Norman Schofield · Gonzalo Caballero · Daniel Kselman *Editors*

Advances in Political Economy

Institutions, Modelling and Empirical Analysis

This book presents latest research in the field of Political Economy, dealing with the integration of economics and politics and the way institutions affect social decisions. The focus is on innovative topics such as an institutional analysis based on case studies; the influence of activists on political decisions; new techniques for analyzing elections, involving game theory and empirical methods.

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constituent preferences are the only factor that exerts statistically significant influences on roll-call votes, while in heterogeneous states constituent preferences are but one of several influences. To the extent that heterogeneous states tend to be more electorally competitive at the presidential level, the Bailey and Brady findings imply that we will observe equal or greater divergence between Democrats' and Republicans' roll-call records in competitive states, than in non-competitive states—a pattern that fits our empirical finding that partisan polarization tends to be as large or larger in competitive districts. And with respect to candidate positioning, Bishin et al. (2006) report empirical analyses that the ideological positions of senate candidates from rival parties were no more similar when these candidates faced off in an election held in a heterogeneous state, than when the election was held in a homogeneous state.[30] This finding is again consistent with our results.

In sum, in this paper we have analyzed how the degree of ideological polarization between the parties in the House and the Senate varies as a function of district ideology, defined in terms of Democratic presidential support in the district. Consistent with previous research, we find that representatives' roll-call voting records reflect their district and their party. However, and we believe of greatest interest, we also find that as great or greater ideological difference between the winners of the two parties occurs in districts that, in presidential support terms, are the most competitive.

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A Heteroscedastic Spatial Model of the Vote: A Model with Application to the United States

Ernesto Calvo, Timothy Hellwig, and Kiyoung Chang

1 Introduction

How do candidate policy positions affect the citizen's vote choice? For over 50 years scholars in political science have built on the standard spatial model inherited from Black (1958) and Downs (1957), where voters assess the relative distance between their own preferred policies and the expected policies to be implemented by competing candidates. The greater the difference between the preferences of the voter and policies of the candidates, the lower the utility the voter derives from selecting them at the polls.

The building blocks of all spatial models of voting are similar: firstly, voters *know* their preferred polices. It may be the case that such preferences are misguided and lead to suboptimal outcomes. But voters know what they want and can compare said policy preferences to those of each of the candidates. Secondly, voters *know* the revealed policy preferences of the candidates. They may use informational shortcuts to assess candidate preferences; they may have imperfect information about likely

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policy choices; and they may even have very biased views of the policies that different candidates will eventually implement. But voters nonetheless make rational decisions by comparing their perceived distance to the candidates using the available information. And thirdly, preferences are assumed to be transitive and single-peaked, allowing our models to produce sensible theoretical social choice results. While not made explicit in most research, single-peaked preferences are drawn with the assumption that the metric of distances in the policy space are identical for all actors involved. That is, if two parties in the same policy location move, say, to the left a given distance, voters use the same metric to measure this change for both parties.

But what if voters have different perceptions of the movement of parties in the policy space? What if when two parties move, say, to the left in the policy space voters perceive a more dramatic change in one compared to the other? In other words, what if voters have different metrics when assessing their relative distance to different parties? In this chapter we will relax this fundamental assumption of standard spatial models of voting and allow voters to *stretch* or *compress* the policy space measuring the distance from their preferred policy location to that of different parties and candidates. To this end, we propose here a *heteroscedastic spatial model of voting*, where the perceived distance from voters to parties is systematically altered by information effects.

Our emphasis on informational biases is directed at observed inadequacies in the existing research on spatial models of the vote. Previous research has shown that "voters may misestimate the policy platforms of candidates or parties either out of ignorance or in a fashion which reflects systematic bias" (Merrill et al. 2001, 200). In particular, respondents tend to overstate the reported proximity to parties which they intend to vote for as well as the distance between themselves and parties which they will not vote for (Granberg and Brent 1980; Granberg and Jenks 1977; Haddock 2003). These biases are not trivial and in many cases contribute adversely to the predictive accuracy of spatial models. Empirical tests of proximity voting often find smaller than expected statistical effects and yield attenuated parameter magnitudes, even if most analysis validate the general tenants of the theory. Furthermore, equilibrium positions for parties are often attenuated, resulting in models that overestimate centrist positions of parties and candidates. Attenuation biases give rise to theoretical problems when trying to ascertain the "correct" location of candidates in policy space and, hence, when testing spatial models of voting under *misreported* proximity. Attenuated proximity estimates and centripetal biases are but one of many puzzles confronting scholars in recent years, as more extensive empirical testing falsifies the theoretical validity of spatial models of voting (e.g., Adams and Merrill 1999; Iversen 1994; Rabinowitz and McDonald 1989).

