Public Choice **78**: 23–41, 1994.

A spatial analysis of winning and losing motions in the U.S. Senate 1979–1981

KEITH T. POOLE

Graduate School of Industrial Administration, Carnegie Mellon University, Pittsburgh, PA 15213

RICHARD A. SMITH

Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh, PA 15212

1. Introduction

In legislative settings, the sponsors of policy alternatives confront a dilemma: the policy alternatives that they most prefer may not attract enough support to win. Instead, sponsors may have to compromise their preferred positions if they hope to see some version of their desired policy enacted into law. This dilemma is well recognized in the U.S. Congress by those who spend their days advocating and making policy. Indeed, a common assumption is that the dilemma is pervasive throughout the Congressional process. Sponsors are generally assumed to confront the dilemma whenever they seek to formulate winning alternatives. Congressional politics is often defined as "the art of compromise"; and politicians often draw the distinction between principle and expediency.

Despite the familiarity of the dilemma, there has been little systematic investigation of how often sponsors actually confront it and how they resolve it. In particular, three sets of related questions remain largely unexamined. They are:

1) In what ways do the formulations of legislative alternatives that win differ from those that lose? Do losing alternatives more closely reflect the versions of the alternatives most preferred by the sponsors?
2) To what extent is a strategy of compromise necessary for formulating winning legislative alternatives? Are there circumstances under which sponsors need not compromise their most preferred versions of the alternatives and still win? How often do these circumstances arise? When sponsors do compromise, what kind of compromises do they offer?
3) In what ways do the formulations offered by majority party leaders differ from those offered by non-leaders? In particular, do leaders offer motions that more closely reflect the prevailing sentiments of their party than do non-leaders?

The investigation of these questions is the major task of this paper.

There are two major obstacles to any investigation of these questions. First, the version of the alternative most preferred by the sponsor must be identified. Second, the relationship of this preferred version to the version of the alternative actually offered by the sponsor must be established. We propose to overcome these obstacles by showing that a simple policy space underlies many of the voting decisions of Congress and that legislative alternatives and members of Congress can be located in this space in ways that successfully account for many of the roll call voting decisions of the members. The member locations are indicators of the ideal points or most preferred positions of the members in the policy space. Hence, when members sponsor legislative alternatives, the member locations can serve as indicators of the locations of those versions of the alternatives most preferred by the sponsors. In turn, the locations of sponsors can be compared with the locations of the alternative actually offered to establish the relationship between the preferred and actual versions of the legislative alternatives. The result is that a comparison of the locations of alternatives and the locations of sponsors can provide considerable insight into the questions raised above.

This paper investigates the relationship between these locations. The analyses center on the legislative motions offered by members of the U.S. Senate in 1979, 1980, and 1981. The remainder of this paper is divided into two major sections. In Section 2, a spatial model of Congressional voting is outlined and the NOMINATE scaling method developed by Poole and Rosenthal (1985, 1991) for estimating it is discussed. NOMINATE produces estimates of the spatial locations of the sponsors as well as the legislative alternative they offer.

The spatial model we outline below is not intended to be descriptive of the actual decision processes of the senators. Those processes are far more complex than those suggested by a spatial model. They include such processes as developing interpretations of the consequences of legislative votes (Smith, 1984, 1989; Fenno, 1986; Lau, Smith, and Fiske, 1991), taking cues from trusted colleagues and staff assistants (Kingdon, 1981; Matthews and Stimson, 1975), making calculations about whether a vote is explainable at home (Fenno, 1978; Kingdon, 1981), and relying on previous voting histories (Asher and Weisberg, 1978). The spatial model is a way of summarizing the *results* of these complex decision processes, thereby revealing the substantive structure of the roll call decisions.

In Section 3, the formulation of the legislative alternatives is investigated by examining the relationship between the locations of alternatives and the locations of their sponsors. It is here that the central questions of the paper are explored. We investigate the extent to which the locations of winning and losing legislative alternatives reflect the locations of their sponsors and the extent to which sponsors must compromise their most preferred locations in order to

formulate winning alternatives. In addition, special attention is given to identifying the circumstances under which sponsors can formulate winning alternatives without compromising. Finally, the formulations of majority party leaders are contrasted with those of non-leaders. The aim of these analyses is to identify the formulation strategies that sponsors follow when they win and lose.

2. A spatial model of senate voting

The spatial model we employ draws upon the work of Ordeshook (1976) and Hinich and colleagues (Hinich and Pollard, 1981; Enelow and Hinich, 1984). The key concept of the model is that of *constraint* (Converse, 1964). We assume that the positions that a senator takes on the issues confronting him or her during a typical session are systematically related. If we know a senator's position on a small set of issues then we can confidently forecast that individual's position on the remaining issues. For example, if a senator opposed the Gulf War resolution and favors an increase in spending for food stamps, we can be fairly confident in predicting that the senator supported the 1991 Civil Rights Act. More formally, suppose each issue considered by the Senate can be represented by a single dimension and each senator has a most preferred position on each issue which is represented by an *ideal point* on the issue dimension. Thus, senators are represented as vectors in this multidimensional issue space. Furthermore, suppose that each roll call vote on a legislative motion has two policy outcomes, one corresponding to "yea" and one corresponding to "nay" that can be represented as vectors in the multidimensional space of issues. If we also assume that senators have symmetric, unimodal utility functions over the multidimensional issue space and vote for the roll call alternatives nearest them in the space, then we have the classic Davis-Hinich (Davis and Hinich, 1966; Davis, Hinich, and Ordeshook, 1970) spatial model. The assumption of constraint in the context of this model means that the senator/roll call outcome vectors lie on a low dimensional hyperplane (the basic space [Ordeshook, 1976] or the *predictive dimensions* [Hinich and Pollard, 1981]) through the multidimensional issue space. If the basic space were m-dimensional, these assumptions mean that there will be a plane midway between, and perpendicular to the line connecting, the two outcome points such that all voting "yea" are on one side of the plane and all senators voting "nay" are on the opposite side of the plane. In one dimension, the assumptions mean that there will be a point equidistant between the locations of the two outcomes such that all senators to the left of the midpoint will vote for the "left" outcome and all senators to the right of the midpoint will vote for the "right" outcome. In sum, in the unidimensional error free case with no abstention, the roll calls

will form a perfect "Guttman scale" (MacRae, 1958).

