Are These Boots Made for Walking?
Ideological Change among U.S. House Members

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ABSTRACT We construct a dynamic measure of House members’ ideology based on roll call votes that imposes fewer restrictions on the trajectory of a legislator’s career than the standard DW-NOMINATE procedure (Poole and Rosenthal 2007). Analysis of legislative behavior using this alternative measure of ideological movement reveals significant and predictable changes in behavior. Specifically, we find that members of the House of Representatives change their behavior in response to changes in the district and that they shift less the longer that they have served. Most surprisingly, we find that the alternative ideological scores produce aggregate measures of party strength and polarization that differ in significant ways from the measures created using DW-NOMINATE scores.

Introduction

A fundamental question in the study of democratic electoral systems is whether officials are responsive to the citizens that elect them. With respect to elected members of the U.S. Congress, there is a growing body of evidence that roll call votes of members are influenced by constituents’ ideological, policy-based preferences. Specifically, numerous studies have found that as constituents become more liberal, legislators’ votes and position taking becomes more liberal as well (Wright and Berkman 1986; Erikson and Wright 1997, 2001; Ansolabehere et al. 2001; Burden 2004; Griffin 2006). Scholars who have examined aggregate movement in party positions and policy outputs find corroborating evidence (Erikson et al. 2002). While responsiveness does not necessarily imply that elected officials are exactly representative of the citizens (Achen 1978; Griffin 2006; Bafumi and Herron 2010), there is significant evidence that elected officials are responsive to constituents policy preferences, or at least to a significant subset citizens in the district or state (Bailey and Brady 1998; Bishin 2000; Gerber and Lewis 2004; Griffin and Newman 2007; Clinton 2006; Bartels 2008, Ch. 9).

This responsiveness in part could be driven by elected officials responding to changes in public opinion and the policy preferences of their constituents.¹ Legislators may adjust their ideological orientation as they learn their constituents’ preferences, as constituent preferences change, or as the constituency changes through population growth, redistricting, or migration. On the flip side, legislators may become less responsive as their concern or desire to be reelected dwindles. While some scholars have found evidence that members of Congress do respond to shifts in public opinion and constituents (Rothenberg and Sanders 2000; Stratmann
2000; Griffin 2006; Crespin 2009), Poole (2007) vigorously declared, “that members of Congress die in their ideological boots.” The implication is that once elected, members of Congress do not alter their roll call voting behavior in any significant fashion.

In this paper, we challenge the claim that members of U.S. House are ideologically stagnant once they are elected. We argue that there are four significant factors that affect whether members will shift their ideological orientation. First, members may respond to changes in the composition of citizens in their districts, most notably changes that result from redistricting (Crespin 2009). Second, as tenure in office increases, a representatives’ knowledge of their constituents’ preferences increases implying the incumbents may gravitate and settle on a particular policy platform (Stratmann 2000; Ensley et al. 2009). Further, the longer serving members may be more constrained by their ideological reputation with their constituents, making changes in behavior less likely (Burden 2004). Third, members may be more likely to find reasons to shift their behavior when faced with a more competitive electoral process (Ansolabehere at al. 2001). Finally, members may be more likely to move when they have decided to retire from the House (Rothenberg and Sanders 2000).

To test these arguments, we consider an alternative dynamic measure of members’ ideology to the predominant measure developed by Poole and Rosenthal (1997, 2007), DW-NOMINATE. We discuss how the assumptions underlying the DW-NOMINATE procedure are ill suited for testing for hypotheses that explicitly examine if members will alter their behavior at different points in their career. To address these concerns, we advocate the use of a procedure that uses the NOMINATE procedure as the foundation for the ideological roll-call scores but we
use the procedure suggested by Groseclose et al. (1999) to make the adjustments necessary for comparisons over time (see Bernhard and Sala (2006) for an application).

We find that the measure of ideological movement created from the DW-NOMINATE scores either fails to uncover any significant relationship between a member’s roll call voting and factors that we anticipate would be associated with a change in behavior, or in some cases, we find a relationship that is counter to what we would anticipate. However, analyses of ideological movement based on the alternative dynamic measure reveal that there are significant and predictable changes in legislators’ behavior. Notably, we find that members of the House respond to changes induced by redistricting, that they move less the longer they have served in the House, and they move more once they have decided to leave office.

However, the most surprising finding we uncover using the alternative dynamic scores is how these subtle differences in individual legislator behavior aggregate. Specifically, we find a pattern of partisan polarization than differs in important ways than the pattern of partisan polarization reflected by the use of DW-NOMINATE scores. Further, we find that measures of intraparty heterogeneity (i.e., the standard deviation of legislators scores within a party) are substantively different across the two measures examined here. Given that testing theories of party competition and organization in Congress (such as Rohde (1991) and Aldrich’s (1995) conditional party government thesis) depend on accurate measures of concepts such as intraparty heterogeneity and partisan polarization, the results in this paper imply that scholars should be cautious and consider carefully which scores best reflect the concept(s) they are trying to measure.
Ideological Movement in Congress

At the end of their book Ideology and Congress, Poole and Rosenthal claim that one of the remaining questions in the literature on roll call voting in Congress is whether members change their ideological orientation over their career: “Do legislators learn their place in the space, in which case behavior will be more variable on early votes, or do they arrive with a pre-wired ideology?” (314, Poole and Rosenthal 2007). Recent work by Poole (2007) suggests that members move very little; members die with their “ideological boots” on.

