Roll Call Voting in Congress 1789-1985: Spatial Models and the Historical Record

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Background

Before the advent of supercomputers, it would have been almost impossible for political scientists to apply a quantitative model to roll call voting for the entire history of the United States Congress in an effort to learn whether consistent patterns of political alignment existed and, if so, how those patterns were changing. Supercomputing has enabled us to discover strong regularities in the roll call voting behavior of members of the United States Congress.

The Problem

A very broad set of specific issues, such as arms control, minimum wage, and abortion, come before Congress. Our basic model, the spatial model of voting [Enelow and Hinich, 1984], maintains that these issues are largely evaluated in terms of a very small number of basic, interpretive dimensions. The concepts underlying the model are illustrated by Figure 1, which portrays Senators serving in 1971-72 as located in a two dimensional space. Democrats are identified by D, Republicans by R, and the two independents by name. Projection of each senator's position onto the horizontal axis would generally be consistent with public perceptions of how the senators line up, in liberal-conservative terms, on a wide variety of "economic" issues. The most conservative or "right" senators on this dimension were Republicans who generally oppose government intervention in the economy and redistribution to either the poor or to organized labor. Projection onto the vertical axis gives an ordering that can be categorized as liberal-conservative "social" positions. The most conservative or "up" senators on this dimension were traditional Southern Democrats.

Results

Each roll call, our model holds, can be placed in the same space as the senators. A roll call is represented in terms of two points: one corresponding to the "Yea" and the other to the "Nay" outcome. The roll call cutting line is a line perpendicular to the midpoint of the line joining the two outcomes. Legislators to one side of the outcome should tend to vote "Yea," those on the other "Nay." Errors in voting should tend to occur among senators with positions close to the cutting line. (Technically, the voting model is a stochastic utility model of the logit form.) These features of the model can be seen in Figure 1 which shows the cutting line for the vote on the Jackson (D-WA) amendment, the critical vote in ratification of the SALT I treaty in 1971. Those favoring the amendment were a coalition of moderate and conservative Democrats and Republicans who wanted to go on record as favoring a "tough" policy toward the Soviet Union. It can be seen that there are few errors and the errors that do occur are close to the cutting line (the errors are in red and blue below the cutting line and green and purple above). The figure thus shows that we do not need a distinct dimension to differentiate "doves" and "hawks". Foreign policy "doves" or "liberals" can be characterized as combinations of economic and social liberals; the doves occupy the southwest quadrant of the figure.

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A byproduct of this analysis is that it helps scholars to identify "strategic" behavior. In our example, Senator Jackson, who proposed the amendment, was an error; the figure shows that his name appears on the "wrong" side of the cutting line, in the region that grouped those opposed to the amendment. Jackson in fact favored ratification. To help win the votes for ratification, he strategically proposed a non-binding "macho" vote that allowed moderates prepared to vote for ratification to take a public anti-Soviet position.