The NOMINATE scaling procedure developed by Poole and Rosenthal (1985), 1991) produces estimates of the spatial locations of legislators and roll call outcomes consistent with the spatial model outlined above. Poole and Rosenthal (1991) applied a dynamic multidimensional version of this procedure, D-NOMINATE, to all roll calls with at least 2.5 percent in the minority from 1789 through 1985 for both the Senate and the House and found that the 81.3 percent of the roll call votes in the Senate and 83.0 percent of the roll call votes in the House were correctly classified by a one dimensional model.[1] In our analyses below we use coordinates obtained from one dimensional scalings done separately for 1979, 1980, and 1981.[2]

Empirically, a simple unidimensional spatial model does very well in accounting for congressional roll call voting. However, as we emphasized earlier, this does not mean that a spatial model describes the actual decision processes of senators. Rather, the empirical results indicate that the roll call decisions reflect a set of evaluations that can largely be reproduced or summarized by a single basic dimension. As a result, the locations of senators along this dimension can serve as reliable indicators of the most preferred or ideal positions of senators on many of the legislative motions they must consider. Furthermore, when the senators are sponsors of legislative motions, their locations can also serve as reliable indicators of the locations of those versions of the alternatives most preferred by the sponsors. These sponsor locations can then be compared with the locations of the alternatives actually offered to explore the relationship between the preferred and actual versions of the legislative alternatives. These comparisons are the subject of Section 3.

Two assumptions made by Poole and Rosenthal in implementing their procedure have an important bearing on our work here. First, they assume that voting is sincere – legislators vote for the closest alternative. Undoubtedly some sophisticated voting does occur, but actual instances appear to be rare (Romer and Rosenthal, 1985; Krehbiel and Rivers, 1988; Ladha, 1987). Even if sophisticated voting is present, it is quite likely that voting is occurring on the *sincere equivalents* to the sophisticated motions.[3]

The second assumption that Poole and Rosenthal make that affects our results is homogeneity of error across roll calls. If the error is homogeneous across roll calls, then the recovery of the outcomes is generally quite accurate although a very small inflationary bias may be present.[4] Empirically, however, errors are not likely to be homogeneous. Clearly some roll calls are more important than others and members will devote more attention and staff resources to ascertaining the policy and career implications of their votes on important roll calls. (For a description of this process, see Smith, 1984.) In terms of the spatial model, suppose two roll calls have the same pair of "true" outcome locations but one is much more important than the other. Because the

Poole-Rosenthal model is probabilistic, more voting errors (i.e., votes inconsistent with the predictions of a spatial model) will occur on the less important roll call and these errors will be dispersed over a broader range; that is, they will tend to be less concentrated around the midpoint of the two outcomes. In terms of estimation, the same *midpoint* will be estimated for both roll calls but the outcomes will be recovered *closer together* on the noisy roll call to force the probabilities nearer to .5 over a broader range (Poole and Rosenthal, 1985: 364). This is an identification problem. For a fixed midpoint, different combinations of the noise level and the distance between the outcome pairs can produce the same observed pattern of votes. In effect, the procedure estimates a parameter that is the ratio of the "true" distance between the outcomes and the standard deviation of the noise for the roll call.[5] The recovery of the legislators and the midpoints is not affected by this problem. In our analyses below, we regress outcome locations on sponsor locations and compare the results for differing sets of roll calls. Consequently, if the error is heterogeneous across roll calls, it will reduce the fit of the regressions but will not affect the estimates of the coefficients. When we compare sets of roll calls, however, we must implicitly assume that the *distribution* of the error within each set is the same. This is a restrictive but not unreasonable assumption.

3. The formulation of legislative alternatives

We investigate the formulation of legislative alternatives by examining the relationship between the location of the sponsor of a motion and the location of the outcomes of that motion. The relationship between a sponsor and the outcome locations represents the results of efforts by the sponsor and other advocates to structure the content of the motion and to influence the interpretations (Smith, 1984; Fenno, 1986; Riker, 1986) that other Senators develop of those motions. Understanding the relationship between outcome locations and sponsor location depends on two critical variables: whether the sponsor desires to win; and if he or she does, the kind of strategies that can be pursued to do so. We now consider each variable in turn.

3.1. Winning may not be everything

Legislative motions are proposed for a variety of reasons – only some of which have to do with winning. Fenno (1973) argues that members of Congress pursue three primary goals: reelection; the making of good public policy; and gaining influence within the chamber. The latter goal is most clearly identified with winning: to gain influence, one must be responsive to the wishes of the larger

membership. One way to demonstrate responsiveness is to offer alternatives that are favored by large portions of the membership, preferably majorities. By contrast, good public policy motivations do not necessarily result in sponsors offering motions that will win on the floor. Certainly the actual making of a good policy requires that the policy proposal becomes law. But members can only compromise their visions of the "good" so much; if they alter their proposal a great deal in order to win, they win little. Thus, members of Congress with strong policy objectives may often offer motions that deviate only slightly from their most preferred positions.

The pursuit of reelection is also only loosely related to winning. Mayhew (1974) argues that members, largely through position-taking, can reap considerable electoral payoff from legislative activities without ever winning (see also, Fiorina, 1977). From a different perspective, Fenno (1978) argues that there is typically little connection between the Washington activity of members and their level of electoral support; members build support by means of their home styles and thus the effective advancing of legislative ideas is not necessary to securing reelection.