While partisanship is a significant and consistent predictor of legislator behavior implying that members do not make large moves across the ideological spectrum (Ansolabehere et al. 2001), some scholars have argued that members do move in response to electoral pressures. These scholars focus on the electoral connection and the pressure that the reelection imperative places on members to stay in step with their constituents’ or risk losing support at the polls (Canes-Wrone et al. 2002; Kassow and Finocchiaro 2011). One source of district change that has received close scrutiny is the change that is induced by the decennial redistricting process in the U.S. Several scholars have provided evidence that as a member’s district becomes more liberal after redistricting that the member adopts a more liberal voting record (Glazer and Robbins 1985; Rothenberg and Sanders 2000; Stratmann 2000; Crespin 2009). This is a straightforward example of direct responsiveness: as the ideological and partisan composition of a member’s district changes, the pattern of that member’s roll call voting shifts in response to the change.

While members may move in response to changes in the ideological leanings of constituents wrought by redistricting, the importance of members’ ideological position to
reelection suggests that members may not exhibit much movement; the imperative to represent constituents will keep members anchored to their position. Rothenberg and Sanders (2000) demonstrate that the electoral connection creates stability in members’ behavior by analyzing what happens when the connection is severed. They show that when legislators’ decide to retire or to run for higher office that members move further in the ideological space (or in their terminology “shirk” more) than other members.

Another factor that may contribute to stability in ideological positions is the investment members’ have made in their ideological reputation. Simply put, members may pay a penalty for changing their ideological position once they have built a reputation with their constituents; fear of being branded a “flip flopper” may keep incumbents tied to their position. Burden argues that the costs associated with movement “are not even the same for all candidates. Public officials have reputations that constrain their movement ... If nothing else, their roll call records tie them concretely to sets of issue positions” (Burden 2004, 214). Given that many voters may not monitor congressional activities, it may not pay to pander to moderate swing voters. Instead, as Fenno (1978) suggests, it may be better to continue to appeal to the re-election constituency, or even more narrowly, to the core supporters. In other words, it may be best to continue to foster and maintain trust with the coalition that supported the incumbent in the previous election. The importance of reputation suggests why some scholars such as Poole (2007) find a small or non-existent response to redistricting: members’ are constrained by their previous actions. But the reputation effect should vary across members according to seniority. Thus, an observable implication of the reputation argument is that members should exhibit less
movement in their ideological positions over time. Thus, there should be a negative relationship between seniority and variability in members’ ideological location.²

Stratmann (2000) offers another reason that movement may decrease over the course of a legislator’s career. He argues that junior members in Congress have an informational disadvantage when compared to their more senior colleagues. More senior members have had time to learn their constituents’ policy preferences and adjust their behavior to match their constituents’ interests. On the other hand, junior members will be more likely to rely on cues from fellow partisans and other relevant actors until they have had the chance to engage, process, and learn what his of her constituents prefer. Stratmann (2000) predicts that members will exhibit more stability in their voting behavior the longer they serve the same set of constituents.

A final factor identified in the literature that may induce ideological movement among members of Congress is the competitive pressures in the electoral process. Ansolabehere at al. (2001) argue that members of Congress, as well as candidates for Congress, are closer to the median voter in the district when the election is expected to be close (see also Griffin 2006, Gay 2007). On the other hand, a legislator has leeway to vote as he or she wishes if the partisan and ideological makeup of the district is tilted too much in one direction. In districts where the opposition party has almost no chance of winning the election, incumbents have less incentive to be concerned about how each roll call will affect their electoral fortunes. With regards to ideological movement, the expectation is that members will adjust their position in response to electoral competition, or at least the anticipation that future competition may be significant.
As the competitive environment becomes more intense, there should be increasing movement in members’ ideological positioning.

Here we have identified four factors that might generate movement in members’ ideological positions. Specifically, we hypothesize that legislators will be more likely to change their ideological position: 1) the more the district changes as the result of redistricting; 2) if they decided or are forced to retire; 3) the less seniority they have in Congress; and 4) the more competitive their next election is expected to be. Each of these factors implies that the pressure to change will be different at different points in a member’s career. For example, the pressure imposed by redistricting will occur only when a member faces significant changes in district composition. The effect of reputation on ideological movement will grow the longer a member serves in the House; thus a member may move a lot early in his or her career and ceases to move later. Thus it is critical that a measure of legislator ideology allow for abrupt and irregular changes in behavior, as well for more gradual movements, if researchers are to detect whether factors such as seniority, redistricting, and retirement affect legislator behavior. The scores created from DW-NOMINATE preclude such irregular jumps in legislator ideology. We offer an alternative measure that allows for sudden as well as more gradual changes in legislator behavior.

