Partisan Bias, Political Information and Spatial Voting in the 2008 Presidential Election

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This article provides direct estimates of the parameters of spatial utility models of voting using data from the 2008 presidential election. By measuring citizens' views on issues for which candidates' stances are known, I estimate voter ideology on the same scale as candidate positions. Using these estimates, I demonstrate that policy exerts a strong influence on vote choice for most voters. While independents appear to cast their ballots in accordance with the assumptions of unbiased spatial voting, partisans are strongly biased toward their party's nominee by spatial standards. At lower levels of political information, voters are influenced primarily by their party identification, with policy views having little impact on vote choice. More highly informed citizens, by contrast, show strong relationships between policy views and vote choice. As information levels increase, the spatial biases exhibited by partisan voters decreases, but even among the most informed citizens, significant partisan biases remain.

Resting on the simple assumption that people tend to choose options closest to their most preferred position, spatial models of politics (Black, 1948; Davis, Hinich, and Ordeshook 1970; Downs, 1957; Hotelling, 1929) have generated a wide range of theoretical predictions and insights across many areas of political science. In field of voting behavior, spatial models assume that each candidate in an election takes a position in an ideological space and voters choose the candidate who is closest to their own position. This approach differs from the social-psychological tradition, developed by Campbell et al. (1960) and others in that it emphasizes a spatial conception of policy views as the primary influence on electoral behavior. Spatial theory offers an attractive alternative to more traditional approaches to political behavior in that it provides a precise and parsimonious framework through which to understand both voter decision making and candidate behavior.

Testing the basic assumption of spatial voting theory, however, has been difficult. In particular, spatial models posit specific relationships between voters' ideological proximity to candidates and the utility they derive from voting for them. Empirically verifying these relationships requires measures of candidate locations on the same scale as the ideological positions of individual citizens. Obtaining such comparable ideology measures with traditional survey data generally requires heroic assumptions.

Focusing on the 2008 presidential election contest between Barack Obama and John McCain, this study provides a direct examination of the foundational axioms of spatial voting theory. First, I construct measures of the ideological positions of voters and candidates on the same scale by surveying citizens about their agreement or disagreement with specific policy proposals on which each of the two candidates has taken public positions. Using these measures, I construct a statistical model estimating the parameters of the spatial utility model of voting behavior. These results suggest that while all voters are influenced by their spatial proximity to each candidate, their behavior differs systematically across party identification groupings. While the behavior of independents is consistent with the predictions of unbiased spatial voting, partisans show strong biases toward their party's nominee above and beyond what would be predicted by their ideological position under the basic spatial model.

I also extend this basic model to allow the influence of policy as well as the spatial biases for each partisan grouping to vary by respondents' level of political information. The results of this more flexible statistical model demonstrate important differences in voting behavior across political information levels. The behavior of less informed citizens is principally dictated by party identification, with policy views having virtually no effect on vote choice for partisans and a

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relatively small effect for independents. As political information levels increase, the impact of policy views becomes stronger. Even among the most informed voters, however, significant differences remain between the voting behavior of Democrats, independents, and Republicans, including those with identical policy positions. While the behavior of independent voters conforms closely to the predictions of unbiased spatial voting, partisans at all levels of political information show a strong tendency to vote for their party's candidate even in situations in which they are ideologically closer to the other candidate. Overall, the behavior of voters is consistent with a model of spatial voting incorporating party bias terms for Democratic and Republican voters, with policy views increasing in importance for all voters as political information levels rise.

The Spatial Utility Model of Voting

In its simplest form, the spatial voting model is built from a single assumption—that voters will choose the candidate who takes a position closest to their own policy views. Thus, voting is deterministic and based solely on a voter's own position in relation to the candidates in a given election. While this simple framework has provided many useful insights to the study of elections, candidate positioning and other areas, its assumption of perfect discrimination by voters is unlikely to be observed in real-world elections. In order to account for such random variation, scholars have expanded the spatial voting framework to include error terms representing the differences between each individual voter that may affect their voting behavior above and beyond what would be predicted by their ideological positions (Adams 1999; Enelow and Hinich 1982, 1984; Hinich and Munger 1994; Lin et al. 1999). Commonly, these expanded models take a form similar to

$$U_i(k) = -a(x_i - c_k)^2 + e_{ik} \qquad (1)$$

where $U_i(k)$ represents the utility voter i would get from voting for candidate k, x_i is the voter's own ideal point and c_k is the candidate's position. The policy weight a represents how strongly voters are influenced by their policy proximity to each candidate, and e_{ik} is a mean-zero error term, usually assumed to follow a normal or extreme value distribution.[1]

In addition to the introduction of random utility disturbances, which are generally conceptualized as the sum of unmeasured (often unobservable) factors acting on individuals, the basic spatial model has also been expanded to include measured nonpolicy factors. One such factor is a valence dimension on which candidates can possess qualities such as charisma or intelligence that are valued equally by all voters (Ansolabehere and Snyder 2000; Groseclose 2001; Stokes 1963). Other studies have examined the consequences of allowing voters to differ in their use of these nonpolicy factors (Adams 2001; Adams, Merril, and Grofman 2005; Chapman 1968, 1967). As pointed out by Erikson and Romero (1990), the inclusion of such measured nonpolicy factors would generally be expected to affect the properties of the stochastic spatial voting model if they are correlated with voters' policy views. The most prominent example of such a factor is party identification, which is known to exhibit very high correlations with ideology and is generally thought to have a fundamental relationship with vote choice (e.g., Campbell et al. 1960). Accordingly, it is appropriate to expand the spatial voting framework to include the influence of partisanship, which could be hypothesized to influence vote choice above and beyond citizens' ideological proximity to each candidate.