Senate Vote, Jackson Amendment, SALT I
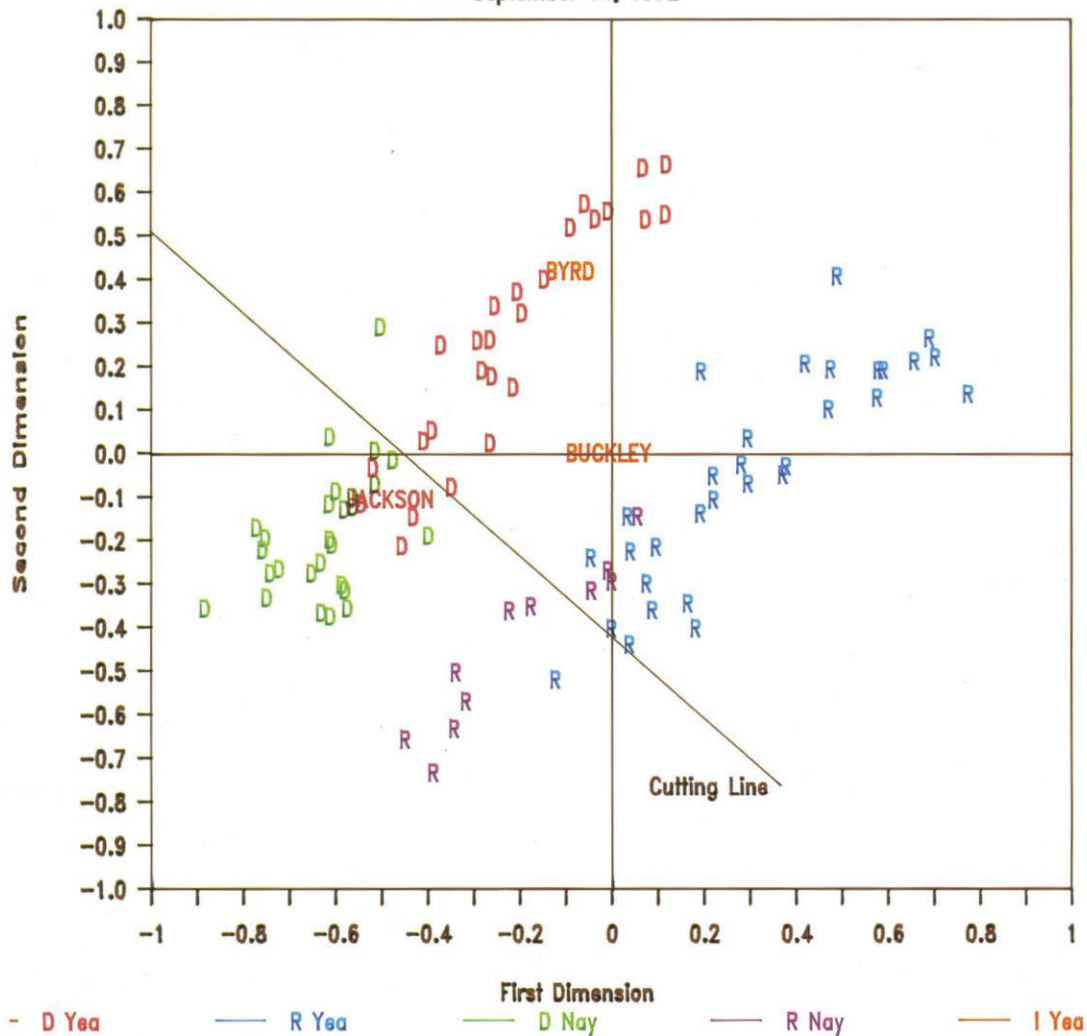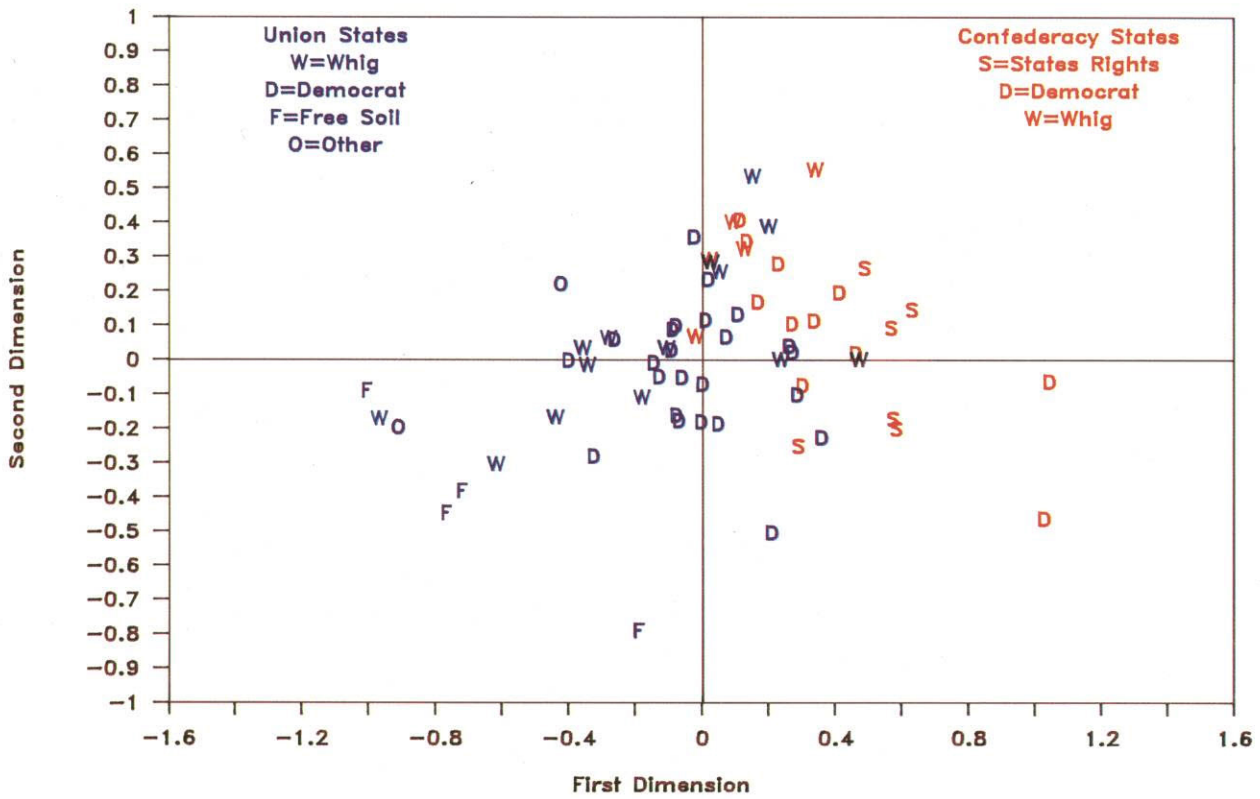
September 14, 1972