As a result, members of Congress on many occasions will not offer motions formulated to win. They will have few reasons to compromise and will instead sponsor motions in which one outcome will closely reflect their vision of good public policy or their responses to some set of constituent concerns. For our purposes here, there is no way that we can *a priori* identify sponsors who wanted to win let alone how much they wanted to win by; the necessary data about the intentions of sponsors is unavailable. We will deal with this difficulty by comparing the motions that actually won (broken down by close and large margins) with losing motions.

3.2. The spatial distribution of losing and winning motions

Table 1 shows the distribution of winning and losing motions across the dimension for the three years we are analyzing. We have normalized the coordinates for each year by placing the origin of each year at the median senator (or midway between the two median senators). The unnormalized coordinates range from -1 to $+1$, but with the normalization the coordinates range from roughly $-.9$ to 1.1 for 1979–80 and from roughly -1.2 to .8 for 1981. The table is laid out accordingly. A total of 889 motions are included in our analysis of which 433 were winning motions and 456 were losing motions.[6] Tie votes are treated as losing motions. The party in power offers more motions than the out party and wins more of the motions it offers – better than 65 percent for all three years. Senators of the in party who are near their party median and near the overall median have the highest success rates and offer most of the motions

Table 1. Motions by the spatial position of the sponsor: U.S. Senate 1979–81

Sponsor's spatial location	1979						1980						1981					
	All		Dem		Repub		All		Dem		Repub		All		Dem		Repub	
	N	Win	N	Win	N	Win	N	Win	N	Win	N	Win	N	Win	N	Win	N	Win
−1.40 to −1.20													16	.125	16	.125	0	–
−1.20 to −1.00													23	.043	23	.043	0	–
−1.00 to − .80	1	.000	1	.000	0	–	1	.000	1	.000	0	–	30	.067	30	.067	0	–
− .80 to − .60	5	.600	5	.600	0	–	13	.462	13	.462	0	–	16	.188	16	.188	0	–
− .60 to − .40	28	.536	28	.536	0	–	23	.522	23	.522	0	–	16	.438	16	.438	0	–
− .40 to − .20	42	.595	34	.618	8	.500	58	.672	45	.756	13	.385	17	.059	17	.059	0	–
− .20 to − .00	70	.714	47	.787	23	.565	23	.565	18	.556	5	.600	25	.440	14	.429	11	.455
Median																		
.20 to .00	66	.500	49	.571	17	.294	65	.631	50	.720	15	.333	27	.593	0	–	27	.593
.40 to .20	31	.258	2	.500	29	.241	39	.513	3	1.00	36	.472	41	.707	0	–	41	.707
.60 to .40	23	.391	0	–	17	.353	17	.471	0	–	16	.500	73	.712	0	–	73	.712
.80 to .60	0	–	0	–	0	–	15	.533	0	–	15	.533	1	.000	0	–	1	.000
1.00 to .80	16	.063	0	–	16	.063	17	.471	0	–	17	.471						
1.20 to 1.00	23	.174	0	–	23	.174	28	.214	0	–	28	.214						
	305	.480	166	.633	133	.293	299	.535	153	.660	145	.407	285	.442	132	.182	153	.667

of their party. For the out party the picture is quite different. It is the senators who are more extreme than the median of their party who offer the most motions and who are the least successful. Senators in the out party nearest the overall median are the most successful.

In terms of their fit to the spatial model, there are no systematic differences between winning and losing motions. The midpoints estimated by the NOMINATE procedure correctly classify 79.3 percent of the votes on winning motions and 80.2 percent of the votes on losing motions. The average geometric mean probability[7] for the winning motions was .669 (std. dev. .098) and for losing motions it was .679 (std. dev. .105). The average margin of victory for the winning motions was 23.4 (std. dev. 18.7) and the average margin of defeat for the losing motions was 23.6 (std. dev. 17.7). Finally, we computed the Pearson correlation between the absolute value of the midpoint (where the origin of the dimension is set equal to the median senator) and the absolute value of the margin (yeas minus nays). The correlation for the winning motions was .869 and for losing motions, .883. In sum, the two sets of motions are indistinguishable save for the party and extremist differences we noted in the previous paragraph. They fit the spatial model equally well.

Table 2 shows all senators offering five or more motions for each of the three years. They are displayed in the order of the number of motions along with their success rates. The last column shows all those senators who both served all three years and offered at least a total of ten motions during the three year period. They are ordered by success rate. Winning is clearly not the most important thing to Jesse Helms – at least not judging from this data. He offered the most motions over the three year period – 64 – and won only 19 times for a success rate of .297. In sharp contrast are Robert Byrd who offered 55 motions and won 45 times and Robert Dole who offered 44 motions and won 32 times. Long of Louisiana is on top largely because he offered no motions in 1981. Offering a lot of motions is, of course, not necessarily a sign that a senator is influential. Paul Laxalt of Nevada, Ronald Reagan's closest friend in the Senate, offered no motions at all during the three years of our study. Joining Laxalt in offering no motions over the three year period are: Goldwater of Arizona, Sarbanes of Maryland, Matsunaga of Hawaii, and Burdick of North Dakota.