Attempts have been made to address the problem. Adams et al. (2005), for example, propose a "discount" model in which a weight is assigned to recalibrate the effect of proximity. Others have augmented existing spatial model to include behavioral factors (Erikson and Romero 1990) and information in regards to the candidates' non-policy appeals (Sanders et al. 2011). Scholars also have looked to the effect of political institutions, suggesting that centripetal biases are moderated

through the consideration of the distribution of power across party actors (Kedar 2009). Electoral rules have also been shown to alter the incentives facing political parties (Calvo and Hellwig 2011) and the voter's perception of party locations (Dahlberg 2012). More fundamentally, others posit alternative non-proximity models for how party and candidate policy positions enter the vote calculus (Macdonald et al. 2001). Many argue that these solutions improve on traditional proximity models. Yet others have used experimental designs to show that proximity voting rules are, in fact, more commonly employed than discounting or directional models (Tomz and van Houweling 2008; see also Lacy and Paolino 2010).

In this chapter our goal is to confront the observed systematic biases in the reported locations of parties and candidates. Working within the standard spatial model of Black and Downs, our emphasis is how information biases contort voter perceptions. The solution we propose allows the analyst to model *how information biases alter the shape of the policy space used by voters to assess their proximity to candidates.* Our model *allows us to alter the perceived distance between the voter and the candidate, allowing the policy space to contract or expand as a function of a variety of covariates*.

The chapter proceeds as follows. The next section elaborates on information biases and how they are reflected in how voters place candidates in policy space. We use data from the 1992, 1996, and 2008 American presidential elections to illustrate the magnitude of these information biases. As a motivating example, we draw from the field of optics and conceive of these biases in terms of ideological lensing, or *magnification*. We provide a naïve estimate of the degree of magnification in the voters' perceived ideological distance from themselves to the candidate. Finally, we propose a heteroscedastic proximity model of voting where magnification is estimated as a function of behavioral and candidate specific covariates. Section 4 reports results of estimating the effect of ideological proximity on vote choice—with and without correcting for magnification—using data from three U.S. presidential elections. Section 5 concludes.

2 Voting with Biased Perceptions of Candidate Positions

Despite decades of research, the literature on how voters decide remains divided by a conceptual gulf. On the one hand, researchers have developed a rich set of models to explain how rational voters make decisions by measuring their relative *proximity* to the policies proposed by candidates and parties. On the other hand, a large body of research shows that voters are ignorant—rationally or not—about politics and, more to the point, the preferences of political candidates running for office.

Contending models of voting differ in important ways. Spatial proximity models assume that voters select among candidates by minimizing the distance from their ideal policy outcome to that proposed by each candidate (Downs 1957; Enelow and Hinich 1984). A competing school argues that voters are motivated by conviction and prefer candidates that take on more extreme positions (Rabinowitz and McDonald 1989). Finally, a third group of scholars argue that voters also make decisions

based on valence-issues, with candidates or parties building a reputation for performance rather than positions (Stokes 1963). Each of these approaches assumes that voters know something about the characteristics of competing candidates for office—be it in terms of policy positions, policy extremity, competence/reputation, or some combination thereof.

