{i}}$ to match the observed column totals.[25] In practice the column total constraints are achieved by returning a data likelihood of zero when any of the drawn column sums are inconsistent with the observed column sums. Note that this top level of hierarchy accounts for potential sampling variability with the size of r_i^1, r_i^2, and r_i^3 across precincts.

The second level of the hierarchy models the unobserved cell probabilities $\tilde{\boldsymbol{p}}_{\boldsymbol{i}}$ as functions of precinct characteristics $\boldsymbol{x_i}$ and $\boldsymbol{z_i}$. I let each cell probability $\hat{p}_i^j$ arise from a multinomial logit link by row with unobserved but estimated cell utilities $\hat{\boldsymbol{\psi}}_{\boldsymbol{i}}$

$$
\hat{p}_i^{j\in[1,2,3]} = \frac{exp(\hat{\psi}_i^j)}{\sum_{j=1}^{3} exp(\hat{\psi}_i^j)}\ ;\ \hat{p}_i^{j\in[4,5,6]} = \frac{exp(\hat{\psi}_i^j)}{\sum_{j=4}^{6} exp(\hat{\psi}_i^j)}\ ;\ \hat{p}_i^{j\in[7,8,9]} = \frac{exp(\hat{\psi}_i^j)}{\sum_{j=7}^{9} exp(\hat{\psi}_i^j)}
$$

with the final utility in each row $\hat{\psi}_i^3$, $\hat{\psi}_i^6$, and $\hat{\psi}_i^9$ set to zero for identification.[26]

I draw the unconstrained multinomial utilities $\hat{\psi}_i^1$, $\hat{\psi}_i^2$, $\hat{\psi}_i^4$, $\hat{\psi}_i^5$, $\hat{\psi}_i^7$, and $\hat{\psi}_i^8$ from normal distributions centered at mean $\hat{\mu}_i^j$ with precision $\hat{\tau}_i$ allowed to vary across precincts. I model each mean $\hat{\mu}_i^j$ as a linear function of precinct characteristics $\boldsymbol{x_i}$. Let the function $\boldsymbol{x_i}(j)$ return a full or partial subset of $\boldsymbol{x_i}$ relevant to the two-election behavior in cell j, and $\hat{\boldsymbol{\beta}}(j)$ return a subset of the coefficient vector $\hat{\boldsymbol{\beta}}$ relevant to the two-election behavior in cell j. Then

$$
\hat{\mu}_i^j = \hat{\boldsymbol{\beta}}(j)' \boldsymbol{x_i}(j)
$$

for all $j \in \{1, 2, 4, 5, 7, 8\}$. I also allow for variability across precincts in the mapping between

[25] I assume with this notation that the multinomial sampler used automatically normalizes the probability vector argument to one, as does `JAGS` (Plummer 2010*a*).

[26] I have begun experimenting with data augmentation versions of the model without the final column utility constraint with initial results suggesting more efficient mixing. The estimates in this paper, however, are from identified multinomial models.

$\boldsymbol{x_i}$ and the cell probabilities by modeling the precision of the $\hat{\psi}_i^j$ distribution $\hat{\tau}_i$ as a function of precinct characteristics $\boldsymbol{z_i}$,

$$\hat{\tau}_i = \exp(\hat{\boldsymbol{\delta}}' \boldsymbol{z_i})^{-1},$$

where $\hat{\boldsymbol{\delta}}$ is a vector of coefficients to be estimated.

Specification of Cell Count Covariates from the Voter File

In the next few paragraphs I describe the voter file variables I use to help estimate each interior cell count; note that these variables are not meant to capture causal relationships, but only to assist in the efficiency of estimation of each count. The goal of the enterprise is to estimate the count of voters who fall into each two-election behavior, not to derive an unbiased estimate of the causal effects of the voter file variables. I essentially take relevant measures from Table 2 and match them to corresponding cells in Table 3.

