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“Ideological Extremism, Branding, and Electoral Design: Multimember versus Single Member Districts”

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Ideological Extremism, Branding, and Electoral Design:
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Abstract

Formal theory suggests single member districts incentivize candidates toward policy positions at their constituency median while multimember districts encourage dispersion. How do these electoral incentives effect substantive representation? Linking spatial electoral theories with ideological branding to motivate our hypotheses, we directly examine the relationship between single and multimember districts and roll-call voting. We generate chamber comparable ideal point estimates in eight Arizona state legislative sessions. Arizona offers a natural experiment because each legislative district chooses one senator and two representatives in single member and multimember contests respectively. We develop new measures of legislative and district extremism, testing formal propositions regarding the impact of electoral structures. Our results are substantially less supportive of the formal theory than those of prior studies.

Electoral structures are among the most important institutional arrangements involved in shaping the incentives that drive legislators' behavior. In addition to national governments, American state legislatures provide considerable institutional variation for testing theories of legislative representation, and one such institution is the multimember district (MMD) wherein more than one legislator is elected from the same district in the same election. Though the single member district (SMD), in which a single legislator represents one geographic district, is employed in the British Parliament, U.S. House and most U.S. state legislatures, several state legislatures are chosen via MMD balloting. Although there can be considerable variation in MMDs among the states, one common structure is multiple candidate competition for two seats representing a single district, with the two candidates receiving the most votes being elected. The electoral game is quite different when a candidate is likely to be running against members of other parties as well as another candidate of the same party. The incentives inherent in such a system diverge from those for a legislator in an SMD, and it likely that such incentives have an impact on legislative representation.

How does MMD affect substantive representation? To address this question, we blend two important theories—ideological branding and candidate positioning—in hypothesizing that a legislator's credible commitment to an ideological "brand name" in an MMD campaign translates into roll call voting patterns that reflect that ideology. Thus, theories of candidate position-taking during a campaign have testable implications for roll call voting behavior. We examine such behavior for Arizona state legislators from 1995 to 2002. Arizona provides a natural experiment for the effect of MMD because not only is the Arizona House chosen through a free-for-all MMD election while the Senate faces a SMD system, but the geographic lines for both House and Senate districts precisely overlap. Thus, in Arizona, two MMD representatives and one SMD senator represent each constituent.

Results from formal theoretical models suggest MMD legislators will move away from the median voter under certain conditions (Cox 1984; 1990a; 1990b; 1997), but there are few empirical examinations of how MMDs affect floor voting behavior in state legislatures (Adams 1996; Jewell 1982a; 1982b; Richardson, Russell, and Cooper 2004). These empirical studies have relied on interest group ratings, interviews, or a few select roll-call votes as indicators of legislator ideology, but none have used large numbers of roll calls over several legislative sessions (e.g., Wright and Schaffner 2002). We seek to test the hypothesis that MMDs influence legislative roll call behavior by generating W-NOMINATE scores with bootstrapped standard errors (Lewis and Poole 2004) as ideal point estimates based on roll calls in eight recent sessions of the Arizona legislature (1995-2002).

By selecting roll calls in which the House and Senate vote on precisely the same language of proposed legislation, we construct ideal point estimates that are scale comparable across chambers. Using these estimates, we test the impact of the electoral mechanism on candidate positioning by examining extremism among legislators representing the same constituents and as measured against per-session median legislators with both quantile regression analysis as well as standard deviation and variance ratio tests. To our knowledge, our research design provides the most rigorous test of the impact of SMD versus MMD electoral incentives on substantive representation yet performed. We find little support for the specific hypotheses in Cox (1990a) regarding the number of candidates in an election, but more support for the more general notion that MMD legislators reveal more extreme positions. It appears that ideological branding leads candidates in the MMD Arizona House to take more extreme positions in roll-call voting than SMD Senate candidates.

We begin with a review of the literature on MMD and SMD electoral institutions, followed by an examination of scholarship on state legislative representation. This is followed by a discussion of prior efforts to empirically estimate the effect of MMD on extremism. We then turn to ideological branding and to the formation of hypotheses regarding the effect of branding on the roll call voting patterns of MMD and SMD legislators once in office. The estimation results follow, and the paper concludes with some brief summary remarks.

Legislative Representation in Multimember Districts

Though proportional representation and hybrid systems are prevalent across nations, multimember district systems have a long history in the American states. As Klain (1955, 1113) notes "for nearly a century after the Declaration of Independence the American states elected by far the greater part of their law-makers in multiple constituencies." The use of MMDs flourished in the first half of the twentieth century up until the 1960s when their use declined as a result of voting rights legislation and court decisions. In the 1950s, 36 state legislatures employed MMDs for 45 percent of legislative seats (Klain 1955), and in 1962 about 46 percent of legislators were elected from MMDs (Cox 1984). Because partisan or racial minorities could be outvoted by the majority in all races within an MMD even though they could have a large enough percent to win in an SMD carved from the larger MMD, many states abandoned the MMD. The percent of legislators from MMDs nationwide had dropped to 26 percent of all representatives and 7.5 percent of senators by 1984 (Niemi, Hill, and Grofman 1985). After the redistricting efforts caused by the 2000 census, fewer than 10 states used MMD systems with free-for-all elections involving multiple candidates.