The effects of partisanship are generally included as additive terms in respondent utility equations. Therefore, in addition to the utility a voter gets from each candidate's proximity to his own ideal point and from the random error term, we also include a term b_{ik} which represents the amount of utility that person i gets from voting for candidate k above and beyond the candidate's ideological proximity to the voter. It will be assumed that respondents within each party identification grouping (here Democrats, independents, and Republicans) have the same values of b_{ik} for a given candidate k (i.e., $b_{ik} = b_{jk}$ whenever respondents i and j have the same party identification). Therefore, our equation for the utility voter i receives from voting for candidate k becomes

$$U_i(k) = -a(x_i - c_k)^2 + b_{ik} + e_{ik}. \qquad (2)$$

While direct empirical investigations of voters' utilities may be problematic, we can instead consider their vote choices in order to learn about the underlying parameters driving their utility functions. Our model assumes that voter i will choose the candidate who offers him the most utility. In our setup, we have voters choosing between the Democratic and Republican candidates who, for the 2008 presidential election, are Barack Obama and John McCain and whose ideological positions I denote as c_D and c_R respectively. Therefore, we can write respondent i's probability of voting for McCain as

[1]For a fuller discussion of extensions to the basic spatial voting framework, see Adams, Merril, and Grofman (2005, 15–27).

$$\begin{aligned} P(v_i = \text{“McCain”}) &= P(U_i(\text{“McCain”}) > U_i(\text{“Obama”})) \\ &= P\left(-a(x_i - c_R)^2 + b_{iR} + e_{iR} > -a(x_i - c_D)^2 + b_{iD} + e_{iD}\right) \\ &= \Phi\left(\lambda x_i + \pi + \delta_{pty(i)}\right) \end{aligned} \tag{3}$$

where $\lambda = 2a(c_R - c_D)$, $\pi = a(c_D^2 - c_R^2)$ and $\delta_{pty(i)} = b_{iR} - b_{iD}$. The direct correspondence to a probit model is obtained by assuming that $e_{iD} - e_{iR}$ follows a standard normal distribution. The main parameters of interest in this utility-based model of voting are the policy weight a and partisan biases b_{ik} toward the candidates.

The policy weight parameter a represents how strongly a respondent's ideological proximity to each candidate affects the utility that he receives from choosing that candidate. This will determine how steeply a respondent's vote probability is related to his ideological position. We can think of a as the precision of the voting rule in discriminating ideologically between the two candidates. At one extreme, the policy weight could be equal to zero, meaning that voting decisions are not affected at all by citizens' policy positions. Alternatively, a could approach infinity, which would imply a perfect cutpoint for which all voters to the left would vote for Obama and all to the right would vote for McCain.

Apart from the issue of precision, we can also talk about the notion of bias in a spatial voting sense. If the bias term for a voter is equal to zero, then he will be most likely to vote for the candidate whose position is closest to his own. Empirically, we cannot estimate the actual values of b_{ik} by observing vote choices, even with data on both respondent and candidate positions. What we can estimate, however, is the net bias toward each candidate, which we have called $\delta_{pty(i)}$ above. In the formulation shown in equation (3), this quantity represents the difference between the bias toward McCain and the bias toward Obama for an individual voter. Importantly, voters using biased decision rules have the potential to have a higher probability of voting for the candidate who is ideologically farther from their own position than for the candidate who takes a position closer to them.

Estimation of Spatial Utility Parameters

If we have data including citizens' vote choices along with their ideological positions and party identification, we can estimate the relationship between citizen ideology and vote choice. To estimate the terms λ, π and $\delta_{pty(i)}$, we can run a probit model predicting vote choice (coded as a 1 for McCain and 0 for Obama) with ideology and party identification. This equation would take the form

$$P(v_i = \text{“McCain”}) = \Phi(\beta_D D_i + \beta_I I_i + \beta_R R_i + \beta_x x_i), \tag{4}$$

where D_i, I_i, and R_i are dummy variables indicating whether respondent i identifies as a Democrat, independent or Republican. These probit coefficients then have the following relationship with our parameters of interest:

$$\begin{aligned} \beta_x &= \lambda = 2a(c_R - c_D) \\ \beta_D &= \pi + \delta_D = a\left(c_D^2 - c_R^2\right) + \delta_D \\ \beta_I &= \pi + \delta_I = a\left(c_D^2 - c_R^2\right) + \delta_I \\ \beta_R &= \pi + \delta_R = a\left(c_D^2 - c_R^2\right) + \delta_R. \end{aligned} \tag{5}$$

If we do not know the positions of the two candidates, then we have six unknowns—a, δ_D, δ_I, δ_R, c_D, and c_R—and four equations. Therefore, we can only solve for a, δ_D, δ_I, and δ_R in terms of the candidate positions. If we did know the positions taken by the two candidates, measured on the same scale that as our voter ideal points x_i, the problem would reduce to one with four equations and only four unknowns. We could then solve for all of our parameters of interest, which would yield

$$\begin{aligned} a &= \frac{\beta_x}{2(c_R - c_D)} \\ \pi &= a(c_D^2 - c_R^2) = \frac{\beta_x(c_D^2 - c_R^2)}{2(c_R - c_D)} \\ \delta_D &= \beta_D - \pi = \beta_D - \frac{\beta_x(c_D^2 - c_R^2)}{2(c_R - c_D)} \\ \delta_I &= \beta_I - \pi = \beta_I - \frac{\beta_x(c_D^2 - c_R^2)}{2(c_R - c_D)} \\ \delta_R &= \beta_R - \pi = \beta_R - \frac{\beta_x(c_D^2 - c_R^2)}{2(c_R - c_D)}. \end{aligned} \tag{6}$$

With estimates for both candidate positions and the probit regression coefficient from equation (4), we could then solve for the values of the parameters of

the spatial utility model from equation (2). Furthermore, if we adjust the scale on which ideology is measured for both citizens and candidates by using a linear transformation that places c_D and c_R at $-1/4$ and $1/4$ respectively, then this implies that $c_D^2 - c_R^2 = 0$ and $2(c_R - c_D) = 1$, reducing the formulas in equation (6) to

$$\begin{aligned} a &= \beta_x & \pi &= 0 \\ \delta_D &= \beta_D & \delta_I &= \beta_I \\ \delta_R &= \beta_R \end{aligned} \qquad (7)$$

This provides a direct correspondence between the estimated probit coefficients in equation (4) and the parameters of the spatial utility voting model from equation (2) above. If we are able to obtain estimates of respondent and candidate ideology on the same scale, we can now estimate the policy weight and spatial bias parameters of the spatial utility model of voting using a probit regression model predicting citizen vote choice with ideology and partisanship. Thus, the derivations presented above have established a direct link between the parameters of the theoretical model of spatial voting and the estimates of statistical models for vote choice.