The first row of Table 3 are cells corresponding to election two Democratic voters, Obama in the two 2006-2008 election pairs and Angelides in California 2004-2006. The second row of the table are election two voters for all other candidates. Both of these rows contain election two voters, and so I specify the cells in each row using voter file variables measured as a proportion of election two voters. Because the model is multinomial, variables used in each row enter the model for each cell in that row. The reference cell in each row is the third cell, counting election one abstentions. For rows one and two, I model each cell probability as a function of the proportion of election two voters voting only in election two and registered Democrat, and the proportion of election two voters voting only in election two and registered Republican. These two quantities should predict the excluded category in each row, election one non-voters who turn out at election two. I also include covariates measuring the proportion of all election two voters voting in both elections and registered Democrat, and the proportion of all election two voters voting in both elections and registered Republican. These quantities should predict the number of voters who fall in each of the two-election voter cells in the upper left of Table 3.

The final row of Table 3 represents election two non-voters. I specify voter file variables conditional on no turnout at election two that should predict each of the election one behaviors. I include variables measuring the proportion of election two non-voters who voted in election one as registered Democrats, and the proportion of election two non-voters who voted in election one as registered Republicans, meant to help estimate the cells in the first two columns. I also include a variable measuring the proportion of all election two non-voters who I match across voter files and abstain in both election one and election two, meant to predict the (excluded category) final column of the row.

For all cells I include a contextual effect relevant to that cell's row (Imai, Lu, and Strauss 2007): table proportion Democrat at election two for the first row, table proportion Not Democrat at election two for the second row, and table proportion NoVote at election two for the third row. To specify the noisiness of the cell probability's relationship to the covariates, the $\hat{\tau}_i$ described in the model, I use as a covariate the missing vote rate in the precinct: the absolute deviation from the number of ballots recorded in the precinct vote returns of the number of votes recorded in the precinct in the voter file, divided by the number of ballots recorded.[27] I present the posterior median and standard deviation of each coefficient for each

[27] This ratio takes on the value of zero when the number of votes cast equals the number in the voter file,

interior cell in Tables A7, A8, and A9, but I note again that the coefficients themselves are not meant to estimate causal effects.

Posterior Estimates of Model Coefficients

and increases as these two numbers differ. I drop all precincts where this ratio is greater than 1, assuming recording errors are especially large in these precincts. This leads to dropping 25 precincts in Florida and 547 precincts 2006-2008 and 1195 in 2004-2006 in California. The California voter file has worse record-keeping than the Florida file.

Table A6: Summary Statistics of 2004, 2006, and 2008 California General Elections and 2006 and 2008 Florida General Elections

	2004	Percent	2006	Percent	2008	Percent
California						
Participation						
Total Registration	16,557,273		15,837,108		17,304,091	
Total Turnout, Percent of Registration	12,589,683	76.0	8,899,059	56.2	13,743,177	79.4
Top-Ticket Votes						
Democratic Candidate	**Kerry**		**Angelides**		**Obama**	
Democratic Votes	6,745,485	53.6	3,376,732	37.9	8,274,473	60.2
Republican Candidate	**Bush**		**Schwarzenegger**		**McCain**	
Republican Votes	5,509,826	43.8	4,850,157	54.5	5,011,781	36.5
Other Votes/Rolloff	334,372	2.7	672,170	7.6	456,923	3.3
Party Registration						
Democratic Registration	7,120,425	43.0	6,727,908	42.5	7,683,495	44.4
Republican Registration	5,745,518	34.7	5,436,314	34.3	5,428,052	31.4
Democratic Registration of Voters[a]		43.8		44.6		45.2
Republican Registration of Voters[a]		36.2		36.9		31.3
Other Registration of Voters[a]		20.0		18.5		23.5
Florida						
Participation						
Total Registration			10,433,148		11,247,634	
Total Turnout, Percent of Registration			4,884,544	46.8	8,456,329	75.2
Top-Ticket Votes						
Democratic Candidate			**Davis**		**Obama**	
Democratic Votes			2,178,289	44.6	4,282,074	50.6
Republican Candidate			**Crist**		**McCain**	
Republican Votes			2,519,845	51.6	4,045,624	47.8
Other Votes/Rolloff			186,410	3.8	128,631	1.5
Party Registration						
Democratic Registration			4,196,608	40.2	4,800,890	42.7
Republican Registration			3,920,201	37.6	4,106,743	36.5
Democratic Registration of Voters[a]				40.9		41.8
Republican Registration of Voters[a]				42.6		37.6
Other Registration of Voters[a]				16.5		20.6