3.3. If you don't care if you win, offer your position

To facilitate our discussion of strategy, we will use the following notation: x_i denotes the spatial location of the sponsor; z_i denotes the location of the motion he/she sponsors; and y_i denotes the status quo. By "status quo" we simply mean what would prevail if the motion was not successful. For example,

Table 2. Sponsors of five or more motions by year and sponsors of ten or more motions over three years: U.S. Senate 1979–81

1979			1980			1981			All Years (1979–1981)		
Name	N	Win	Name	N	Win	Name	N	Win	Name	N	Win
Byrd, R. (D)	24	.958	Helms (R)	25	.200	Dole (R)	30	.933	Long (D)	13	.846
Helms (R)	23	.174	Hollings (D)	24	.708	Helms (R)	16	.625	Byrd, R. (D)	55	.818
Johnston (D).	14	.714	Byrd, R. (D)	21	.952	Stevens (R)	14	.857	Stevens (R)	20	.800
Long (D)	11	.818	Bellmon (R)	16	.750	Kennedy (D)	14	.071	Johnston (D)	27	.778
Bellmon (R)	11	.273	Hatfield (R)	9	.333	Hatfield (R)	12	.667	Dole (R)	44	.727
Hatfield (R)	10	.800	Metzenbaum (D)	7	.571	Baker (R)	11	.727	Heinz (R)	12	.667
Muskie (D)	9	.667	Proxmire (D)	7	.714	Byrd, R. (D)	10	.200	Hollings (D)	31	.645
Javits (R)	8	.500	Dole (R)	7	.429	Bradley (D)	10	.000	Baker (R)	14	.643
Magnuson (D)	8	.750	McClure (R)	7	.571	Moynihan (D)	9	.111	Tower (R)	11	.636
Proxmire (D)	8	.250	Jackson (D)	6	.667	Metzenbaum (D)	8	.125	Hatfield (R)	31	.613
Byrd, H.F. (I)	7	.429	Weicker (R)	6	.500	Johnston (D)	8	.750	Eagleton (D)	11	.455
Dole (R)	7	.143	Exon (D)	6	.500	Weicker (R)	8	.500	McClure (R)	12	.417
Stevens (R)	6	.667	Armstrong (R)	6	.333	Riegle (D)	7	.000	Weicker (R)	20	.400
Schweiker (R)	6	.167	Moynihan (D)	5	.600	Percy (R)	6	.500	Garn (R)	10	.400
Morgan (D)	6	.333	Magnuson (D)	5	.400	Tower (R)	6	1.000	Percy (R)	11	.364
Ribicoff (D)	6	1.000	Javits (R)	5	.200	DeConcini (D)	5	.000	Proxmire (D)	20	.350
Weicker (R)	6	.167	Johnston (D)	5	1.000	Hollings (D)	5	.200	Moynihan (D)	18	.333
Church (D)	5	.800	Danforth (R)	5	.400	Proxmire (D)	5	.000	Metzenbaum (D)	18	.333
Eagleton (D)	5	.800	Schmitt (R)	5	.200	Heinz (R)	5	.800	Armstrong (R)	12	.333
Humphrey (R)	5	.000	Thurmond (R)	5	.400	Garn (D)	5	.600	Schmitt (R)	13	.308
									Helms (R)	64	.297
									Exon (D)	12	.250
									Riegle (D)	12	.167
									Bradley (D)	13	.077
									Kennedy (D)	15	.067

Table 3. Losing motions as a function of sponsor location: U.S. Senate 1979–81

Percentage against motion			
At least 50		At least 55	At least 60
α	−.048	−.057	−.024
	(.023)	(.027)	(.032)
β	.931	.991	1.043
	(.036)	(.042)	(.048)
N	456	355	269
$\bar{R}^2$	.591	.614	.638
$\hat{\sigma}$	.497	.515	.517

Standard errors in parentheses.

the status quo could be an amendment and the motion an amendment to the amendment. We assume that the status quo is known and, as we discussed above, that voting is sincere. If a legislator is indifferent to winning, the simplest strategy of all is to offer his/her own position as an alternative to the status quo. Accordingly, we estimated the following simple model

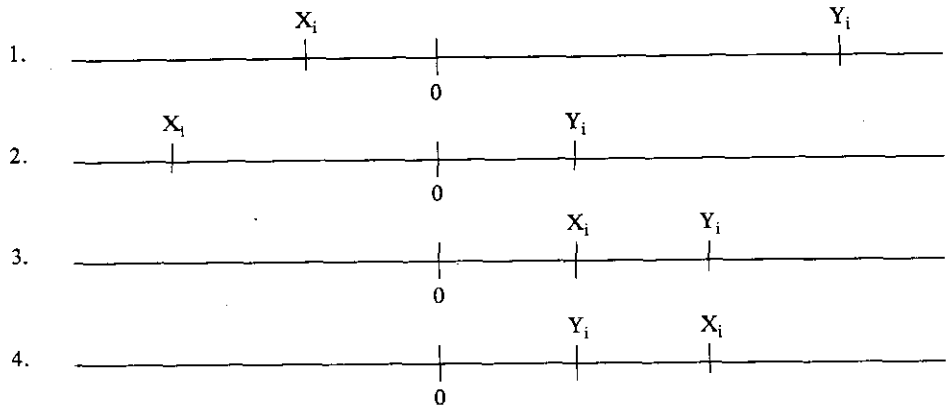
$$z_i = \alpha + \beta x_i + e \tag{1}$$

for the losing motions using ordinary least squares. We expect α to be zero and β to be one. Table 3 shows the results pooled for all three years.[8]

The table displays three different sets of estimates – for motions losing by at least 50 percent, 55 percent, and 60 percent respectively. The greater the losing margin, the less likely it is that the sponsor expected to win, and thus the more evident the predicted relationship should be. The estimates in Table 3 are consistent with this interpretation.[9] The estimated α's are all near zero and the estimates of β approach one as the losing margin increases.[10]

3.4. Winning strategies

When a senator is indifferent to winning, it makes no difference where on the dimension he/she is located – the strategy is simple, offer one's own position. However, if a senator wants to win, then his/her position relative to the status quo matters a great deal. For example, if the senator is closer to the median than is the status quo, then he/she is already in a winning position. In fact, 81 percent (351 of 433) of the winning motions had sponsors who were closer to the median than was the status quo.[11] Given this fact, sponsors generally do not need to compromise their most preferred position – they can have their