Estimating Voter and Candidate Ideology

A central problem in directly testing models of spatial voting lies in the measurement of the ideology of voters and candidates. Because the values of the parameters of the spatial utility model of voting derived in equation (6) are based on the positions taken by candidates, we cannot recover estimates of these parameters without measuring candidate positions on the same scale as citizen ideology. Previous scholars have taken several approaches to measuring the policy views of citizens and the positions of candidates. The most basic method of measuring citizen ideology consists of using self-placed positions, usually on 5- or 7-point ideology or issue scales (e.g., Alvarez and Nagler 1995; Erikson and Romero 1990). Such scales provide valuable measures of respondents' self-perceptions, but are problematic for our purposes in several ways. For example, it is possible that respondents use these scales differently. The way that one person interprets a "4" on this scale may not be the same way that another person thinks of this same response category. Perhaps more seriously, such scales may measure ideology on a scale other than the primary ideological dimension that structures voters' political beliefs.

Above and beyond the problem of obtaining valid measures of citizen ideology is the more difficult problem of measuring the positions of the candidates in a given election on this same scale. In order to obtain estimates of candidate positions, previous scholars have often relied on citizen perceptions of candidate positions, usually expressed on simple ordinal scales, either using each respondent's perceptions of the candidates (Merrill and Grofman, 1999) or by assuming that the true positions are equal to the mean of survey respondents' perceived scale placements of the candidates (Alvarez and Nagler 1995; Erikson and Romero 1990). These assumptions are problematic because the spatial voting model, in its traditional form, makes assumptions about the actual locations of candidates rather than citizens' perceptions about them. The possibility that citizens may systematically misperceive candidate locations and, even worse, that these perceptual errors may be correlated with citizens' own ideology or party identification, make such measures less than ideal.

In order to obtain useful measures of voters' ideological positions and to overcome the fundamental issue of comparability mentioned above, I conducted a survey of 2,000 voters, fielded shortly before the 2008 presidential election.[2] In addition to being asked general questions about their political opinions, the survey asked voters to indicate whether they agree or disagree with a set of 10 policy statements that corresponded with issues raised in the presidential campaign. These policy statements were selected from a wide range of issue areas including the economy, health care, abortion, and the environment. A full list of the ten positions shown to respondents along with the overall responses to each question can be found in Table 1.

The key advantage of this survey design is its ability to produce measures of citizen ideology on the same scale as candidate positions.[3] For each of the 10 policy statements, we not only have the position of each respondent, but we also know the stances taken

[2]The survey was fielded October 25–27, 2008 by Polimetrix, Inc. Respondents were selected from the company's Polling Point panel, an online volunteer respondent pool of over one million Americans, using a sample matching technique (Rivers 2003) to ensure representativeness at the national level. For the purposes of this study, voters who failed to state their party identification, a group consisting of less than three percent of the full sample, are dropped from the analysis.

[3]This measurement approach is similar to that of Jessee (2009), but uses policy statements instead of proposals from Senate roll-call votes.

TABLE 1 Survey Questions, Responses and Question Parameter Estimates

Policy Proposal	Candidates		Respondents	Parameters	
	Obama	McCain	Y-N-DK (%)	γ_j	α_j
The United States should begin a phased withdrawal of troops from Iraq.	Yes	No	64-24-12	−6.69	−1.10
The definition of marriage should apply only to relationships between a man and a woman.	Yes	Yes	58-33-10	3.80	−.48
Younger workers should be allowed to invest some of their Social Security contributions in private investment accounts.	No	Yes	51-30-19	3.56	−.40
The Supreme Court's decision in Roe v. Wade, which legalized most forms of abortion, should be overturned.	No	Yes	31-55-14	4.29	.49
A mandatory cap on carbon dioxide emissions by American companies should be imposed, with a credit trading system so that companies who pollute less can sell their credits to other companies.	Yes	Yes	44-28-28	−4.30	−.42
A "windfall profits" tax should be imposed on large profits made by oil companies.	Yes	No	59-25-16	−7.74	−1.16
Tax cuts for those making over $250,000 should be reversed.	Yes	No	50-36-14	−5.26	−.28
The federal government should require that all American children have health insurance.	Yes	No	57-28-14	−6.68	−.83
Same-sex couples should be allowed to form civil unions that give them most of the same legal protections that married couples enjoy.	Yes	Yes	61-29-10	−2.30	−.55
Up to $700 billion dollars should be spent to have the federal government purchase troubled assets from financial institutions in an attempt to remedy current economic troubles.	Yes	Yes	24-50-26	−1.24	.47

by both Barack Obama and John McCain during the election (also listed in Table 1).[4] Furthermore, the response options for voters correspond with the positions we have for the candidates, rather than being measured on vague ordinal scales. We know, for example, that Obama disagrees with the statement that the Supreme Court's decision in *Roe v. Wade* should be overturned, while McCain agrees with this position. By measuring respondents' positions as "agree" or "disagree," we can directly compare their policy views with those of the two candidates. Had we asked respondents to provide their responses on a 5-point scale from "strongly agree" to "strongly disagree," we would lose this direct comparability. Would Obama's position be a 5? Or a 4? Where would we place John McCain? It could be argued that he should be a 1 or a 2, but there is no way of firmly pinning down his exact location.