**Scaling Roll Call Votes**

To test these hypotheses about responsiveness in members’ ideological positioning over time, we need valid measures of members’ ideology that can be compared across congresses. The key difficulty in creating dynamic measures of legislators’ ideology is that the position of
the average roll call and the range of the positions of the roll calls are likely to shift over time
due to changes in the roll call agenda caused by turnover in the rank-and-file membership and
the leadership, as well as due to changes in the greater political, economic, and social
environments. If the scores are not adjusted for fluctuations in the underlying scale caused by
changes in the agenda, researchers risk making false inferences (Groseclose et al. 1999; Carson
et al. 2004; Herron 2004). Since the roll call votes that are used as indicators to create the
ideological scores are not constant between congresses, we need to develop a method that will
anchor the underlying scale so we can make comparisons across time.

Poole and Rosenthal (1997) first addressed the issue with D-NOMINATE. DW-
NOMINATE is the updated version of this procedure. In order to make these dynamic
adjustments, Poole and Rosenthal (2007) make several assumptions. Within the context of
their random utility model for scaling roll call votes, NOMINATE (Poole and Rosenthal 1985),
they assume that members move in a linear manner over their career. Further, they add an
additional parameter to their scaling procedure that accounts for the pace of the linear change
(i.e., the slope of the line). Finally, the linear change assumption implies that members move in
only one direction over the course of their career, if they move at all. Poole and Rosenthal
(2007) note they have allowed for more flexible functional forms (e.g., quadratic) to model the
change over a members’ career but they claim that the estimated scores are virtually
unaffected by the more general specification.

Ideally, the method used for adjusting roll call voting scores should allow for dynamic
comparisons without imposing assumptions on movement as restrictive as linearity and
unidirectional change. This is particularly important if one is interested in testing hypotheses
that imply that the pressure for members to change occurs at uneven intervals or at different points in their career. In fact, Nokken and Poole (2004) recognized how limiting the assumption of linear, unidirectional movement can be when trying to analyze how members respond to changing circumstances. In their case, they were interested comparing how party switchers change relative to those members who stay with their party. Nokken and Poole (2004) used the DW-NOMINATE architecture to estimate a single score for each member and then estimated separate ideal points for each member in each Congress using the previously estimated cut points for the roll calls to anchor the estimates.

While the Nokken and Poole (2004) procedure might be a viable alternative, we advocate a simpler method that can be applied to many types of roll call scaling procedures. Specifically, Groseclose et al. (1999) define a procedure that allows a researcher to adjust roll call voting scores without strict assumptions on movement. They developed this procedure for adjusting the commonly used Americans for Democratic Action (ADA) voting scores. The ADA scores have several issues that make them deficient as a measure of legislator ideology. For one, the set of roll calls used to estimate the scores do not adequately span the policy space, which can make legislators appear more extreme than they actually are (Snyder 1992). Also, the scores are based on different roll call votes and thus are not directly comparable over time. The procedure advocated by Groseclose et al. (1999) was designed to overcome the flaws associated with the use of ADA scores. However, there is nothing specific about the procedure that necessitates the use of ADA scores. In other words, this procedure could be used to adjust any set of scores that measure members’ ideological positions within a given Congress relative
to other members (assuming that there at least some members who appear in multiple congresses).

To adjust the scores, Groseclose et al. (1999) assume that legislator scores can be adjusted via a linear transformation involving two parameters. The first parameter is the intercept shift that varies across years and the second parameter is the stretch factor that allows the scale to contract and expand across years. More formally, legislator's adjusted score in year \( t \), \( \hat{y}_{it} \), is related to a legislator’s nominal, unadjusted score, \( y_{it} \), via a shift parameter \( a_t \) and stretch parameter \( b_t \) and is given by:

\[
\hat{y}_{it} = \frac{y_{it} - a_t}{b_t}
\]

To create adjusted scores, therefore, we must estimate the shift and stretch parameters for each Congress. To do this, Groseclose et al. estimated a mean preference parameter, \( x_i \), which is a weighted average of the adjusted scores. The adjusted scores are allowed to vary by assuming that they are a function of the mean preference parameter, the shift and stretch parameters, and a random error term as follows:

\[
y_{it} = a_t + b_t x_i + e_{it}
\]

The errors are assumed to follow a Gaussian distribution: \( e_{it} \sim N(0, \sigma^2) \). The error terms thus allow the scores to adjust over time in response to idiosyncratic changes for each legislator. The errors are assumed to be uncorrelated across members, as well as being uncorrelated with past and future errors for each member.
The model proposed by Groseclose et al. (1999) is essentially an item-response model, where the test items are the scores derived from any scaling procedure. Each item (score) has a difficulty (shift) parameter and a factor loading (stretch parameter). To estimate the model, we must establish a baseline Congress. For the baseline, the intercept is set to 0 and the stretch parameter is set to 1. The values of the parameters estimated for the other congresses are relative to these values. The shift and stretch parameters, as well as the mean preference scores, are obtained via maximum likelihood. We estimated the model using the GLLAMM package in Stata (Rabe-Hesketh et al. 2004, 2005).