Vote returns, gross registration, and gross turnout accessed from the California Secretary of State, `http://www.sos.ca.gov/elections/elections_elections.htm`*, and the Florida Department of State, Division of Elections,* `http://election.dos.state.fl.us/`*. Vote percentages are of turnout, while turnout and registration percentages are of total registration.*

[a] *Voter partisan composition percentages calculated by the author from statewide registered voter files.*

Table A7: California 2004-2006 Electoral Change Coefficients

Election Two Choice	Election One Choice	Variable	Posterior Mean	Posterior SD
Angelides	Kerry	2006 Vote Only Reg'd Dem | Vote 2006	-6.51	(0.79)
Angelides	Kerry	2006 Vote Only Reg'd Rep | Vote 2006	-5.99	(0.72)
Angelides	Kerry	2006 and 2004 Vote Reg'd Dem | Vote 2006	-1.60	(0.70)
Angelides	Kerry	2006 and 2004 Vote Reg'd Rep | Vote 2006	3.03	(0.73)
Angelides	Kerry	Constant	0.86	(0.55)
Angelides	Not Kerry	2006 Vote Only Reg'd Dem | Vote 2006	-11.00	(2.05)
Angelides	Not Kerry	2006 Vote Only Reg'd Rep | Vote 2006	-9.23	(2.20)
Angelides	Not Kerry	2006 and 2004 Vote Reg'd Dem | Vote 2006	-9.25	(0.70)
Angelides	Not Kerry	2006 and 2004 Vote Reg'd Rep | Vote 2006	2.59	(0.50)
Angelides	Not Kerry	Constant	1.03	(0.23)
Not Angelides	Kerry	2006 Vote Only Reg'd Dem | Vote 2006	-0.27	(0.47)
Not Angelides	Kerry	2006 Vote Only Reg'd Rep | Vote 2006	-12.44	(0.83)
Not Angelides	Kerry	2006 and 2004 Vote Reg'd Dem | Vote 2006	3.45	(0.30)
Not Angelides	Kerry	2006 and 2004 Vote Reg'd Rep | Vote 2006	-4.99	(0.31)
Not Angelides	Kerry	Constant	0.30	(0.22)
Not Angelides	Not Kerry	2006 Vote Only Reg'd Dem | Vote 2006	-0.40	(0.24)
Not Angelides	Not Kerry	2006 Vote Only Reg'd Rep | Vote 2006	-0.85	(0.18)
Not Angelides	Not Kerry	2006 and 2004 Vote Reg'd Dem | Vote 2006	0.89	(0.20)
Not Angelides	Not Kerry	2006 and 2004 Vote Reg'd Rep | Vote 2006	0.93	(0.17)
Not Angelides	Not Kerry	Constant	0.78	(0.13)
NoVote	Kerry	2004 Vote Reg'd Dem | 2006 NoVote	0.68	(0.14)
NoVote	Kerry	2004 Vote Reg'd Rep | 2006 NoVote	-0.59	(0.14)
NoVote	Kerry	2004 and 2006 Abstain | 2006 NoVote	-2.57	(0.09)
NoVote	Kerry	Constant	0.70	(0.11)
NoVote	Not Kerry	2004 Vote Reg'd Dem | 2006 NoVote	2.49	(0.20)
NoVote	Not Kerry	2004 Vote Reg'd Rep | 2006 NoVote	7.24	(0.20)
NoVote	Not Kerry	2004 and 2006 Abstain | 2006 NoVote	0.78	(0.13)
NoVote	Not Kerry	Constant	-2.90	(0.14)
Latent utility heteroscedasticity		Vote Returns to Voter File Discrepancy, 2004	1.80	(0.05)
Latent utility heteroscedasticity		Vote Returns to Voter File Discrepancy, 2006	0.81	(0.05)
Latent utility heteroscedasticity		Constant	-2.42	(0.02)

Note: Multinomial logit coefficient estimates by row (2006 choice) relative to excluded category 2004 abstention. Latent utility heteroscedasticity coefficients link to utility variance through an exponential function. See description of the model in the Appendix beginning on page 36. This estimation uses county fixed effects instead of contextual effects.