Now that we have survey data measuring the policy positions of respondents and candidates on the same scale, we can use the technique of ideal point estimation to obtain estimates of their overall ideology on a general liberal-conservative scale. Ideal point estimation generally assumes that actors have some underlying ideology that shapes their responses to policy questions. Actors with more liberal ideal points will be more likely to support liberal policy proposals and less likely to support conservative ones, for example. These techniques can take several forms, most of which vary in terms of the assumed shape of utility functions and error distributions, but generally produce similar estimates in most applications. I follow Clinton, Jackman, and Rivers (2004) in assuming quadratic utility functions and errors that follow the normal distribution, yielding a probit link ideal point model. Preliminary analyses of the stated positions of respondents and candidates revealed a dominant first

[4]These positions were coded from a variety of sources and focused on using the candidates' own statements to establish their positions on issues. In general, there was broad agreement on the positions of the candidates on these ten issues across media and campaign sources.

dimension, with further dimensions contributing little explanatory power.[5]

A Statistical Model of Spatial Voting

To estimate the policy weight and partisan biases used by voters in the 2008 presidential election, we must first specify a full statistical model of vote choice. In this model, respondents' vote decisions depend on their party identification and their ideological locations, which are estimated from their positions on the 10 surveyed policy statements. It is important to note that there is a significant amount of uncertainty in our estimate of any individual voter's ideal point. Because respondents state their positions on only 10 policy proposals, we have a more limited amount of information about their true ideological location as compared with other ideal point applications such as congressional voting in which we have legislators' positions on hundreds of proposals in a given congress. For this reason, it is important that the estimated coefficients from our probit regression model account for this uncertainty, which would not happen if we were to simply run a probit regression using the point estimates of respondent ideal points as an independent variable. In order to account for this uncertainty, I estimate the two stages of the model—the ideal point model estimating the ideology of respondents and candidates on the same scale and the probit regression model estimating respondents' vote choice probabilities as a function of their ideology and party identification—simultaneously in one statistical model. The first stage of the model follows the ideal point setup proposed by Clinton, Jackman, and Rivers (2004). Here y_{ij} gives respondent i's position on proposal j, with 1 indicating support and 0 indicating opposition. Formally, we have

$$P(y_{ij} = 1|\gamma, \alpha, x) = \Phi(\gamma_j x_i - \alpha_j) \tag{8}$$

where x_i is respondent i's ideological position and γ_j and α_j are the proposal's discrimination and difficulty parameters.[6] The discrimination parameter γ_j for each bill estimates how strongly and in what direction respondents' ideological positions are related to their probabilities of supporting a given policy. Liberal policies should have negative discrimination parameters, while conservative policies will have positive discrimination parameters. Furthermore, policies on which respondent support is strongly related to ideological position will have discrimination parameters that are large in magnitude. The difficulty parameters α_j are related to the general level of support for each policy, with higher values of α_j representing lower levels of support holding ideology constant. As discussed above, the positions of Obama and McCain are estimated together with those of respondents based on their positions on each of the 10 proposals in the survey. In order to aid in the interpretation of the regression coefficients as discussed above, the restriction is imposed that Obama and McCain take positions at $-1/4$ and $1/4$, respectively.

The second stage of the model is a probit regression predicting respondents' stated vote intention for the 2008 presidential election using their party identification and ideological position.[7] For respondent i, we model their probability of voting for McCain as

$$P(v_i = \text{``McCain''}) = \Phi(\beta_D D_i + \beta_I I_i + \beta_R R_i + \beta_x x_i) \tag{9}$$

as in equation (4), where D_i, I_i and R_i are dummy variables indicating whether respondent i identifies as a Democrat, independent, or Republican.

One final consideration in estimating this model is the potential "feedback" between the ideal point and presidential voting stages of the model. Obviously, because respondent ideal points x_i are used as a predictor in the probit regression stage of the model (equation 9), we want information about the values of these ideal points to influence the estimates of these probit coefficients. It is less clear, however, whether we should want respondents' presidential vote choices v_i to affect their estimated ideal points, which could pull the estimated ideal points of Obama voters to the left and of McCain voters to the right. On one hand, if we believe that our model is an accurate representation of ideology and voting, then knowledge of a respondent's vote choice provides us with useful information about the location of his ideal point, conditional on the value

[5]Examinations of the eigenvalues of the correlation matrix of respondent policy responses revealed one large value with all further eigenvalues being significantly smaller. Furthermore, estimating a one-dimensional ideal point model for these data produces a correct classification rate of 81.7% while moving to a two-dimensional model provides a relatively modest increase in fit, correctly classifying 86.4% of the stated positions.

[6]Positions are treated as missing for respondents who decline to state whether they support or oppose a given proposal.

[7]Respondents who stated that they did not plan to vote, that they planned to vote for a candidate other than Obama or McCain, or who declined to reveal their vote intention are coded as missing. This group constitutes less than 12% of the sample used here.

of the coefficient β_x. On the other hand, in its basic state, the model does not necessarily define the dimension on which respondent and candidate ideal points are estimated other than to assume that it may affect both the policy positions and vote decisions. If we want our estimates of respondent and candidate ideology to be based only on preferences over policy and not over parties and candidates, then we may want to prevent information from flowing from vote decisions back into estimated ideal points. This would effectively impose the restriction that ideal points are estimated only based on respondents' stated policy positions and not influenced by their vote choices.

In order to ensure that estimated ideal points measure respondents' preferences between different policy proposals and not their feelings toward specific candidates or parties, I adopt this conservative strategy, allowing information about respondent ideal points to be used in predicting vote choice, but preventing the voting decisions of respondents from influencing their ideal point estimates. In order to accomplish this, I estimate the full model with a modified version of the Gibbs sampler which allows uncertainty in the estimated ideal points x_i to propagate into the estimated probit coefficients in equation (9), but does not allow the ideal point estimates to be influenced by respondents' vote choices v_i. The Gibbs sampler is a method for sampling from complicated multivariate distributions (in this case the posterior distribution over our model's unknown parameters) using a series of simpler, often univariate, conditional distributions. The procedure used here is identical to the standard Gibbs sampler for the simultaneous model with the exception that instead of sampling from the full conditional posterior for voter ideal points $p(x|\beta, \gamma, \alpha, y, v) \propto p(y|x, \gamma, \alpha)p(v|x, \beta)p(x)$, the sampler instead takes a random draw from a conditional posterior distribution omitting the likelihood term for v (respondents' vote choices).[8] In other words, we now sample from $p(x|\beta, \gamma, \alpha, y,) \propto p(y|x, \gamma, \alpha)p(x)$ at this step, preventing "feedback" from respondents' voting decisions v_i from influencing their ideal point estimates x_i. All other sampling steps are identical to the standard Gibbs sampler setup. This procedure is implemented in the freely available software WinBUGS (Spiegelhalter, Thomas, and Best 1999).[9]

All unknown parameters are given vague normal priors with mean 0 and variance 100, and the model is estimated in an unidentified state. After estimation, the results are postprocessed to impose the identifying restriction on the ideal points x_i such that Obama and McCain's positions fall at $-1/4$ and $1/4$, respectively, which establishes the direct correspondence discussed above between the estimated probit coefficients and the policy weight and bias terms from the spatial voting model. After a burn-in period of 10,000 iterations to allow the sampling procedure to converge, parameter estimates for 200,000 subsequent iterations were stored.