Figure 1: Senate Vote on Jackson Amendment Salt I, September 14, 1972.

The results shown in Figure 1 manifest a highly stable two-party system. Although there are strong liberal-conservative differences within each party, the members of the two parties occupy parallel but widely separated regions in the space. The pattern is not simply a consequence of the basic institutional structure set out by the Constitution but is one that has evolved over time. Consider, as a contrast, Figure 2 on the next page. The pattern of the Senate which sat in 1853-54 shows the divisive slavery issue that led to the Civil War resulted in an "implosion" of the political system. As shown in the top panel, senators in the two established political parties, the Whigs and Democrats, tended to concentrate in the center of the space. At the same time, two new parties are emerging at the periphery of the space, the States Right group defining a pro-slavery pole and the Free Soilers, one of the antecedents of the Republicans, defining an anti-slavery pole. The new arrivals foreshadowed increasing polarization as the nation moved toward Civil War. Indeed, the bottom panel illustrates that the Senate was basically differentiated in terms of a Confederacy-Union conflict rather than in terms of conflict between political parties.

A stable party pattern emerged in the two decades following the Civil War. By 1900, as seen in Figure 3, there was a polarized party pattern similar to Figure 1. There are, however, two noteworthy differences. First, there was more polarization in the past. The party clusters are
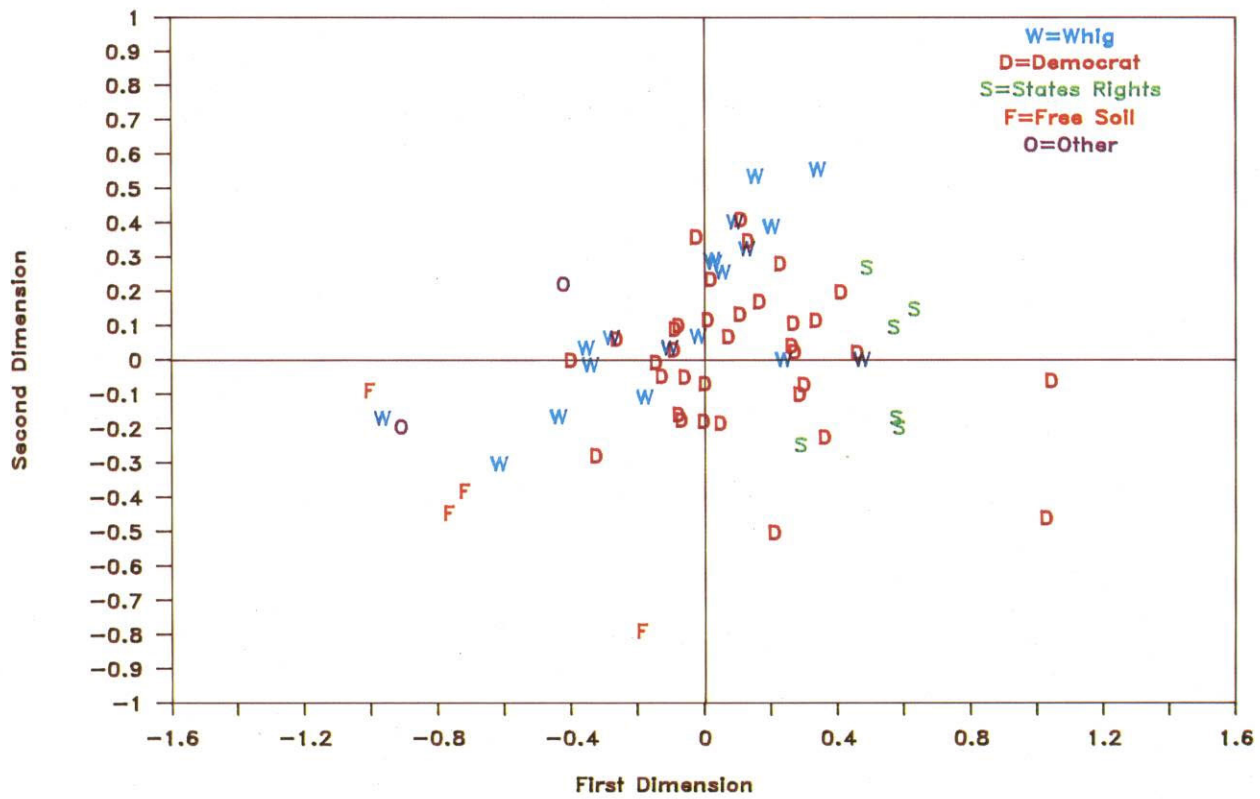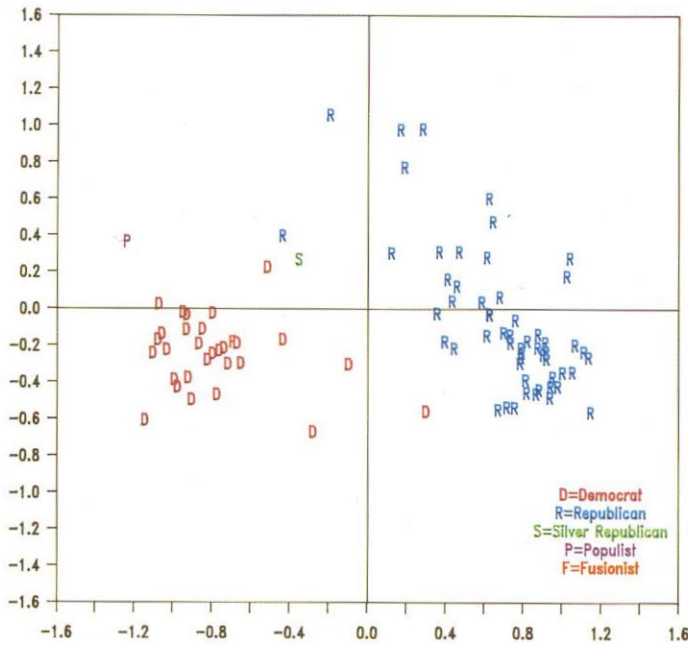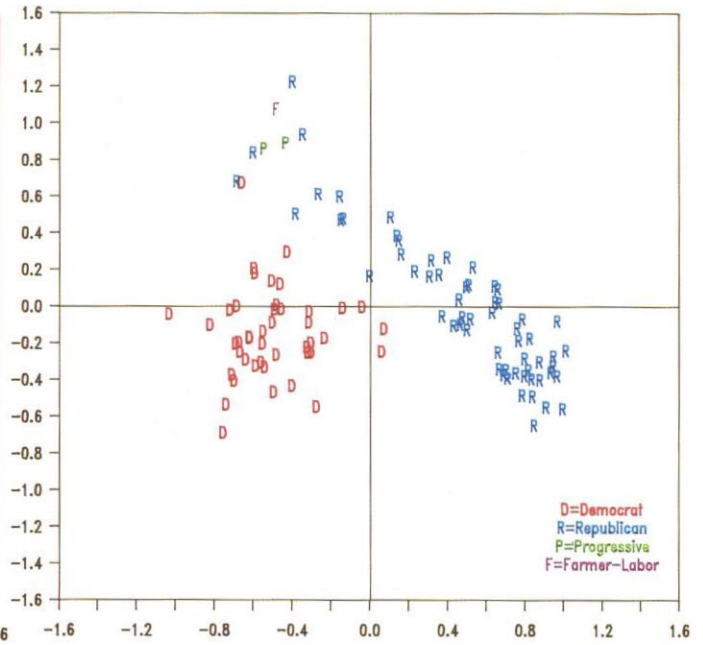
112