The key advantage of this procedure relative to the DW-NOMINATE procedure is that it imposes less restrictive assumptions on legislator movement. Specifically, each member’s position as indicated by the roll call record can move in a gradual manner, as well as in a more abrupt fashion in any direction. Therefore, we can now examine if members change direction over the course of their career, since this method does not impose a strict, linear functional form on movements. It allows members’ scores to move in a straight line or in a more haphazard, abrupt manner.

We leverage the Groseclose et al. (1999) procedure by combining it with scores estimated using W-NOMINATE, which is the static version of the Poole and Rosenthal scaling procedures (1985, 1997, 2007). In others words, we estimate roll call scores using W-NOMINATE on the full set of roll calls available for each Congress (see Poole et al. 2007 for information on the NOMINATE software package). We then adjust the scores using the Groseclose et al. (1999) procedure in order to make the scores comparable across congresses.
If we find differences between the scores derived from this procedure and results derived using the DW-NOMINATE scores, it is not attributable to set of roll calls used to construct the scores.

**A First Look at Adjusted W-NOMINATE Scores**

Although the assumptions used to make the Adjusted W-NOMINATE scores using the Groseclose et al. (1999) procedure and the DW-NOMINATE scores comparable across time are quite different, the two procedures generate quite similar scores. The correlation between the Adjusted W-NOMINATE and the DW-NOMINATE scores is approximately 0.96. There is some variance across the years with the lowest correlation between the two sets of scores occurring in the 91st Congress, where the correlation is 0.88. The strong relationship between the scores is not surprising given that the scores are based on the same scaling procedure and the same roll calls with the only key difference being how the scores are adjusted to make the scores comparable across time.

However, if we take a closer look at the scores we will see that there are some potentially interesting differences between members. First consider a few anecdotes illustrated in Figure 1, which show the career trajectories of three members and put the linearity assumption of DW-NOMINATE into question. The first example is Phil Crane (Figure 1A), a Republican from Illinois. Adjusted W-NOMINATE describes Phil Crane as having both conservative and moderate movements in his career as opposed to DW-NOMINATE, which portrays a steady but slight growth into conservative voting behavior.

A second example is Bill Clay (Figure 1B), an African-American Democrat from Missouri who served from 1969 to 2000. Based on the Adjusted W-NOMINATE scores, Clay started his
career with a very liberal voting record and moderated abruptly in the 99th Congress, and then gradually became more liberal after that. The DW-NOMINATE scores, however, paint a drastically different trajectory: Clay is portrayed as an average Democrat that slowly became more liberal over his career. A final example is Matthew Martinez (Figure 1C), a Democrat from California. The Adjusted W-NOMINATE scores indicate that Martinez became more conservative in the 106th Congress, which is when he repudiated the Democratic Party after a primary loss to Hilda Solis. The DW-NOMINATE records indicate Martinez had a career-long gradual slide toward moderate voting.

INSERT FIGURE 1

While these anecdotes may be potentially interesting and suggest that fitting a linear trend to a member’s career could be misleading, we certainly want evidence that these differences extend to a wider set of members. Consider that if we examine the changes within a legislator in adjacent congressional terms, we find that the two sets of scores are quite different. The correlation between the first differences (i.e., the change in a legislator’s ideology in consecutive terms) for the Adjusted W-NOMINATE and DW-NOMINATE scores is 0.15. Thus to the extent that there is substantively meaningful movement in legislators ideological positions that can be culled from the roll-call record, the lack of relationship between first differences suggests the two measures are capturing quite different dynamic components.

Potentially the best way to validate the Adjusted W-NOMINATE measure is to examine whether it helps us predict the behavior we would expect based on theory, as we do below. However, it is useful to see how the measure relates to other roll call measures of ideology. Here we compare both the Adjusted W-NOMINATE and DW-NOMINATE scores to ADA scores.
Despite the aforementioned issues in using ADA scores to measure legislator ideology, there is certainly valuable information provided by the scores. Further, assessing if either the Adjusted W-NOMINATE or DW-NOMINATE scores are better predictors of legislators votes across these substantively important issues is a valuable exercise. First, we compare the scores to the adjusted ADA scores provided by Anderson and Habel (2008), which rely on the same procedure for adjusting the scores advocated by Groseclose et al. (1999). Given the similarity of the adjustment procedure it is not surprising to find that the Adjusted W-NOMINATE scores are more highly correlated \((r=-0.93)\) with the Adjusted ADA scores than with the DW-NOMINATE scores \((r=-0.88)\).^4

However, it may be more interesting to compare the Adjusted W-NOMINATE scores and the DW-NOMINATE scores with the nominal ADA scores. The nominal ADA scores have not been adjusted to be comparable across time and thus represent a snap shot of a legislator's ideology at a given point in time. The comparison with the ADA scores provide an external referent on which to compare the dynamic measures. Figure 2 plots the correlation coefficient between the Adjusted W-NOMINATE and DW-NOMINATE scores and the nominal ADA scores for each session of each congress. The two panels in Figure 2 plot the correlation coefficient for the first and second session, respectively, of each legislative term between the 81st (1951-52) and 108th (2003-04) congresses.