Voter and Candidate Ideology Estimates

Figure 1 shows the density of estimated respondent ideal points plotted alongside the estimated positions of Obama and McCain for respondents of each of the three party identification groupings. We see that, as expected, Democratic identifiers tend to be more liberal, while Republicans tend to have more conservative ideal points. Respondents who do not identify with either party have ideal points that are near the middle on average.[10] We also see that the majority of respondents are concentrated in the interval between (or nearly between) the two candidates' positions. As is commonly noted in American politics, the two candidates clearly offer divergent positions, contrasting sharply with classic predictions of convergence to the position of the median voter (Black, 1948; Downs, 1957; Hotelling, 1929). The candidates instead appear to offer positions near the center of their partisan constituencies (and likely near the center of their primary election constituencies as well).

It is also instructive to examine how each of the 10 different policies relates to these ideal point estimates. The two rightmost columns of Table 1 list the estimated bill parameters for each of these policy statements.[11] The estimated discrimination

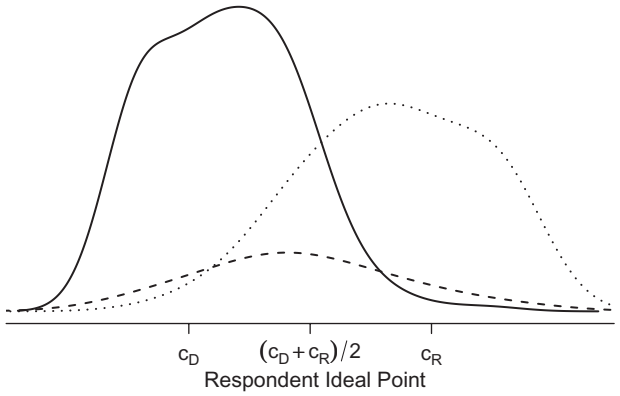
[8]Such "feedback control" procedures have previously been described by Lunn et al. (2009) in the context of pharmacokinetic and pharamacodynamic (PKPD) modeling.

[9]The WinBUGS model specification language includes a "cut(.)" function for setting up such feedback cutoffs.

[10]The party identification measure is based on the standard NES question wording with seven possible responses from "Strong Democrat" to "Strong Republican." Throughout the article, I treat respondents who identify with or lean toward a party as partisans, while independents consist solely of of "pure" independents who express no preference for one party or the other.

[11]Obviously, these policies were not chosen simply at random, but rather to represent issues that were discussed during the campaign and on which the candidates had clearly stated positions. While there is some potential for biasing the estimated positions of candidates through the choice of these positions, they do generally represent a broad selection of issues and a good characterization of the candidates' general policy stances.

FIGURE 1 **Density of estimated respondent ideal points by party identification. Solid, dashed and dotted lines indicate Democratic, independent and Republican respondents. Estimated locations of Obama and McCain are indicated by c_D and c_R respectively. The estimated midpoint between the two candidates' positions is shown as $(c_D+c_R)/2$.**



parameters (γ_j's) generally show the expected direction across all issues, being estimated to be negative for what are generally thought of as liberal policy proposals and positive for conservative ones. The one exception is the so-called "bailout bill" for which the discrimination parameter is estimated to be negative, but much smaller in magnitude than those for any of the other policies. This suggests that respondent positions on the bailout bill are not as strongly related to ideology as are positions for other policies.

Spatial Utility Parameter Estimates

Table 2 shows the estimates of the probit regression stage of the model (equation 9). As discussed above, by fixing the positions of Obama and McCain at $-1/4$ and $1/4$, respectively, we obtain the direct correspondence between the estimated probit coefficients and the parameters of interest from the spatial voting model shown in equation (7). We see that respondents show large and significant differences across party identification groupings, with Democrats and Republicans having estimated biases of -1.13 and 1.17, respectively. We can clearly reject the hypothesis that partisans engage in unbiased spatial voting, which would take place if these biases λ_D and λ_R were equal to zero. Partisan voters are pushed strongly strongly toward voting for their party's nominee above and beyond their relative ideological proximity to the two candidates' positions.[12]

TABLE 2 **Spatial Utility Model Parameter Estimates**

Probit Coefficient	Vote Model Parameter	Estimate (95% HPD)
β_D	δ_D	-1.13 (-1.28, $-.98$)
β_I	δ_I	$-.08$ ($-.35$, .19)
β_R	δ_R	1.17 (.99, 1.35)
β_x	a	3.40 (1.18, 5.75)

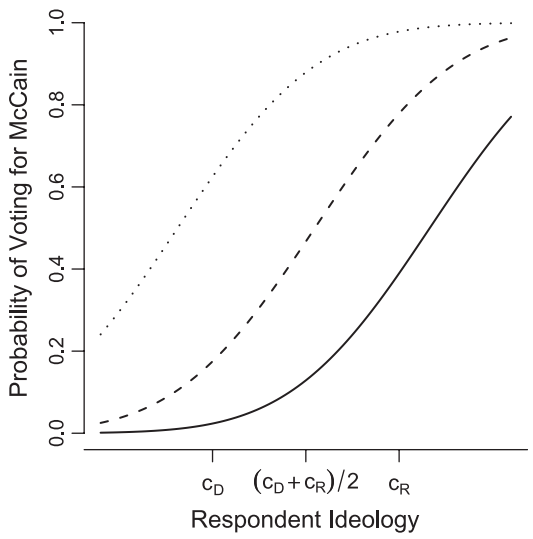
On the other hand, our estimate for δ_I is $-.08$, with a 95% credible interval of $-.35$ to .19. This means that independent voters are estimated to have little or no bias toward either candidate. In other words, the behavior of independent voters is strongly consistent with a model in which voters make their choices based on their ideological proximity to each candidate, tending to select the one closest to their own ideal point. While there is some uncertainty in the estimated size of this bias for independents, it is clear that the magnitude of any possible spatial bias for independents is many times smaller than that for either Democratic or Republican voters.