Senate, 1853–54

Senate, 1853–54
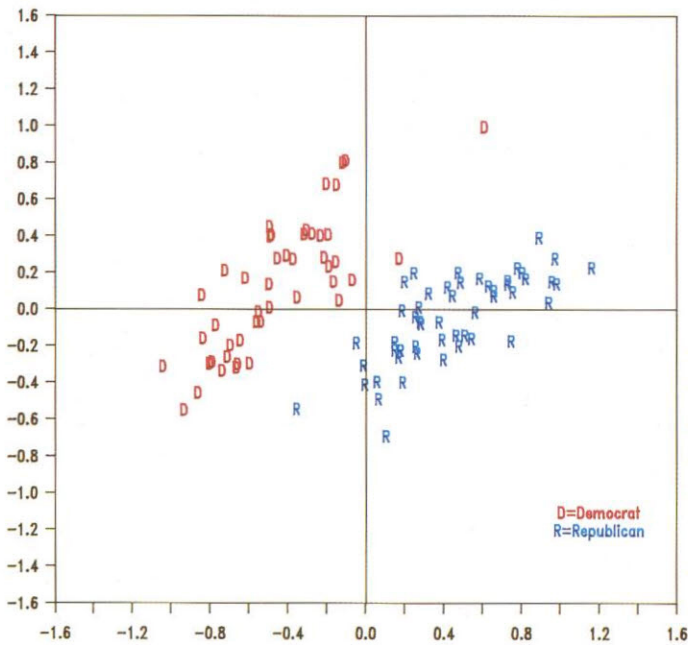

Figure 2: Political Reallignments Just Prior to the Civil War.

Senate, 1901–02

D=Democrat
R=Republican
S=Silver Republican
P=Populist
F=Fusionist

Senate, 1929–30

D=Democrat
R=Republican
P=Progressive
F=Farmer-Labor

Senate, 1947–48

D=Democrat
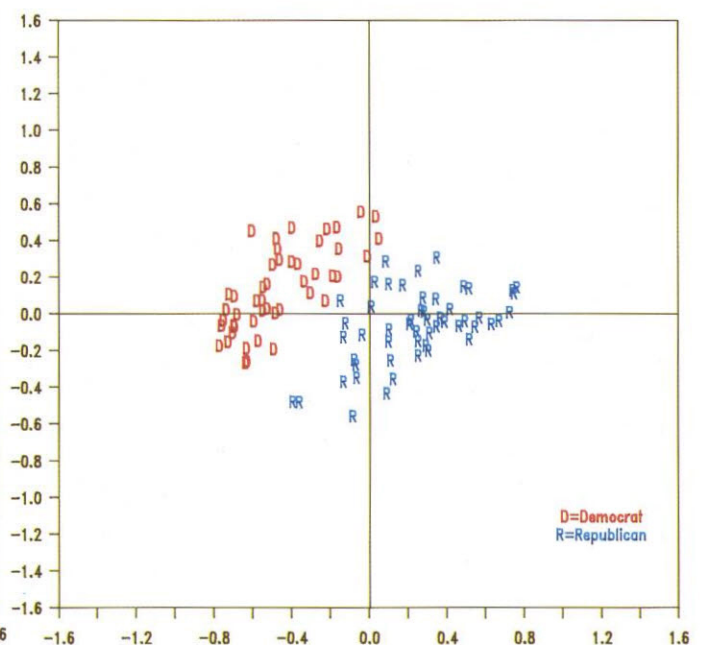R=Republican

Senate, 1985

D=Democrat
R=Republican

Figure 3: Shifting Alignments Within the Senate During the Twentieth Century.

further apart. The reduction in polarization indicates a reduction in the range of political viewpoints that are represented in Congress. Second, the party clusters occupied different positions in the space in 1900 than they do today.