Where:

X_i is the spatial location of the sponsor
Y_i is the status quo

Figure 1. Four possible spatial arrangements.

cake and eat it too. Hence, the model given by (1) for the losing motions should work well here. However, that is not what sponsors of winning motions appear to be doing. The slope estimate for winning motions is only 0.202 (std. dev. .052) with an intercept of -0.017 (std. dev. .022), an adjusted r-square of .031 and a standard error of the estimate of .446.[12]

The difficulty in applying equation (1) to winning motions is, as we noted above, a lack of knowledge of how much the sponsor wants to win by. There are situations in which a sponsor wants to win big and this is much more important than his/her most preferred position. The flip side of this coin is that situations can arise such that a sponsor cannot offer his/her most preferred position – even if doing so would result in a lopsided victory – because of constituent or contributor concerns, deals made in committee, and so on. Consequently, the sponsor may have to settle for a closer win than he or she really desired.

To deal with some of these difficulties, we must take into account the four possible spatial arrangements of a sponsor and a status quo; these are shown in Figure 1. (An arrangement and its reflection are treated as a single entity.) In arrangements 1 and 3 the sponsor can win by simply offering his/her most preferred position. In arrangement 2, the sponsor will have to moderate in order to win; and in arrangement 4, winning is not possible (of the 107 motions made by sponsors in arrangement 4, only 10 won). If equation (1) were applied to motions made by sponsors in arrangement 1 who wanted to win big, then β would be very small or negative. If equation (1) were applied to motions made by sponsors in arrangement 3 who wanted to win big, then β should be greater than $+1$. We therefore estimated the following model:

Table 4. Winning motions by spatial arrangement: U.S. Senate 1979–1981

	Low margin	High margin
a	−.022	−.064
	(.024)	(.031)
β_1	.988	−.594
	(.108)	(.099)
β_2	.278	−.088
	(.077)	(.127)
β_3	−.153	.862
	(.232)	(.197)
β_4	−.125	.187
	(.288)	(.365)
N	291	142
$\bar{R}^2$	.239	.269
$\hat{\sigma}$	.403	.369

$$z_i = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + e \qquad (2)$$

where the D's are dummy variables for the 4 different arrangements. For example, $D_1 = x_i$ if arrangement 1, and $D_1 = 0$ otherwise.

We split the winning motions into two groups; those that won with between 50 percent and 65 percent of the vote and those that won with more than 65 percent of the vote. For the lower margin motions, β_1 should be near $+1.0$, and β_2 and β_3 should be less than $+1.0$ with $\beta_2 > \beta_3$. Given the perversity of arrangement 4, we are not confident of any value for β_4 other than it should be considerably less than $+1.0$. For the higher margin motions, β_1 should be negative, β_2 should be near zero, and β_3 should be positive. Again, we are not confident of a value of β_4, but it should be larger than that estimated for low margin motions. Table 4 shows the results.

In general, the results are as expected. With low margin motions, the sponsor is winning with his/her most preferred position in arrangement 1; in arrangement 2 the motion is between the most preferred position and the median senator; and in arrangements 3 and 4, the median is offered. For high margin motions, the sponsor in arrangement 1 is winning with the motion on the opposite side of the median from his/her position; in arrangements 2 and 4 the motions are essentially at the median; and in arrangement 3 the sponsor is offering his/her most preferred position.[13] These results suggest that sponsors pursue different formulation strategies depending on both the spatial arrangement in which they offer the motion and the size of the winning coalition they desire. On about half of the winning motions, 196 of 433 (all low margin motions in arrangement 1 and all high margin motions in arrangement 3), sponsors did not compromise from their most preferred position. On the other half of the

motions, sponsors offered some kind of compromise. The 95 high margin motions made in arrangement 1 were typically extreme compromises in which the sponsors essentially offered the reflection point of their most preferred location. The remainder of the motions were less extreme compromises and were generally located near the median senator locations.

While Table 4 provides evidence that is suggestive of the formulation strategies that sponsors may actually use, the results are based on an after the fact specification. Unlike the losing motions where we could test a *prediction*, with winning motions we cannot predict where the motion will be located without some knowledge of when sponsors desire to win big and a theory of when sponsors will choose to offer a motion in a particular spatial arrangement. All we can say is that sponsors are behaving consistently with the spatial model. That is, given their spatial situation, sponsors are doing what they should be doing to win and to win big even if it means that they must compromise their most preferred position.

However, we can test a prediction for sponsors of winning motions who are in leadership positions of the majority party. These leaders are likely to be keenly interested in maintaining and increasing (if possible) their influence within the Senate. One major way to do this is to offer motions that members of their party think are reasonable alternatives that address many of their major concerns. Hence, we expect that majority party leaders will be offering a disproportionate number of winning motions with low margins at their respective party medians.[14] To test this we used the specification shown in (1) except we used the majority party median instead of x_i. The results are shown in Table 5.

Table 5 shows the results for specification (2) and for (1) using the party medians for three different definitions of majority party leaders. The corresponding group of majority party non-leaders is also shown for comparison. The top part of the table shows the results for the majority leader and the whip,[15] the middle part adds in the committee chairs of the three key money committees (Appropriations, Budget, and Finance),[16] and the bottom part adds in the remaining majority party leaders (e.g., assistant whips).[17] The majority party leaders are indeed offering the close winning motions near their party medians – taking into account the specific spatial arrangements does not appreciably increase the adjusted r-square or decrease the standard error of the estimate. Moreover, the coefficient on the party median stays near 1.0 as the leadership group is expanded. The contrast with the non-leaders is striking. The party median model does not account for much of the behavior of the non-leaders of the majority party but the specific spatial arrangements do.