\textit{Insert Figure 2}

There are several things to note about the correlations shown in Figure 2. First, except for the 84th (1955-56) and 85th (1957-58) congresses, the correlation between the Adjusted W-NOMINATE scores and nominal ADA scores is approximately 0.9. Second, although the
correlation between DW-NOMINATE scores and the ADA scores is also fairly high, the
correlation coefficient for the Adjusted W-NOMINATE scores are higher than the DW-
NOMINATE scores in almost every case. The only two exceptions of the 54 sessions shown are
the second session of the 84th Congress (1956) and the first session of the 85th Congress (1957).
As just indicated, neither sets of dynamic scores does a very good job at predicting the nominal
ADA scores roll calls in these two sessions, which were characterized by tension within the
Democratic Party on questions of civil rights. The set of roll calls used to calculate the 1956
ADA scores include the infamous Powell amendment (see Stewart 2001). Further, several of
the votes included in the 1957 ADA scores relate to questions of foreign policy (i.e. Eisenhower
Doctrine) and foreign aid, which are issues that often do not fall cleanly into the left-right
divide.

The third finding of note in Figure 2 is that the DW-NOMINATE scores do a much poorer
job of predicting nominal ADA scores between the 91st (1969-70) and 97th (1981-82)
congresses. During the time period that the Democratic Party was going through a significant
transition as conservative members were exiting the party and many Southern House seats
began to fall into Republican control (Rohde 1991), the DW-NOMINATE scores provide a less
reliable fit to the nominal ADA scores. On the other hand, the relationship between the
Adjusted W-NOMINATE score and the nominal ADA scores are unaffected by these
circumstances.

On the surface the Adjusted W-NOMINATE and DW-NOMINATE scores seem remarkably
similar. The high correlation between the scores is expected since the estimates are based on
the same set of roll call votes (see Poole 2007 for more on this). However, a closer examination
of the scores and where they differ provides some evidence that the method used to adjust roll call scores to make them comparable over time has important implications. In particular, it appears that changes across congressional terms in a legislator’s scores are quite different across the two measures. Further, the DW-NOMINATE scores are not as highly correlated with voting patterns on salient issues identified by the ADA scores, particularly during a time of high intra-party disagreement in the Democratic Party.

While these differences suggest the Adjusted W-NOMINATE scores may be more reliable indicators of legislator ideology, the best manner to validate the measure in this case is to assess whether the scores are related to theoretical concepts of interest. In the next section, we examine the link between ideological variability and several relevant concepts to determine if the Adjusted W-NOMINATE scores provide insights that diverge from those produced using DW-NOMINATE scores.

**Variability within Legislators**

To test if ideological movement decreases over a member’s career and responds to competition and redistricting, we analyze the change in the ideological position of House members who served in the 82nd to the 106th Congresses (note that we limit the analysis to this time frame given the availability of data from Levendusky, Pope and Jackman 2008). The dependent variable is the absolute value of the difference in a member’s roll call voting score in two adjacent Congresses. Thus, we are not interested in the direction in which members move; we are interested in knowing whether members change their position in either direction. We
use the DW-NOMINATE and Adjusted W-NOMINATE scores to measure ideology in each Congress.

**Independent Variables**

Earlier we identified four factors that vary across members over time that may affect variability in ideological positions. The first factor that may affect variability is a change in constituents due to redistricting. To measure the potential effect of redistricting on members’ movement, we measure the absolute Partisan Change in the districts’ partisan and ideological makeup using the measure of normalized district partisanship created by Levendusky, Pope, and Jackman (2008). This measure captures the partisanship of the district purged of short-term local and national forces. We calculate the absolute value of the change in the normalized partisanship variable from before to after the district lines were changed due to redistricting. We expect that the larger the change in the partisan makeup of the district, the more the incumbent will move in response to this change.

The second source of ideological variability is length of service in the House, where we anticipate that variability will deccese as seniority increases because of learning (Stratmann 2000) and reputation effects (Burden 2004). To test if ideological variability decreases over a member’s career, we measured the number of consecutive terms served by the incumbent. Following Stratmann (2000), we use the natural log of Seniority since we assume that the marginal effect of seniority on movement will decline with each additional term served.