This rotation of the parties shown in the figure reflects changes in the issues that define party alignments. The Great Depression in itself was not a realigning event. An image for 1937-38

appears identical to that for 1929-30, except that there are many more Democrats and far fewer Republicans. The shift in the party alignment between 1929-30 and 1947-48 reflects the increasing salience of civil rights issues in the forties. In 1929-30 nearly all Democrats were Southern Democrats situated in the southwest quadrant. By 1947-48, the delegation of Southern Democrats had migrated to the northwest quadrant. The relative positions of the parties

114

in the forties persisted into the 1970's as seen in Figure 1.

The movement in the party clusters induced when new issues arise is accomplished only to a very slight degree by changes in positions of long-term incumbents. On the contrary, party positions shift almost entirely as a result of the positions taken by newly elected, replacement legislators. For example, Southern Democrats have become more liberal since the passage of the Voting Rights Act in 1965 produced a black voting constituency. The change did not occur because of adaptation of Southern Democrats serving in 1965. Legislators elected since 1965 have been the motor of change. The most rapid overall changes occur in periods of massive turnover, such as the elections of 1930-36 during the Great Depression.

Throughout the twentieth century, the party system has been sharply differentiated, as seen in Figure 3. At the same time, the range of debate has compressed; senators are more tightly clustered in 1985 than in 1901-02.

Methodology and Computer Resources Required

The basic pattern of spatial voting, with a few errors, holds for most roll calls. We have used the CYBER 205s to estimate dynamic, multi-dimensional models using the entire roll call voting record since 1789, a total of some 15,000,000 observed choices. Large scale estimation of this type can be done relatively rapidly because the BIT Fortran feature of the 205 allows for very efficient storage of binary choice data. In the dynamic models, each legislator's position can potentially vary as a polynomial function of time. One of our most striking findings is that legislator positions are very stable in time, particularly in the twentieth century. Some eighty three percent of the individual voting decisions can be accounted for by a two dimensional model in which each legislator is constrained to a constant position throughout his or her career. Classification is improved by a further one percent by allowing each legislator to have a linear trend, but individual movement abated considerably in the first half of this century and is virtually absent today. A potential explanation for this phenomenon lies in reputational forces that constrain a legislator to behave in a highly predictable fashion. The fit of the model is not substantially improved by the use of higher order polynomials or by more than two dimensions.

Future Directions

Our results are surprising in two senses. First, we show much lower dimensionality than that exhibited by most statistical analyses. This result is the consequence of our estimation being based on an explicit model of voting rather than applying standard multidimensional scaling packages in an ad hoc manner. The non-linear form of the voting model and the size of the database imply that large scale dynamic models can only be estimated by supercomputers. Use of supercomputers has thus led to a simpler and more attractive representation of data. Second, much of the mathematical, formal theory of political processes would suggest much less stability in voting patterns [Ordeshook, 1986]. Thus, our results present a broad set of regularities that will have to be reconciled in future theoretical developments.

One potential source of instability lies in the potential for a member of Congress to base his or her voting decision on the narrow interests of their electoral constituency or of some special interest group in contrast to, as our model claims, basing the decision on broadly based liberal-conservative considerations. To date, social scientists have had limited success in analyzing special interest voting if only because of the immense problems of measuring constituency interests on complex pieces of legislation. Supercomputing provides a line of attack on this problem in that we can look into, in simplified terms, whether a spatial voting error by a senator from one state is echoed by a similar error by the state's other senator. The result of such an investigation, our next supercomputing project, should provide a fairly complete categorization of roll call voting as it reflects broad-based, "ideological" dimensions and narrower "special interest" concerns.

References

Enelow, James M. and Melvin J. Hinich, The Spatial Theory of Voting: An Introduction, Cambridge Univ. Press, New York, 1984.

Ordeshook, Peter C., Game Theory and Political Theory: An Introduction, Cambridge Univ. Press, New York, 1986.

Poole, Keith T. and Howard Rosenthal, "A Spatial Model for Legislative Roll Call Analysis", American Journal of Political Science, 357-84 (1985).