Majority party leaders as a group differ from the non-party leaders in another important way. Party leaders offer very few "divisive" motions; that is, they offer very few motions against status quos that are located in the

Table 5. Low margin winning motions by majority party leaders and non leaders: U.S. Senate 1979–81

Majority Leader and Whip

	Leaders				Non-leaders			
		X_i	Party med.			X_i	Party med.	
α	−.134	(.065)	−.082	(.068)	.017	(.034)	.050	(.036)
β_1	1.680	(.271)	1.098	(.218)	.903	(.141)	.426	(.116)
β_2	.089	(.881)			.152	(.147)		
β_3	−1.86	(.742)			−.969	(.402)		
β_4	–	–			.128	(.420)		
N	43		43		169		169	
$\bar{R}^2$	.458		.368		.206		.070	
$\hat{\sigma}$	.411		.444		.428		.463	

Majority Leader, Whip and Committee Chairs of Appropriations, Finance, Budget Leaders

	Leaders				Non-leaders			
		X_i	Party med.			X_i	Party med.	
α	−.093	(.058)	−.057	(.053)	.014	(.034)	.019	(.039)
β_1	1.388	(.226)	1.117	(.165)	.862	(.151)	.161	(.131)
β_2	.360	(.417)			.133	(.139)		
β_3	−.665	(.835)			−.763	(.358)		
β_4	.193	(1.300)			−.234	(.396)		
N	87		87		125		125	
$\bar{R}^2$	.286		.343		.217		.004	
$\hat{\sigma}$	.501		.481		.374		.422	

All Majority Party Leaders and Committee Chairs of Appropriations, Budget and Finance

	Leaders				Non-leaders			
		X_i	Party med.			X_i	Party med.	
α	−.065	(.048)	−.018	(.046)	.024	(.038)	.014	(.044)
β_1	1.167	(.186)	.937	(.144)	.985	(.180)	.111	(.148)
β_2	.209	(.217)			.121	(.160)		
β_3	−1.115	(.768)			−.604	(.365)		
β_4	.342	(.601)			−.053	(.597)		
N	110		110		102		102	
$\bar{R}^2$	.257		.277		.225		−.004	
$\hat{\sigma}$	.482		.476		.375		.427	

extremes of their party. A divisive motion is one that produces a coalition of the minority party with the moderates of the majority party against the extremists of the majority party. Only 7 of the 110 motions offered by the majority party leaders were divisive motions while 32 of the 102 motions offered by the non-party leaders were divisive motions. In addition, as Table 1 shows, *extremists in the majority party are not offering motions* – these divisive motions are being offered by moderates in the majority party. These facts have interesting implications for spatial theory. Suppose a member of the majority party introduces a bill with a policy outcome that is considerably more extreme than the party median. Suppose further that the no-bill status-quo is located near the median of the minority party. The majority party leadership calculates that the bill if not amended will lose, so the leadership, reluctantly, offers an amendment. What is likely to happen? In a standard voting analysis, the first division is the amendment versus the bill and the winner then goes against the no-bill status-quo. Accordingly, in spatial terms, the first division should be a divisive motion. We think this is very unlikely. We speculate that what really is happening is that the leadership, by whatever means, offers an amendment near the party median and gets the extreme wing of the party to support it so that the vote actually pits the amendment against the no-bill status-quo.[18]

4. Conclusions

Roll call voting in the U.S. Senate is highly structured. Over 81 percent of non-unanimous voting is consistent with a simple one-dimensional two outcome spatial model. However, this consistency does not necessarily mean that the *process* of constructing legislative motions can be explained purely in spatial terms. All that it means is that *once a motion is offered*, voting on it is usually consistent with a two outcome spatial model. This is true of both winning and losing motions. We have exploited this consistency in voting to explore the three sets of questions with which we began this paper. We now summarize our findings with respect to those questions:

(1) Winning and losing motions are quite different spatially. About 81 percent of winning motions are made by sponsors who are closer to the median than is the status quo while about 62 percent of losing motions are made by sponsors who are further away from the median than is the status quo. These figures rise to about 91 percent and 69 percent respectively when roll calls with less than 10 vote margins are excluded. Senators on the far left and far right win the least and senators near the median win the most – but not by much – senators at center-left and center-right do almost as well.

If a sponsor is indifferent to winning, then compromise is unnecessary. The evidence is consistent with this prediction. Sponsors generally do not com-

promise on losing motions; rather they tend to offer their most preferred locations. This tendency increases as the margin of defeat increases.

(2) If a sponsor wants to win, we cannot predict where he/she will locate the motion without some knowledge of how badly the sponsor wants to win. Consequently, our results on winning motions are primarily descriptive. In general, sponsors of winning motions are behaving consistently with their spatial situation when the winning margin is taken into account. Sponsors generally offer motions in spatial arrangements where they need not compromise to win. Because 81 percent of the winning motions are made by sponsors who are closer to the median than is the status quo, if voting were sincere, then they could always win by offering their most preferred location. This is indeed the case in spatial arrangement 1 for close margin winning motions and in spatial arrangement 3 for high margin winning motions.

However, for reasons that we can only speculate on, sponsors compromise their most preferred locations even when those locations would probably win. Sometimes, they offer the motion at the median and win by a smaller margin (arrangement 3). More frequently they offer extreme compromises that win by large margins, completely abandoning their most preferred locations in favor of positions midway between the median and the reflections of their most preferred locations (arrangement 1).

When sponsors are further from the median than the status quo, they tend to locate motions at or near the median senator (arrangement 2). This tendency is strongest when the margin of victory is large.

(3) We can make a prediction about sponsors of close winning motions who are in leadership positions of the majority party. They will offer motions that tend to reflect their party median and hence the sentiments of the members of their parties. The data are also consistent with this prediction. Moreover, the motions that party leaders do offer rarely split the extremists and moderates within their party. Both party responsiveness and harmony appear to be much more important to leaders than non-leaders.