The third factor we consider is the competitiveness of the electoral process. We include the incumbent’s share of the Previous Vote from the last election to control for any potential
effects that electoral safety has on a members’ roll call behavior. Since some incumbents did not face a challenger from the other major party in the previous election, we also include a dichotomous variable to indicate those incumbents who were \textbf{Uncontested} in the previous election (for the previous vote variable, these members are assigned a 0, implying that the variable has no effect for the uncontested incumbents). Another factor that may affect ideological variability is the decision to retire from the House or to run for higher office (Rothenberg and Sanders 2000). Further, we expect that incumbents will be more likely to move if they have been defeated in primary. We include a variable that indicates that is was the member’s \textbf{Last Congress} due to either retirement or defeat in the primary election.

Since the dependent variables are continuous, we use OLS regression to examine the absolute change in a members’ ideology. The model includes fixed effects for each district to control for the effect that a particular constituency may have on legislator behavior due to factors such as ideological and policy heterogeneity and demographic factors such as race, education, and income. Table 1 presents the results for the dependent variables using both the Adjusted W-NOMINATE and DW-NOMINATE scores.

\textit{Results}

The first set of regression results in Table 1 use the Adjusted W-NOMINATE scores to measure ideological variability. The results provide support for three of the four hypotheses about ideological variability. The hypothesis that does not receive support is the competitiveness hypothesis. The previous vote variable and the uncontested incumbent variable have coefficients that are in the expected direction but are statistically insignificant ($p =$}
0.97 and $p = 0.72$, respectively). The coefficients for the other three independent variables in
the model are in the expected direction and are statistically significant.

The coefficient on the partisan change variable is positive and significant ($p < 0.01$),
which indicates that the larger the shift in district partisan composition the more legislators will
move in the Congress following the redistricting. Thus, this is evidence of direct
responsiveness, as incumbents appear to adjust in response to an exogenously imposed
change. The second independent variable in the Adjusted W-NOMINATE model that is
significant is incumbent seniority. The coefficient on seniority is negative and statistically
significant ($p < 0.001$). The longer a member serves in the House, the less variable his or her
ideological orientation is as measured by roll call votes. This supports the hypotheses offered
by Stratmann (2000) and Burden (2004) that we should see less variability in members’ roll call
behavior over time because of learning, experience, and the development of an ideological
reputation. The final variable that achieves statistical significance ($p < 0.001$) is the coefficient
for the last Congress dummy variable. As Rothenberg and Sanders (2000) showed, we find that
the severing of the electoral connection through retirement leads to larger shifts in members’
roll call behavior.

The substantive effect of the variables is modest but meaningful. For example, a
member in his of her last congress is likely to move about 0.015 units on the scale, which is the
equivalent to a move of about 5 to 10 positions in the rank order of legislators if we focus
around legislators in the middle of their party. Similarly, a move of two standard deviations on
the partisan change variable produces a move of about 5 rank order positions and a member
that has served 10 years moves approximately 5 rank order positions less than a new member.
The regression of ideological movement using the DW-NOMINATE scores is the second set of results presented in Table 1. The partisan change variable has a positive coefficient as we would expect but the coefficient is not statistically significant. Two of the variables are statistically significant: seniority and last congress. However, each of the variables has a coefficient that has the opposite sign than expected. Seniority is positive, which indicates members that have served longer in the House exhibit more movement. The dummy variable for the last term in Congress is negative indicating that retiring and defeated members are less likely to move. Both of these results stand in contrast to the results presented for the Adjusted W-NOMINATE scores, as well as existing research (Stratmann 2000; Rothenberg and Sanders 2000). The result for seniority likely results from fitting a linear trend to a member’s career trajectory, where members whom have served longer will be more likely to have a significant slope to the trend line. The statistically significant coefficient for the last Congress variable likely indicates a difference between members who have yet to retire as of the 106th Congress in comparison to other members since the linear trend does not allow members to change more or less at the end of their career.

Discussion

The regression using the Adjusted W-NOMIANTE scores demonstrated a link between seniority, redistricting, and retirement and ideological variability. The model using the DW-NOMINATE scores either failed to uncover a link between these factors and ideological variability or produced results that contradicted the results obtained using the Adjusted W-NOMINATE. Clearly, the method used to make ideological scores derived from roll call votes has
important consequences. Given the restrictive assumptions imposed on movement in the DW-NOMINATE procedure, we believe that procedure advocated by Groseclose et al. (1999) provides a better alternative for adjusting scores.

The differences between these models also suggest the key distinction between the findings of Stratmann (2000) and Poole (2007) is not the use of ADA scores. Poole (2007) noted that a potential reason Stratmann (2000) found a significant relationship between redistricting and ideological movement was that he used adjusted ADA scores. Poole (2007) noted that since the scores are based on a small, non-randomly selected set of roll call votes, the “coarseness of the ADA scores” is the likely source of the differences when comparing analyses using NOMINATE to those using ADA adjusted scores (Poole 2007, fn. 14). However, given that Adjusted W-NOMINATE procedure used same set of roll calls employed in the creation of the DW-Nominate scores, but still uncovered a significant effect for redistricting, the key difference appears to be the method used to make the scores comparable across time.5

It also worth noting that link between seniority and decreased ideological variability may be due to a selection effect. Simply put, incumbents that have served a long time in the House may have either stumbled upon a good position or discovered a good position through experience and learning. Once a member has happened or discovered upon the good location they have no incentive to move and will likely be re-elected until some other factor overrides ideological positioning such as large national swing against the incumbents party (Ensley et al. 2009). Further, incumbents that are out of step may be more likely to retire, thus reinforcing this pattern of results. Future researchers may want to try to parse out the potential
endogeneity created through strategic retirement and electoral selection of better-matched incumbents.