The coefficient on respondent ideal point, which corresponds to the policy weight a from our utility-based voting model, is estimated to be 3.40. Obviously, the size of this coefficient can only be interpreted relative to the range of ideal point values x_i across respondents and the candidate locations. Respondent ideal points have an average estimate of $-.02$ and a standard deviation of .23. Overall, this represents a fairly large influence for ideology. As an illustration, a shift of one sample standard deviation in voter ideology would imply a change of .79 units on the probit scale.

Another way of examining the results from this model is to look at predicted vote probabilities for voters of various party identifications and policy views. Figure 2 plots the predicted probability of voting for McCain for Democratic, independent, and Republican voters (shown with solid, dashed, and dotted lines, respectively) as a function of policy views, with the positions of Obama, McCain, and the midpoint between the two candidates, denoted by c_D, c_R, and $(c_D+c_R)/2$. We see that respondents of all three party

[12]If party identification is caused at least in part by presidential vote choice (e.g., if Democrats or independents who come to decide that they are voting for McCain are more likely to become Republicans because of their candidate choice), then these estimates of partisan bias could be biased upwards in magnitude.

FIGURE 2 **Predicted probabilities of voting for McCain as a function of respondent ideal point for Democrats, independents and Republicans indicated by solid, dashed and dotted lines respectively, based on the parameter estimates for Equation 9 shown in Table 2. Estimated positions of Obama, McCain and the midpoint between the two candidates are noted as c_D, c_R and $(c_D+c_R)/2$.**



identifications show relatively steep relationships between policy views and vote probability as implied by the relatively large value estimated for β_x. For respondents with identical policy views, a Democrat will have a significantly lower likelihood of voting for McCain than an independent, while a Republican would have the highest probability of voting for McCain. For example, Democratic, independent, and Republican respondents with ideal points at the actual midpoint between the two candidates (which has been fixed to zero here) would have predicted probabilities of voting for McCain of .13, .47, and .88, respectively. Therefore, while the vote choices made by independents show little if any bias toward either candidate, those of partisan respondents are systematically pushed away from the implications of unbiased spatial voting and toward selecting their party's nominee.

A More Flexible Model of Spatial Voting

While the previous model of spatial voting provides strong support for the hypotheses that voters use proximity-based voting rules and that the decisions of independent voters correspond strongly with the assumptions of unbiased spatial voting, the model is somewhat restrictive. In particular, it is assumed that all voters employ the same policy weight in forming their utility for each candidate and that the partisan bias terms are the same for all voters within each partisan grouping. To the extent that different types of voters vary in their reliance on either policy or partisanship in their voting behavior, the conclusions of the basic model presented above may be misleading.

We may also expect the spatial utility model to apply differently based on voters' levels of political information. Less informed voters, for example, may lack the basic political knowledge to make decisions based on candidates' actual policy positions and may instead rely on the cue of partisanship. More informed voters may be more able to form perceptions of the policies supported and opposed by each candidate and to compare these positions with their own issue preferences, allowing for stronger spatial voting. Furthermore, voters from different partisan groups may vary in their use of policy in their voting behavior with partisans and independents using different policy weights to calculate the utility they would derive from each candidate. Because of these considerations, I expand the basic model discussed in the previous section to allow the partisan bias terms b_{ik} to vary across respondents' level of political information and the policy weight term a to vary by both information level and partisanship. This more flexible model will allow us to investigate whether these voters of differ in their use of spatial voting.

Expanded Model Specification

The expanded model begins with the same ideal point model presented in equation (8), measuring the ideological positions of survey respondents on the same scale as those of Obama and McCain using their positions on the survey's set of policy proposals. In addition to measuring the ideology of respondents, we also need to obtain reliable measures of their level of political information. To this end, the survey asks respondents five questions related to their knowledge of American politics. These questions follow the suggestions of Delli Carpini and Keeter (1993), measuring knowledge of Dick Cheney's office, the Supreme Court's responsibility for judicial review, the required majority for a veto override, current party control of the House and which political party is more conservative.

I employ an item-response model of the same form as the ideal point model above to measure each respondent's level of political information based on her

responses to these information questions. Here, instead of measuring positions on a liberal-conservative ideological spectrum, the model estimates each respondent's level of political information. Those with higher levels of information are more likely to answer questions correctly. For each respondent i and political information question j, we have

$$P(q_{ij} = 1) = \Phi(\rho_j info_i - \omega_j), \tag{10}$$

where $q_{ij} = 1$ if the respondent answers correctly and and $q_{ij} = 0$ otherwise. Here ω_j and ρ_j are question-specific "difficulty" and "discrimination" parameters.

Finally, the model estimates a probit regression, expanding on the specification in equation (9). This new regression equation includes respondents' level of political information $info_i$ as a predictor and also adds an interaction term between respondents' political information level and ideal point x_i. Furthermore, all coefficients in this presidential vote choice stage of the model are allowed to vary by respondents' party identification, estimating separate coefficients for Democrats, independents, and Republicans. For each voter i, we model their vote probability as

$$\begin{aligned} &P(v_i = \text{"McCain"}) \\ &= \Phi(\beta_{0,pty(i)} + \beta_{1,pty(i)} x_i + \beta_{2,pty(i)} info_i + \beta_{3,pty(i)} x_i info_i). \end{aligned} \tag{11}$$

Under this expanded version of our model, again identifying the ideal point scale to place Obama and McCain at $-1/4$ and $1/4$, respectively, we now have the following correspondence between the parameters of our utility-based voting model and the probit regression coefficients in equation (11) for a respondent with party identification $pty(i)$ and political information level $info_i$:

$$\begin{aligned} \delta_i &= \beta_{0,pty(i)} + \beta_{2,pty(i)} info_i \\ a_i &= \beta_{1,pty(i)} + \beta_{3,pty(i)} info_i. \end{aligned} \tag{12}$$

In other words, we are now allowing the partisan bias terms δ_D, δ_I, and δ_R to vary by respondent political information level. Furthermore, we also allow the policy weight term a to vary by respondents' information level and party identification, whereas the policy weight was assumed in the previous specification to be the same for all respondents.