A much richer set of information is necessary to predict not only the locations of winning motions but also the locations of those losing motions made by senators in winning positions. For example, information is needed about when a sponsor desires to win and if so, by now much; when and why sponsors offer motions in particular spatial arrangements; and whether the arguments advanced during legislative debate introduce other significant evaluative dimensions. Information about agenda control is also important. In terms of the Hinich-Ordeshook spatial model we outlined earlier, it could be that certain subsets of issue dimensions are outlawed in policy terms and therefore the choice set of the sponsor is constrained. In other words, when sponsors do not win in spatial arrangements 1 and 3 what we may be observering are agenda limits imposed by institutional arrangements à la Shepsle (1979) or heresthetical maneuvers à la Riker (1984, 1986); that is, status quos that a majority would

defeat if the appropriate alternative could be offered on the floor. As Mayhew (1974) has informed us, losers are usually winners via position-taking, but if there is agenda control, losers are truly losers.

Notes

1. The NOMINATE procedure maximizes probabilities *not* classifications. If the legislator configurations are searched for the optimal midpoints, classifications improve to 83.8 percent for the Senate and 84.3 for the House (Poole and Rosenthal, 1991).
2. A FORTRAN program implementing the one dimensional static (as opposed to the dynamic version discussed in Poole and Rosenthal, 1991) model, 1-NOMINATE, is available on request. To obtain the program, send a floppy disk to Keith T. Poole, Graduate School of Industrial Administration, Carnegie-Mellon University, Pittsburgh, PA 15213.
3. For a discussion of sincere equivalents in a binary voting scheme, see chapter 6 of Ordeshook (1986). In effect, the NOMINATE procedure recovers the sincere equivalent outcome points. If voting is occuring on the sincere equivalents or if vote trading is occuring between *spatially adjacent coalitions* (e.g., center-left Democrats trading with center-right Republicans), then the *observed* voting patterns are consistent with the spatial model outlined in the text. The voting on the 1977 common situs picketing bill shown in Ordeshook (1986: 289–290) is an example of this.
4. These assertions are based on the Monte-Carlo work reported in Poole and Rosenthal (1987, 1991). The estimates of the midpoints and legislators were found to be unbiased in the Monte-Carlo simulations but a slight bias, on the order of .02, was found for the outcome coordinates at the error levels and number of legislators found in the actual Senate roll call data. In other words, the estimate of a typical "left" or "liberal" outcome was recovered .02 units to the right of the "true" location, and the corresponding "right" outcome was recovered .02 units to the left of the "true" location. Because the span of the recovered dimension is set to 2.00 units in the NOMINATE procedure, this small bias will have very little impact on the results we report below.
5. Mathematically, the parameter is not a ratio because of the non-linearity of the model. Empirically, however, for the reasons pointed out in the text, the model is close to not being identified so that the parameter can be thought of as the ratio.
6. The legislative motions that were included in the analyses were selected according to the following criteria: 1) all motions with an identifiable sponsor; 2) all motions in which the minority coalition included at least 2.5 percent of those with recorded choices (pairs and announced positions included); and 3) all motions in which the estimates for the outcomes were *unconstrained* in the NOMINATE procedure. Roll calls that are constrained are almost always very lopsided, for example 96-4, and the estimated outcomes "predict" a unanimous vote; that is, the midpoint of the outcomes lies outside the configuration of Senators. (See Poole and Rosenthal, 1985, 1991, for a discussion of this problem.) A total of 1551 roll calls were taken in the 1979–1981 Senates. Of these 1551, 1019 had both an identifiable sponsor and had at least 2.5 percent voting minority. Finally, of these 1019 motions, 889 were unconstrained.
7. The geometric mean probability is used by Poole and Rosenthal (1985, 1991) as a measure of fit. For a specific roll call, it is computed by taking the total log likelihood for the roll call, dividing the log likelihood by the number of legislators voting, and exponentiating the result. This yields a summary probability statistic. The geometric mean probability is a conservative measure – it behaves like a squared error measure in that it penalizes low probability choices (e.g., Edward Kennedy voting for restrictions on abortion).
8. All the results reported in the text were checked by estimating each year separately.
9. We do not report t- or F-statistics and levels of significance because the entire population of

cases is being analyzed. However, we do report the standard deviations of the estimated coefficients to indicate their stability.