**Aggregate Measures based on Roll Call Scores**

The results regarding the members’ roll-call behavior demonstrates that the assumptions used to create dynamic measures of legislators’ ideology can lead to substantively different assessments. Further, even though these differences may appear small compared to the overall predictability of roll call behavior, these small individual differences can produce large aggregate differences. Simply put, when we create measures to characterize the relative location of the parties, as well the heterogeneity within the major political parties, the Adjusted W-NOMINATE and DW-NOMINATE measures create substantively different measures. This is critical because there are many theories of American politics that rely on these aggregate measures. For example, one prominent theory that utilizes both of the characteristics is the conditional party government thesis (Rohde 1991; Aldrich 1995).

Here we show that both of these measures, polarization and intraparty homogeneity, are affected by which procedure one uses to estimate dynamic roll-call scores for the period from 1951-2012. First consider the polarization measure. If we calculate the mean score of legislators from the same party across time, as illustrated in Figure 3, we find that measures are similar but far from identical.

Further, if calculate the difference between the scores for the two parties, i.e. the polarization between the parties, we see a quite different pattern as illustrated in Figure 4. The
correlation of the difference in party means polarization measure is 0.915 (and 0.949 for
distance between party medians). But the high correlations, mask interesting patterns in the
differences. The DW-Nominate measure provides a picture of a gradual divergence between
the parties, whereas the polarization measure documented using the Adjusted W-NOMINATE
scores shows that the parties were polarized in the 1950’s but that polarization declined
through the 1960s. In particular, the Adjusted W-NOMINATE measure shows that parties were
more polarized prior to 1964 than the DW-NOMINATE scores. Given that middle of the 1960’s
were critical moments in terms of the transformation of the parties with respect to the role of
civil rights and race in American politics (Carmines and Stimson 1989; Aldrich 1995), the pattern
associated with the Adjusted W-NOMINATE scores is reasonable and compelling.

We also sought to verify the validity of the polarization measure using public opinion
data. The American National Election Studies has asked survey respondents to place both
parties on a seven-point ideological scale. Using the provided sampling weights, we calculated
the average difference in the placement of the parties on the ideological scale for each year
provided between 1972 and 2004 (the questions were not asked in 2002). Unfortunately, the
ANES did not ask the ideological placement questions prior to 1972. We found that the
correlation between the survey measure of polarization and the Adjusted W-NOMINATE
polarization measure was higher ($r = 0.73$) than the correlation between the survey measure
and the DW-NOMINATE measure ($r = 0.63$).

Perhaps just as interesting as the differences we found in polarization across the two
measures is how different the measures are with respect to internal partisan heterogeneity.
Theories of conditional party government hold that the majority party is more likely to empower its leaders when the parties are farther apart and less internally heterogeneous, where heterogeneity is often measured by the standard deviation of ideological scores within a party. Figure 5 illustrates that there are significant differences in the standard deviation of the party members’ ideological positions created from the two sets of scores. The correlation of the partisan heterogeneity measures for the Republicans is less than 0.5 and the correlation for the Democrats is about 0.75. Further, the two sets of scores differ over which party is more heterogeneous since 1994. The DW-NOMINATE series suggests that the Democrats were more heterogeneous than the Republicans until the 104th Congress. After the Republicans took over the House, Democrats became more cohesive as an opposition party. Adjusted W-NOMINATE describes a Democratic Party that more closely adheres to that old Will Rogers adage about their organizational abilities (“I am not a member of any organized political party. I am a Democrat.”), since only briefly for the 101st Congress (1989-90) are the Democrats less heterogeneous than the Republicans.

**INSERT FIGURES 3-5**

It is notable that the relative positions of the Democrats and Republicans are revered using the two measures from the 104th Congress onwards. The adjusted scores conform the prevailing belief that the Republicans are a more ideologically cohesive group than the Democrats, whereas the DW-NOMINATE scores suggest that since the mid-1990s that Democratic Party is more cohesive than the Republican Party. Clearly both parties have become more homogenous since the 1960s but which party is more cohesive has importance in terms if their ability to be successful in the legislative process. The results based on the Adjusted W-
NOMINATE scores indicate that Republicans appear to be advantaged given their relative homogeneity.