Table A8: California 2006-2008 Electoral Change Coefficients

Election Two Choice	Election One Choice	Variable	Posterior Mean	Posterior SD
Obama	Angelides	2008 Vote Only Reg'd Dem | Vote 2008	-1.89	(0.19)
Obama	Angelides	2008 Vote Only Reg'd Rep | Vote 2008	-7.08	(0.38)
Obama	Angelides	2008 and 2006 Vote Reg'd Dem | Vote 2008	2.98	(0.19)
Obama	Angelides	2008 and 2006 Vote Reg'd Rep | Vote 2008	0.35	(0.24)
Obama	Angelides	Proportion Precinct Obama	1.40	(0.16)
Obama	Angelides	Constant	-1.63	(0.18)
Obama	Not Angelides	2008 Vote Only Reg'd Dem | Vote 2008	-7.08	(0.23)
Obama	Not Angelides	2008 Vote Only Reg'd Rep | Vote 2008	-11.17	(0.41)
Obama	Not Angelides	2008 and 2006 Vote Reg'd Dem | Vote 2008	-1.72	(0.20)
Obama	Not Angelides	2008 and 2006 Vote Reg'd Rep | Vote 2008	2.23	(0.23)
Obama	Not Angelides	Proportion Precinct Obama	2.45	(0.13)
Obama	Not Angelides	Constant	0.37	(0.18)
Not Obama	Angelides	2008 Vote Only Reg'd Dem | Vote 2008	1.30	(1.21)
Not Obama	Angelides	2008 Vote Only Reg'd Rep | Vote 2008	8.57	(1.51)
Not Obama	Angelides	2008 and 2006 Vote Reg'd Dem | Vote 2008	4.08	(1.21)
Not Obama	Angelides	2008 and 2006 Vote Reg'd Rep | Vote 2008	8.13	(1.30)
Not Obama	Angelides	Proportion Precinct Not Obama	-30.47	(1.31)
Not Obama	Angelides	Constant	-0.39	(0.91)
Not Obama	Not Angelides	2008 Vote Only Reg'd Dem | Vote 2008	1.83	(0.24)
Not Obama	Not Angelides	2008 Vote Only Reg'd Rep | Vote 2008	6.12	(0.26)
Not Obama	Not Angelides	2008 and 2006 Vote Reg'd Dem | Vote 2008	3.97	(0.24)
Not Obama	Not Angelides	2008 and 2006 Vote Reg'd Rep | Vote 2008	5.54	(0.23)
Not Obama	Not Angelides	Proportion Precinct Not Obama	-1.75	(0.14)
Not Obama	Not Angelides	Constant	-2.13	(0.16)
NoVote	Angelides	2006 Vote Reg'd Dem | 2008 NoVote	9.14	(0.36)
NoVote	Angelides	2006 Vote Reg'd Rep | 2008 NoVote	0.57	(0.34)
NoVote	Angelides	2006 and 2008 Abstain | 2008 NoVote	-0.30	(0.12)
NoVote	Angelides	Proportion NoVote 2008	-4.24	(0.10)
NoVote	Angelides	Constant	0.06	(0.09)
NoVote	Not Angelides	2006 Vote Reg'd Dem | 2008 NoVote	-2.61	(1.11)
NoVote	Not Angelides	2006 Vote Reg'd Rep | 2008 NoVote	9.10	(0.95)
NoVote	Not Angelides	2006 and 2008 Abstain | 2008 NoVote	-4.83	(0.34)
NoVote	Not Angelides	Proportion NoVote 2008	5.63	(0.28)
NoVote	Not Angelides	Constant	-3.04	(0.27)
Latent utility heteroscedasticity		Vote Returns to Voter File Discrepancy, 2006	3.80	(0.04)
Latent utility heteroscedasticity		Vote Returns to Voter File Discrepancy, 2008	1.94	(0.05)
Latent utility heteroscedasticity		Constant	-2.42	(0.02)

Note: Multinomial logit coefficient estimates by row (2008 choice) relative to excluded category 2006 abstention. Latent utility heteroscedasticity coefficients link to utility variance through an exponential function. See description of the model in the Appendix beginning on page 36.