The research on political knowledge and voter choice naturally calls into question the validity of said proximity based models of vote choice. Indeed, there is a vast American and comparative literature documenting information deficits and political naïveté among voters. Describing voters' abilities to assimilate candidate positions in summary terms, Converse (1964) succinctly argued that Americans are "ideologically innocent." He showed that very few people could meet the criteria of voting on the basis of a liberal-conservative (or left-right) scale. In his seminar work on public opinion formation, Zaller (1992) largely echoed Converse's view. While the typical voter may know something about politics, such knowledge tends to be shallow and ephemeral. As Zaller (1992, 16) puts it, "a majority pays enough attention to public affairs to learn something about it. But even so, it is easy to underestimate how little typical Americans know about even the most prominent political events—and also how quickly they forget what for a time they do understand." This view certainly calls into question the average American's ability to cast a vote based on candidate positions on one or a set of issues.[1]

There is much evidence in existing survey data to support this more pessimistic view of voters' ability to discern and correctly use information about parties and candidates when making their decisions. Survey respondents differ in predictable ways when reporting the location of parties in the ideological space. Respondents with very different political leanings consistently overestimate their distance to parties with which they do not identify as well as the ideological distance to parties they do not expect to vote for (Adams et al. 2005; Bartels 1988; Page 1976).

As an example of this phenomenon, consider voter choice in the 1980, 1996, and 2008 U.S. presidential elections. In Fig. 1 we plot respondent placements of the two major party candidates in each of these elections. The graphs illustrate how respondents' self-placements affect their view of where the candidate is located in policy space. Take as example the task of placing the Democratic Party's candidate in 2008, Barack Obama. When asked in to place Obama on the 1–7 liberal-conservative scale, a self-identified "extremely conservative" respondent (scored 7 on the scale) places Obama around 6 (5.8) on the scale if she intends to vote for Obama. A similarly conservative respondent places Obama at less than 2 (1.7) if she instead planned to support another candidate. This can be taken

[1] The authors of *The American Voter* (Campbell et al. 1960) laid out such criteria for voting according to issue position. These include the ability to cognicize the issue in some form (generally interpreted as have an opinion on the issue), to perceive where the candidates stand on it, and to see a difference between them. To this list, Abramson et al. (2009) add that voters must see the positions of the relevant parties or candidates (approximately) correctly if they are to make reasonable decisions.

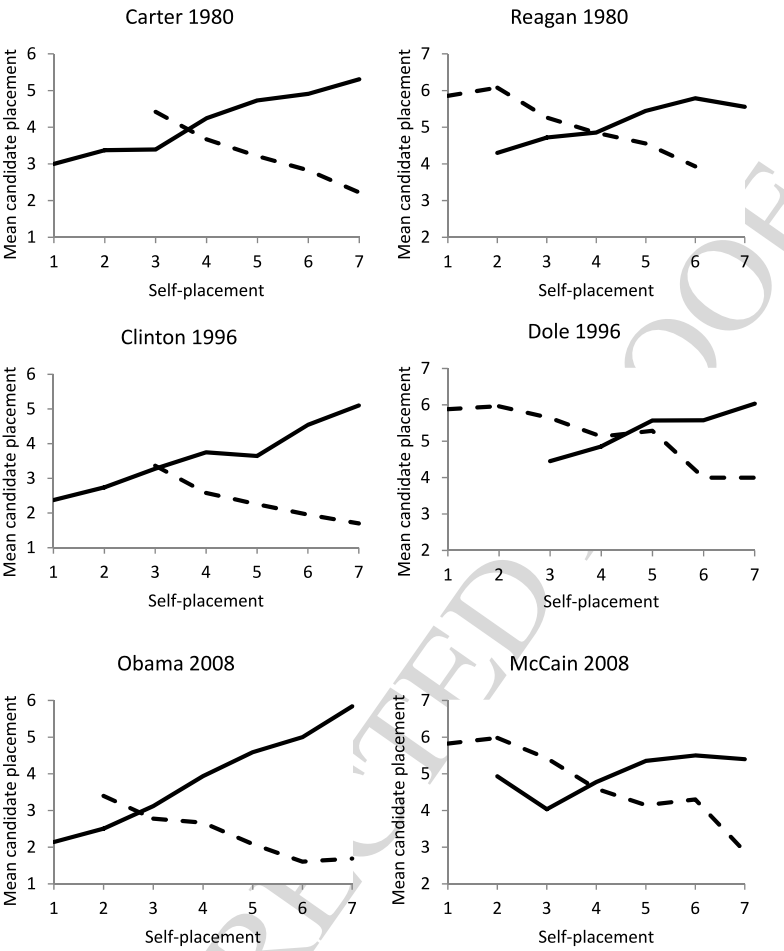

Fig. 1 Mean candidate placements versus self-placements, U.S. 1980, 1996, 2008. Notes: *Solid lines* report mean candidate placements among candidate supporters, *dashed lines* report mean candidate placements among non-supporters. Means with 10 or fewer respondents not reported. Source: American National Election Studies

as strong evidence of projection effects: party supporters systematically locate the party closer to their own ideal point, while non-supporters place the party further away.[2]