**Conclusion**

We have argued that DW-NOMINATE scores are inappropriate for testing models of ideological change given the strict assumptions about movement imposed by the estimation procedure. We have offered an alternative measure of ideology that is less restrictive in terms of movement over time but takes advantage of the NOMINATE procedure of Poole and Rosenthal (1985, 1997, 2007). The method of creating dynamic scores advocated by Groseclose et al. (1999) was applied to static W-NOMINATE scores. The resulting scores are similar to the DW-NOMINATE scores but differ in important ways.

Using the new scores, we have found evidence that House members do alter their voting behavior in response to changes wrought by redistricting. Further, we also found evidence that members are less likely to change their position the longer they serve in the House but once they retire or are defeated in a primary election that they are more likely to change. Members maintain fairly stable positions over the course of their career, which is not surprising given the importance of reputation as well the strength of the electoral connection. However, members are not completely stuck in the same position.

Perhaps most surprising is that these subtle differences across members that DW-NOMINATE masks can lead to important differences when the scores are aggregated. Given the
importance of measures of polarization and intra-party heterogeneity to testing theories of party governance (e.g., Schickler 2000; Lebo et al. 2007), this indicates that scholars should be mindful of the assumptions that underlie the scores. It is feasible that DW-NOMINATE scores are appropriate for some tests. If scholars believe that appropriate measure is one that provides a long-term summary of a member’s ideology that is comparable across time and members, then the DW-NOMIANTE may be best. However, if the researcher needs a measure of ideology that allows members the chance to respond to short-term forces, as well as longer-term pressures, then the Adjusted W-NOMINATE scores discussed in this paper are a more appropriate choice.
References


### Table 1: Regression of Variability in Legislator Ideology

**Adjusted W-NOMINATE**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
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<tbody>
<tr>
<td>Partisan Change</td>
<td>0.0067</td>
<td>0.0020</td>
<td>0.001</td>
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<tr>
<td>Seniority</td>
<td>-0.0069</td>
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<td>0.000</td>
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<tr>
<td>Previous Vote</td>
<td>-0.0004</td>
<td>0.0117</td>
<td>0.969</td>
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<tr>
<td>Uncontested</td>
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<td>0.0085</td>
<td>0.722</td>
</tr>
<tr>
<td>Last Congress</td>
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<td>0.000</td>
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<tr>
<td>Constant</td>
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<td>0.0081</td>
<td>0.000</td>
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</tbody>
</table>

| N                | 8402        |
| R²               | 0.40        |

**DW-NOMINATE**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partisan Change</td>
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<td>0.000</td>
</tr>
<tr>
<td>Previous Vote</td>
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<td>0.697</td>
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<tr>
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<td>0.000</td>
</tr>
<tr>
<td>Constant</td>
<td>0.0087</td>
<td>0.0008</td>
<td>0.000</td>
</tr>
</tbody>
</table>

| N                | 8402        |
| R²               | 0.80        |

Dependent Variable is absolute value of the change in the legislator's score.

Fixed-Effects for Congressional District in both models.
Figure 1. Selected Members’ Voting Trajectories using DW-NOMINATE and Adjusted W-NOMINATE

(A) Phil Crane
the long serving Illinois Republican

(B) Bill Clay
Long Serving Democrat from Missouri

(C) Matthew G. Martinez
the mostly Democratic Representative from California
Figure 2. Correlation of Adjusted Roll Call Scores with Nominal ADA Scores
Figure 3

Party Means 1951-2012
using DW-NOMINATE & Adjusted W-NOMINATE

Figure 4

Polarization 1951-2012

difference in DW-NOMINATE & Adjusted W-NOMINATE Party Means

Figure 5

Standard Deviation by Party 1951-2012
using DW-NOMINATE & Adjusted W-NOMINATE

Endnotes

1 Erikson et al (2002) offer a stronger version of this argument noting that elected officials may anticipate changes in constituents’ preferences could generate responsiveness to public opinion.

2 It is possible that seniority could lead to more variability in roll calls; the longer members have served in office the more political capital they will have, which would provide slack to pursue more specific policy goals. Members might build-up a personal vote based on the delivery of “pork” and the provision of constituent service in order to mitigate the negative consequences of casting a vote that is out of line with their constituents’ policy preferences. However, this effect may be mitigated if the electoral process is an efficient mechanism for holding members accountable. As Rothenberg and Sanders (2000) note, there is a selection effect – members that are in line with their constituents’ preferences are more likely to survive.

3 If the range of roll calls remained constant across time (i.e. the scale does not stretch as described by Groseclose et al. 1999) but the position of the average roll call does vary over time one could adjust for the shift in the average position by including fixed effects for years if the legislator’s revealed position is the dependent variable of interest (Groseclose et al. 1999; Carson et al. 2004).

4 The adjusted ADA scores provided by Anderson and Habel (2008) are provided for the first and second session of each congress separately. The correlations reported here are based on the average of the two scores for each congress. However, if we look at the correlations for each session separately, the correlation coefficients are nearly identical.
It’s important to note that this methodological choice about how to adjust scores is not grounded in the spatial model which undergirds NOMINATE.