Table A9: Florida 2006-2008 Electoral Change Coefficients

Election Two Choice	Election One Choice	Variable	Posterior Mean	Posterior SD
Obama	Davis	2008 Vote Only Reg'd Dem | Vote 2008	-3.14	(0.17)
Obama	Davis	2008 Vote Only Reg'd Rep | Vote 2008	-5.62	(0.25)
Obama	Davis	2008 and 2006 Vote Reg'd Dem | Vote 2008	1.98	(0.16)
Obama	Davis	2008 and 2006 Vote Reg'd Rep | Vote 2008	1.20	(0.26)
Obama	Davis	Proportion Precinct Obama	0.68	(0.15)
Obama	Davis	Constant	0.25	(0.16)
Obama	Not Davis	2008 Vote Only Reg'd Dem | Vote 2008	-8.72	(0.83)
Obama	Not Davis	2008 Vote Only Reg'd Rep | Vote 2008	-17.19	(1.62)
Obama	Not Davis	2008 and 2006 Vote Reg'd Dem | Vote 2008	1.75	(0.70)
Obama	Not Davis	2008 and 2006 Vote Reg'd Rep | Vote 2008	1.03	(0.98)
Obama	Not Davis	Proportion Precinct Obama	-1.18	(0.64)
Obama	Not Davis	Constant	0.50	(0.76)
Not Obama	Davis	2008 Vote Only Reg'd Dem | Vote 2008	-9.21	(0.45)
Not Obama	Davis	2008 Vote Only Reg'd Rep | Vote 2008	-2.08	(0.64)
Not Obama	Davis	2008 and 2006 Vote Reg'd Dem | Vote 2008	6.63	(0.42)
Not Obama	Davis	2008 and 2006 Vote Reg'd Rep | Vote 2008	-2.08	(0.70)
Not Obama	Davis	Proportion Precinct Not Obama	-2.75	(0.30)
Not Obama	Davis	Constant	0.87	(0.35)
Not Obama	Not Davis	2008 Vote Only Reg'd Dem | Vote 2008	-3.16	(0.18)
Not Obama	Not Davis	2008 Vote Only Reg'd Rep | Vote 2008	-3.21	(0.24)
Not Obama	Not Davis	2008 and 2006 Vote Reg'd Dem | Vote 2008	2.34	(0.16)
Not Obama	Not Davis	2008 and 2006 Vote Reg'd Rep | Vote 2008	4.94	(0.20)
Not Obama	Not Davis	Proportion Precinct Not Obama	-3.02	(0.13)
Not Obama	Not Davis	Constant	1.09	(0.12)
NoVote	Davis	2006 Vote Reg'd Dem | 2008 NoVote	9.72	(0.53)
NoVote	Davis	2006 Vote Reg'd Rep | 2008 NoVote	6.54	(0.79)
NoVote	Davis	2006 and 2008 Abstain | 2008 NoVote	-1.34	(0.36)
NoVote	Davis	Proportion NoVote 2008	0.20	(0.55)
NoVote	Davis	Constant	-3.02	(0.24)
NoVote	Not Davis	2006 Vote Reg'd Dem | 2008 NoVote	-2.94	(1.13)
NoVote	Not Davis	2006 Vote Reg'd Rep | 2008 NoVote	10.32	(0.67)
NoVote	Not Davis	2006 and 2008 Abstain | 2008 NoVote	-3.84	(0.39)
NoVote	Not Davis	Proportion NoVote 2008	-0.58	(0.43)
NoVote	Not Davis	Constant	-0.65	(0.21)
Latent utility heteroscedasticity		Vote Returns to Voter File Discrepancy, 2006	7.81	(0.23)
Latent utility heteroscedasticity		Vote Returns to Voter File Discrepancy, 2008	7.26	(0.17)
Latent utility heteroscedasticity		Constant	-4.22	(0.04)

Note: Multinomial logit coefficient estimates by row (2008 choice) relative to excluded category 2006 abstention. Latent utility heteroscedasticity coefficients link to utility variance through an exponential function. See description of the model in the Appendix beginning on page 36.

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