As in the previous model above, this model is estimated using a modified version of the Gibbs sampler that allows information about respondent ideal points and now respondent political information levels to inform estimates of the probit regression coefficients in equation (11), but prevents respondents' presidential vote choices from affecting their estimated ideal points or political information levels. A burn-in period of 10,000 iterations is run and the following 200,000 iterations of the sampler are stored for inference. All parameters are given vague normal priors with mean zero and variance 100 and the ideal point and political information scales are left unidentified. The results are postprocessed in order to impose the identifying restrictions that the ideal point locations for Obama and McCain are at $-1/4$ and $1/4$, respectively, and that respondents' political information levels have mean zero and variance one, with higher values indicating more informed respondents.

Results of Expanded Model

Table 3 shows the resulting coefficient estimates for the expanded model. The ideal point estimates are the same as those estimated in the simpler model above because the model is again estimated by cutting the feedback from vote decisions into estimated ideal points and information levels as described above. The intercept terms give the predicted latent scale values for Democrats, independents, and Republicans with average levels of information. We see that, just as the previous model's estimates imply, Democratic and Republican voters with average information levels are strongly biased toward their party's candidate even after controlling for their ideological positions. Independents of average information levels, on the other hand, seem to have little or no bias at all in this respect. Their voting decisions do not seem to systematically favor either candidate. In other words, independents of average information levels are estimated to be unbiased spatial voters.

The coefficient on respondent ideology, $\beta_{1,pty(i)}$, provides an estimate of the policy weight a_i for respondents of a given party who have average political information levels. We see that voters of all three party identifications show a strong reliance on policy in making their voting decisions. Furthermore, these estimated coefficients are all of somewhat similar size.[13] The next question is what role political information plays in the process of policy voting. The

[13]The posterior probabilities that each coefficient on ideology $\beta_{1,pty(i)}$ is the largest one are .36 for Democrats, .54 for independents, and .10 for Republicans. The relative lack of precision in the estimate for independents is likely due to the fact that independents make up less than 12% of the sample.

TABLE 3 Expanded Spatial Utility Model Parameter Estimates

	Presidential Vote Equation Estimates		
	Democrats	**Independents**	**Republicans**
Intercept ($\beta_{0,pty(i)}$)	−1.07 (−1.66, −.51)	−.02 (−.83, .81)	1.23 (.54, 1.90)
x_i ($\beta_{1,pty(i)}$)	3.38 (1.02, 5.94)	4.36 (.91, 8.25)	4.02 (1.32, 7.09)
$info_i$ ($\beta_{2,pty(i)}$)	.12 (−.21 .45)	.05 (−.39, .50)	.06 (−.30, .41)
$x_i info_i$ ($\beta_{3,pty(i)}$)	1.51 (.08, 3.21)	1.44 (−.99, 4.33)	1.01 (−.94, 3.29)

main effect of information, shown by the estimates for $\beta_{2,pty(i)}$, seems to be fairly small for all three party identification groups. Because of the scale of these information measures, these coefficients estimate the effect on the probit scale for vote choice of moving one sample standard deviation on the ideology scale. These values are all quite small relative to the model's other coefficients and the credible intervals for all of these coefficients overlap 0, implying that the value of the nonpolicy bias δ_i shown in equation (12) is largely unchanged by political information.

There is, however, some evidence that higher information levels tend to increase the importance of policy considerations in voters' decision making. As seen in equation (12), the policy weight a_i for an individual i is estimated as $\beta_{1,pty(i)} + \beta_{3,pty(i)} info_i$. Because $\beta_{3,pty(i)}$ is estimated to be positive for all three party identification groupings, we see that higher information levels appear to be associated with a stronger reliance on policy in making vote choices. While the highest posterior density regions for $\beta_{3,pty(i)}$ overlap zero for independents and Republicans, there is still relatively strong evidence that these values are positive. The posterior probabilities that these coefficients are greater than 0 are .99, .90, and .87 for Democrats, independents, and Republicans, respectively.[14]

While we are interested in the actual parameters of the spatial utility model of voting, it is also informative to examine the vote probabilities implied by these parameter estimates for various classes of voters. Figure 3 displays these predicted probabilities, plotted separately for low-, medium-, and high-information respondents which are defined as those at the .05 quantile, mean, and .95 quantile of the sample distribution for estimated political information. Among low information respondents, we see that the relationship between ideology and vote probability is relatively flat, particularly for partisans, over the typical range of respondent ideal points within each group. Furthermore, there are very large differences between the vote probabilities of low-information Democrats, independents, and Republicans at similar ideological positions. Overall, vote choice among low-information citizens seems to be determined principally by party identification, with only a minor influence from policy views.

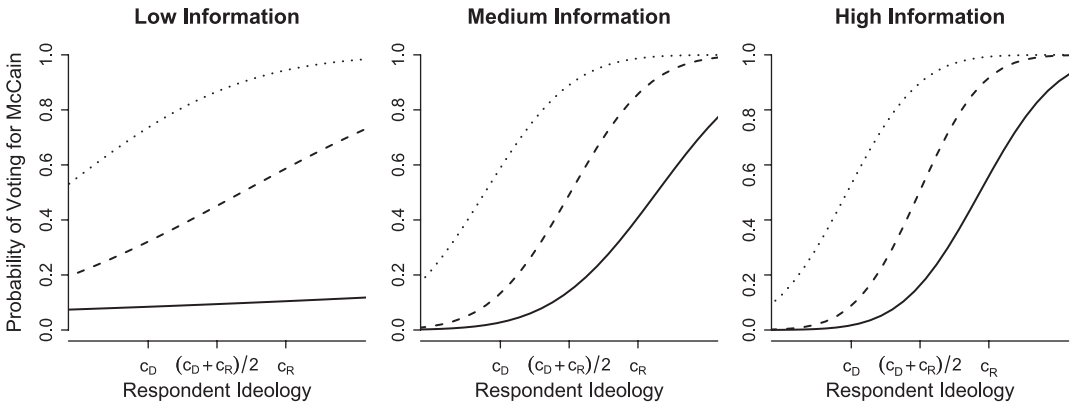
Medium-information respondents, by contrast, show much steeper relationships between their ideological position and vote probabilities. While there are still fairly large discrepancies between Democratic, independent, and Republican respondents, these differences are much smaller than those for low-information respondents. Although the degree of partisan bias δ_i is estimated to be similar across information levels for each party identification grouping, we do see that the larger policy weight counteracts these biases, significantly reducing their impact on the probability scale and pulling the behavior of partisans closer to that of independents, as information levels rise.