[2]These biases are not strictly an American phenomenon. For example, British election studies data from 2005 show that when asked to place the Conservative Party on the left-right scale, a voter located on the far-right of the left-right scale identify the Party as very conservative, at approximately 9 (8.9) 0–10 point scale if she voted for one of its candidates. A similarly conservative voter will perceive the Tories as very liberal—at 2.2—if she voted against the party (see Calvo et al. 2012). See also Adams et al.'s (2005, Chap. 10) analysis of survey data from France, Norway, and Britain.

We might surmise that such biases due to assimilation and contrast effects shape how voters make use of candidates' placements when making their decision (Adams et al. 2005; Granberg and Brent 1980; Granberg and Jenks 1977; Merrill et al. 2001). As we show in the next section, this picture implies that individual, candidate, and contextual factors may *stretch* or *compress* the policy space, altering the perceived distance between the voter and the candidates. Our contribution in this chapter is to provide a means to model and assess the factors that contribute to what we term *magnification*: the curving of the policy space in response to information. In the next section we propose a novel way to incorporate assimilation and contrasting biases into a spatial model of candidate choice.

3 A Motivating Example to Describe *Magnification* (Assimilation and Contrast) in Policy Distances

Let us begin with a motivating example for our heteroscedastic spatial model of voting. The intuition comes from the field of physics, which has developed an extensive literature on *gravitational lensing*: i.e., the effect that matter exerts on a beam of light from a background source as it travels across the space towards an observer. The curving of a beam of light passing through a lens alters the perceived location of the background source while revealing information about the distribution of matter in space. Such altered perceptions apply to politics as well. When it comes to elite-mass communications, the perceived policy position of a political representative is shaped by the location of the observer—the observer here being the voter. Drawing from an extensive literature on information bias, we describe similar lensing effects in the perceived location of parties in the ideological space.

Let us assume that all voters see the location of a party through a *convex* lens that projects an "image" of the location of the party that differs from its actual location. While we expect all voters to observe the party in a single "true" location in the ideological space, spherical aberration[3] shifts the view of observers so that the image of the party appears closer or further away from its true location. When voting **for** a party, the *focal point* of the object (party or candidate) falls *behind* the object, which appears closer than it should. When voting **against** the party, the *focal* point appears ahead of the object, which is projected further away than it should. We might think of the first of these cases as one where the voter is farsighted (unable to focus at a distance); in the second case the voter is nearsighted.

Just as individuals correct their eyesight with lenses, we can speculate that there is a graduation of this lens which explains the degree of optical aberration in ideological distances. The curvature of this lens can be approximated by a large number

[3] A convex lens suffers from spherical aberration when light transmitted through the lens fails to converge to a single point. This is known in optics as hyperopia or, more commonly, as farsightedness.

of different functions, but for the sake of our example we can use a simple parabola (e.g. a quadratic approximation) estimating the convexity of lenses or the projection of a ray of light on a parabolic mirror.

As an illustrating example, let us use the case of the Republican Party in the U.S. In the model L_{iR} describes the reported location of the Republican Party by respondent i. The self-reported ideological position of the same respondent is given by x_i. The quadratic approximation is thus

$$L_{iR} = a + bx_i + cx_i^2. \tag{1}$$

We can center the convex lens of the Republican Party at its projected axis; that is, where there exists an individual x_i^* that observes the "true" location of the Republican Party, designated L_{iR}^*, from a position perpendicular to the principal ideological axis on which the N respondents—each with a different image of R's position—are arrayed. This allows us to set $L_{iR}^* = x_i^*$. With this equality, we can use (1) to solve for x_i^*. The solution is

$$L_{iR}^* = x_i^* = -\frac{1}{2}\frac{-1 + b + \sqrt{1 - 2b + b^2 - 4ca}}{c}. \tag{2}$$

When voting for the party, all respondents $x_i \neq x_i^*$ observe images that are either closer to or further away from $L_{iR} \neq L_{iD}^*$ for every $x_i \neq x_i^*$, e.g. magnification.