10. The small bias in the z_i (see note 3) will, if present, have the effect of slightly increasing the values of the β's in Table 3. For example, if the mean of the absolute values of the x_i was .5, the mean of the error was zero, the bias is .02 on each z_i, and if the true value of each z_i equaled the corresponding x_i, then $\beta = .52/.50 = 1.04$, instead of 1.00.
11. About 38 percent of losing motions (173 of 456) were made by sponsors in winning positions. If close motions are excluded this drops to a still substantial 31 percent (79 of 254 motions losing by at least 60 percent). (Also, see note 13.)
12. In addition to equation (1), we tried four other specifications for sponsors of winning motions: sponsors locate motions at their respective party medians; sponsors locate motions at the overall Senate median; sponsors locate motions at the maximum winning coalition point; sponsors locate motions at the minimum winning coalition points. None fared any better than equation (1).
13. We ran the equivalent model on the losing motions by classifying them according to the winning margins of the status quos. For motions that lost by more than 15 percent (n = 280), equation (2) was not a significant improvement over equation (1). (The standard errors of the estimate were .490 and .517 while the adjusted r-squares were .680 and .642 respectively.) The estimation for motions that lost by less than 15 percent (n = 176) was similar to that for low margin winning motions. The estimated coefficients were: $\alpha = 0.030$ (s.d. .027); $\beta_1 = 1.633$ (s.d. .106); $\beta_2 = .572$ (s.d. .051); $\beta_3 = 1.577$ (s.d. .791); $\beta_4 = .215$ (s.d. .126). The standard error of the estimate was .348 as opposed to .434 for (1) showing that the specific spatial arrangements do play some role – although it is nowhere near as important as it is for winning motions – on close losing motions (the adjusted r-square was .679 as opposed to .502). The coefficients for spatial arrangements 2 and 4 make sense when compared to those for close winning motions. The size of the coefficient for arrangement 1 is a puzzle – it may reflect agenda control problems for these sponsors (see the discussion in the conclusion). The coefficient for spatial arrangement 3 should be much smaller but the standard deviation is quite large.
14. We exclude high margin motions since they often involve strategies that would require substantial deviation from the party median.
15. These four senators were Robert Byrd, Howard Baker, Alan Cranston, and Ted Stevens. However, only Byrd, Baker, and Stevens offered low margin winning motions when their party was in the majority.
16. The chairs of these committees were Dole, Domenici, Hatfield, Long, Magnuson, and Muskie. Each offered at least one low margin winning motion.
17. The party leadership positions included the majority leader, majority whip, president pro tempore, assistant whips, chairman of conference, secretary of conference, and the chairs of the Legislative Review Committee, the Policy Committee, the Senatorial Campaign Committee, the Steering Committee (all Democratic party committees), the Committee on Committees, the Policy Committee and the National Republican Senatorial Committee (all Republican party committees). The senators holding these position who offered low margin winning motions when their party was in the majority were: Byrd, Baker, Stevens, Bumpers, Garn, Glenn, Huddleston, Inouye, Leahy, Magnuson, Metzenbaum, Packwood, Riegle, and Tower.
18. Our speculation does not necessarily conflict with the theory of leadership compromise developed by Enelow (1984). In fact, our results are consistent with his theory if the first division, between the amendment and the original bill, is actually a bargaining process between the party leaders and the sponsors of the bill. The recorded roll call vote is then the second division.

References

Asher, H. and Weisberg, H. (1978). Voting change in Congress: Some dynamic perspectives on an evolutionary process. *American Journal of Political Science* 22: 391–425.

Converse, P. (1964). The nature of belief systems in mass publics. In D.E. Apter (Ed.), *Ideology and discontent*. New York: Free Press.

Davis, O. and Hinich, M. (1966). A mathematical model of policy formation in a democratic society. In J. Bernd (Ed.), *Mathematical applications in political science II*. Dallas: Southern Methodist University Press.

Davis, O., Hinich, M. and Ordeshook, P. (1970). An expository development of a mathematical model of the electoral process. *American Political Science Review* 65: 426–448.

Enelow, J. (1984). A new theory of congressional compromise. *American Political Science Review* 78: 708–718.

Enelow, J. and Hinich, M. (1984). *The spatial theory of voting*. New York: Cambridge University Press.

Fenno, R. (1973). *Congressmen in committees*. Boston: Little, Brown.

Fenno, R. (1978). *Home style: House members in their districts*. Boston: Little, Brown.

Fenno, R. (1986). Observation, context, and sequence in the study of politics. *American Political Science Review* 80: 3–15.

Fiorina, M. (1977). *Congress: The keystone of the Washington establishment*. New Haven: Yale University Press.

Hinich, M. and Pollard, W. (1981). A new approach to the spatial theory of electoral competition. *American Journal of Political Science* 25: 323–341.

Kingdon, J. (1981). *Congressmen's voting decisions*. New York: Harper and Row.

Krehbiel, K. and Rivers, D. (1988). The analysis of committee power: An application to Senate voting on the minimum wage. *American Journal of Political Science* 32: 1151–1174.

Ladha, K. (1987). Decisionmaking in the U.S. Congress. Ph.D. Dissertation, ISIA, Carnegie-Mellon University.

Lau, R., Smith, R. and Fiske, S. (1991). Political beliefs, policy interpretations, and political persuasion. *Journal of Politics* 55: 644–675.

MacRae, D. (1958). *Dimensions of congressional voting*. Berkeley: University of California Press.

Matthews, R. and Stimson, J. (1975). *Yeas and nays: Normal decision-making in the U.S. House of Representatives*. New York: Van Nostrand Reinhold.

Mayhew, D. (1974). *Congress: The electoral connection*. New Haven: Yale University Press.

Ordeshook, P. (1976). The spatial theory of elections: A review and a critique. In I. Budge, I. Crewe and D. Farlie (Eds.), *Party identification and beyond*. New York: Wiley.

Ordeshook, P. (1986). *Game theory and political theory*. Cambridge: Cambridge University Press.

Poole, K. and Rosenthal, H. (1985). A spatial model for legislative roll call analysis. *American Journal of Political Science* 29: 357–384.

Poole, K. and Rosenthal, H. (1987). Analysis of congressional coalition patterns: A unidimensional spatial model. *Legislative Studies Quarterly* 12: 55–75.

Poole, K. and Rosenthal, H. (1991). Patterns of congressional voting. *American Journal of Political Science* 35: 228–278.

Riker, W. (1984). The heresthetics of constitution-making: The presidency in 1787 with comments on determinism and rational choice. *American Political Science Review* 78: 1–16.

Riker, W. (1986). *The art of political manipulation*. New Haven: Yale University Press.

Romer, T. and Rosenthal, H. (1985). Modern political economy and the theory of regulation. In E.E. Bailey, (Eds.), *Regulation at the crossroads: Challenges of the coming decade*. Cambridge: M.I.T. Press.

Shepsle, K. (1979). Institutional arrangements and equilibrium in multidimensional voting models. *American Journal of Political Science* 23: 27–59.

Smith, R. (1984). Advocacy, interpretation, and influence in the U.S. Congress. *American Political Science Review* 78: 44–63.

Smith, R. (1989). Interpretation, pressure, and the stability of interest group influence in the U.S. Congress. Presented at the annual meeting of the American Political Science Association, Atlanta, Georgia.