Finally, moving to high information respondents, we again see that the differences between partisans with similar ideologies are reduced and the relationship between policy views and vote probability is steeper. This stronger relationship corresponds to the larger policy weight used by highly informed voters. It is still the case, however, that large differences in behavior exist between Democrats, independents, and Republicans with identical policy views even among the most informed citizens.

In all three sets of plots from Figure 3, we can examine the behavior of hypothetical voters whose policy views fall at the midpoint between the two candidate, making them equally close in ideological terms to Obama and McCain. In each of these plots, we clearly see that for respondents with this

[14]The fact that independents make up a smaller portion of the sample than partisans of either side and that the variance of political information is smallest among Republicans likely contribute to the larger degree of uncertainty about the estimates for $\beta_{3,pty(i)}$ for these two groups.

FIGURE 3 **Predicted probabilities of voting for McCain as a function of respondent ideal point for Democrats, independents and Republicans indicated by solid, dashed and dotted lines respectively, based on the parameter estimates for Equation 11 shown in Table 3 for low, medium and high information voters defined as the .05 quantile, mean and .95 quantile of the sample distribution of information level respectively. Estimated positions of Obama, McCain and the midpoint between the two candidates are noted as c_D, c_R and $(c_D+c_R)/2$.**



ideological location, Democrats show very high probabilities of voting for Obama, while Republicans are extremely likely to vote for McCain. Partisans, then, exhibit significant spatial bias in their voting across all levels of political information. Independents, by contrast, have roughly equal chances of voting for either candidate when they hold policy views midway between these two options. Low-, medium-, and high-information independents are estimated to have .45, .49, and .51 probabilities, respectively, of voting for McCain. This implies that while the precision of the spatial voting rules used by independents increases significantly with with higher levels of political information, independents at all information levels appear to be using unbiased or approximately unbiased spatial voting rules in making their vote choices.

It should also be noted that the overall results of this model are essentially unchanged when voter information levels are measured using respondents' perceptions of Obama and McCain's positions on each of the 10 issues used in the survey. On average, respondents were able to correctly identify just over 14 out of these 20 issues (approximately 70%), with nearly half of respondents able to correctly guess at least three-quarters of these positions. Therefore, whether political information is measured in general terms using broad questions about the government and political environment or with regard to knowledge of specific issue stances by candidates, more informed voters seem to discriminate more precisely based on their policy views relative to the positions taken by candidates.

Discussion

While the spatial theory of voting behavior has been highly influential, contributing many important insights and results, testing its basic assumptions has proven difficult with traditional survey data and statistical techniques. In particular, obtaining valid measures of citizen ideology on the same scale as candidate positions has generally not been possible, causing researchers to rely on strong assumptions and indirect proxies. By obtaining measures of respondents' policy views on specific measures for which we know the candidates' positions, this study is able to directly examine the foundational assumptions of spatial voting theories. The results of these analyses provide general support for the spatial framework, but also suggest that factors such as partisanship and political information have important moderating influences on the conduct of spatial voting.

In general, policy views exert a strong influence on citizens' voting decisions. The influence of partisanship, however, is also strong. Voters are pushed systematically toward selecting candidates from their own party above and beyond their ideological proximity to each candidate. As levels of political information increase, voters rely more strongly on policy views in making their voting decisions, with low-information voters showing relatively flat relationships between policy views and vote probabilities, tending to vote mostly based on their party identification. Across all levels of political information, the behavior of independent voters corresponds strongly with the predictions

of unbiased spatial voting. By contrast, Democrats and Republicans, even at the highest information levels, show large amounts of spatial bias toward their party's candidate. While these biases become smaller in magnitude as information levels rise, significant amounts of bias remain even among the most informed voters.

This article has also shown, consistent with the work of Ansolabehere, Rodden, and Snyder. (2008) and others, that ideology is a powerful determinant of vote choice even after controlling for party identification. In fact, ideology by itself explains nearly as much variation in vote choice as does party identification, which is all the more impressive given that ideology is measured here with considerable uncertainty for each individual voter.[15] Beyond establishing that "ideology matters," however, this article has shown that the actual form of the relationship between ideology and vote choice is consistent with the assumptions of spatial voting models for a broad class of voters and that spatial voting models incorporating partisan bias terms can describe quite accurately how voters' ideological beliefs determine their vote choices.

This article has also extended and reinforced the analysis of the 2004 presidential election presented in Jessee (2009), providing a direct link between the unknown parameters of the spatial voting model and estimates of probit models of vote choice. The analysis presented here of the 2008 presidential election, in which many factors combined to produce what was generally thought to be a significant advantage for the Democratic candidate, provides an even stronger demonstration that independent voters show little or no spatial voting bias. Even on what might be called an "uneven playing field" for the two candidates in 2008, independent voters show no evidence of being biased toward either candidate. While the results from one or two elections may not be enough for strong conclusions, this provides some suggestion that valence politics may not play a significant role in presidential elections.

Overall, the findings presented here reaffirm the utility of the general spatial voting framework. A significant portion of the electorate—independent voters—cast their ballots in a manner indistinguishable from the predictions of unbiased spatial voting theory. While those with less political information show lower amounts of precision in their decision rules, more informed independents are able to discriminate rather precisely between the two choices presented to them. Partisan voters do employ a spatial logic in their voting decisions, but also display strong biases toward the candidate from their own party even in situations in which the other party's candidate is ideologically closer to their own position. Although these partisan biases decrease as information levels rise, they are still relatively strong among even the most politically informed voters. These findings suggest that elections scholars as well as those who study candidate behavior should consider the consequences of spatial voting models with partisan biases as well as the assumption that decision rules are strongly influenced by voters' political information levels.

[15]The percent of vote choices correctly predicted by probit models using ideology and party identification alone are 87.8% and 89.6%, respectively, with pseudo R^2 values of .559 and .567.

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