We can describe this *magnification* (M) of the mirror that i attaches to R as:

$$M_{iR} = \frac{(x_i - L_{iR})^2}{(x_i - L_{iR}^*)^2}. \tag{3}$$

Note that magnification is defined as the ratio of two quadratic (Euclidian) distances: the distance from the voter's position and her perception of the candidate's position, and the distance from the voter's position to the "true" location of the party. We can think of the first of these as "reported distance" and the second as "true distance." Thus, when $M > 1$ we have a lens that *stretches* ideological, distance and when $M < 1$ the effect of the lens is to *compress* ideological distance. Moreover, if we had information to explain the degree of magnification in reported data, we could also estimate the "true" rather than the reported distance from the voters to the candidates.

$$\left(x_i - L_{iR}^*\right)^2 = \frac{(x_i - L_{iR})^2}{M_{iR}}. \tag{4}$$

While there are many different functional forms that can be used to estimate biases in the perceived location of parties, the previous example serves two purposes. First, it provides the intuition for how we might link lessons from physics to models of voter choice. And second, it provides a point of departure to estimate assimilation and contrast in proximity models of voting.

4 A Heteroscedastic Proximity Voting Model

The existing literature on assimilation and contrast has shown that reported proximity to parties is different for respondents that expect to vote for or against a party. We can go one step further and argue that a number of covariates will explain assimilation and contrast, compressing and stretching ideological distances as described in (4). Indeed, let us assume that magnification is the result of information processes that can be explicitly modeled with covariates.

As it is commonly done when estimating heteroscedastic discrete models (e.g., models in which the variance component is explained by covariates such as heteroscedastic probit models, negative binomial, etc.), we can assume that the level of magnification in ideological proximity can also be itself a function of other covariates. We can therefore use a placeholder parameter θ_{iR} in lieu of our magnification term, which will be used to assess the effect of variables that induce magnification:

$$\mathrm{U}(\mathrm{V_R}) = -\alpha \frac{(x_i - L_{iR})^2}{\exp(\theta_{iR})} + \mathbf{BZ}. \tag{5}$$

In (5) we have substituted the angular magnification estimate with the exponentiated parameter θ_{iR}, so that $\log(\theta_{iR}) \sim N(\mu_\theta, \sigma_\theta^2)$. Notice that if all covariates for the magnification equation have no effect, the $\exp(0) = 1$, and (5) will be reduced to the standard proximity model.

As in the case of a heteroscedastic choice model (Alvarez and Brehm 1995), the expression in (5) has the desirable feature of allowing us to model the variance as a linear function of a set of covariates. Yet different from a heteroscedastic model, the variance is only rescaling the ideological proximity measure. The second component of the model, **BZ**, is a vector of individual-specific controls which are unaffected by the covariates for the magnification. Since the variance applies only to distance, we label this a *heteroscedastic proximity model*.

By explicitly modeling the magnification in the ideological scale, (5) provides a means for testing arguments about which factors, both individual and systemic, shape the voter's capacity to "see clearly." In particular, this representation provides a novel way to bring in different candidate and voter attributes into the spatial model of the vote and, hence, gives us a strategy for incorporating those factors discussed in the introduction: non-proximal (directional) spatial components, candidates' valence characteristics, and voter attributions. Let's consider each of these in turn.

First, take directional effects. Directional models provide an alternative conception of how voters incorporate information on party positions. First proposed by Rabinowitz and McDonald (1989), the directional model has long been the chief rival to the proximity model from *within* the spatial modeling tradition. Like the Downsian proximity model, the directional model posits that voters obtain utility from candidates' positions on the issues. This utility is not gained by minimizing proximity but is a positive function of the candidate's distance from the voter. Specifically, when candidates are on opposite sides of the neutral point, N, directional voters prefer the candidate who advocates their side. In the context of American politics, voters select the larger from $(x_i - N)(L_{iR} - N)$ and $(x_i - N)(L_{iD} - N)$.