States have employed a number of types of MMD over the years, with Arizona using the bloc with partial abstention system.[1] A bloc system institutes a free-for-all election in which multiple candidates compete simultaneously for two or more seats, and the candidates with the most votes win the seats. Voters must use both of their votes on different candidates in a bloc MMD election, but an important variation includes partial abstention. In this electoral structure, voters may choose to cast only one vote or up to the

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[1] The major variations include bloc, bloc with partial abstention, cumulative, staggered, and seat, but within these structures, the district magnitude, or number of seats in a district, can vary across states and even within a state. Cox (1990b) argues that cumulative systems offer very different strategic considerations for candidates than bloc MMDs. Scholars have argued that the staggered and seat varietals are not true MMD because they essentially involve SMD elections occurring in the same geographic district (Cox 1984; Hamm and Moncrief 1999, 148; Niemi, Jackman and Winsky 1991, 97), but they are often mistakenly used in analyses of MMD effects on representation.

limit allowed. In the Arizona House (with a district magnitude of two), as many as two Democrats, two Libertarians, two Greens, and two Republicans could vie for the two available seats. Those seats are awarded to the two candidates with the highest vote totals in the district. In a tight four-candidate race, then, a winning candidate may garner as little as 26 percent of the votes cast in the election.[2]

The vast majority of studies examining the spatial theory of elections have focused on SMD systems. Nonetheless, research on MMD systems provides ample evidence that most variations of MMD generate incentives for candidates to move away from the median voter. Using a variety of assumptions about rules, voters, and the number of competitors, formal models have identified equilibria distant from the position of the median voter (Eaton and Lipsey 1975; Denzau, Katz, and Slutsky 1985; Greenberg and Shepsle 1987). In the most comprehensive examination of MMD rules, Cox (1990a; 1990b) introduces the concepts of *centripetal* (centrist-directed) and *centrifugal* (extremism away from the center) forces to characterize the incentives inherent in various electoral systems. In a unidimensional spatial model with candidates characterized by typical assumptions (e.g., single-peaked preferences, sincere voting), bloc with partial abstention provides centrifugal forces away from the median voter with as few as 4 candidates in a two-seat MMD (Cox 1990b, 917). Cox shows further that more candidates should lead to more dispersion from the median.

The Empirical Analysis of Extremism

The hypothesis that MMDs lead to more extreme legislators in a chamber has received little empirical verification. Much of the work has been done in the comparative context with various MMD

[2] Consider general election returns reported by the Arizona Secretary of State during the period from which our data are drawn. Of the 240 elections between 1994-2000, 58 had two, 88 had three, 76 had four, 16 had 5, and 2 had six candidates. Among the two-candidate races, the average vote percent accrued by the winning candidate was 48.98 percent, while that number fell to 38.23 percent in three-candidate, 32.29 percent in four-candidate, 30.32 in five-candidate, and 24.5 percent in six-candidate races. In the 94 races with four or more candidates, the average vote percent for the winner was 31.79 percent.

arrangements, institutional rules and political cultures that may or may not reflect the realities of American state legislatures. Cox (1997) examined the implications of his spatial models with case studies in nations having various forms of MMD, where he found evidence supporting the extremism hypothesis. Similarly, in two studies of Chilean MMDs, Dow (1998) and Magar, Rosenblum, and Samuels (1998) also find support for the extremism hypothesis. In the American context, Schiller examined the U.S. Senate (a staggered MMD) and finds evidence that "a combination of electoral incentives and institutional forces … push senators [from the same state] in contrasting directions" (Schiller 2000, 4).

The extremism hypothesis has received less attention in the literature on American state politics. One possible effect generated by MMD is that political parties could be different in chambers with members elected in MMD versus SMD elections. To address this issue, Adams (1996) employed formal logic in arguing MMDs do not provide the same incentive to converge on the median voter as SMD. In all but the rarest of cases, Adams (1996, 137) argued, MMDs "should increase the ideological variance across a party's pool of nominees." Using ratings of Illinois legislators calculated by an interest group both before and after a switch from MMD to SMD, Adams finds evidence that parties were more ideologically diverse during the years with the MMD system. This finding is suggestive, but has several limitations. First, it uses only one interest group's rating as a measure of legislator preferences. Second, the Illinois legislature used a cumulative MMD system, which was unique at the time it was in place, has not been used in any state since 1982, and generates different incentives for legislators' behavior than the more prevalent bloc with partial abstention form of MMD (Cox 1990b).

Richardson, et al. (2004) test for ideological extremism in the Arizona state legislature and provide evidence for the ideological extremism hypothesis. Using a scale of interest group endorsements as a measure of legislator preferences, the authors compare the distribution of preferences in the MMD House and SMD Senate, the differences between legislators within the same geographic districts, and the distributions across party caucuses. The results are suggestive of the impact of MMDs, but their measure of ideology is based on interest group endorsements, and interest group scores have several major limitations (Fowler 1982). First, the interest group score is an ordinal rather than a continuous variable such as our roll-call based measures. Less variation – their scale has a range of only nine values -- can mask extremism, which is precisely the subject of the formal propositions we examine. A change in endorsement from one or two groups would have a large impact on whether someone is classified as ideologically extreme. Critically, however, they test only for chamber differences, but do not test specific formally-derived hypotheses regarding candidate competition.

Though the extremism hypothesis has been examined using voting behavior after candidates facing MMD and SMD elections take office, the link between the electoral positioning incentives shown by the Cox (1984; 1990a; 1990b) spatial models and roll call voting behavior has been theoretically weak. It is to this question that we now turn.

The Impact of MMD on Roll-Call Voting

Scholars have connected legislator ideology to positions taken in roll-call voting in a wide variety of studies by making the straightforward assumption that legislators vote sincerely on proposals, thereby revealing their preferences over those proposals (Krehbiel and Rivers 1988, 1156; see also Poole and Rosenthal 1997; Clinton, Jackman, and Rivers 2004; Londregan 2000). A straightforward linkage between rational legislators' campaign positions and their voting behavior in office can be made through a theory of *ideological branding*: Candidates' ideological reputations make their campaign commitments more credible, but also constrain them as legislators to positions taken on the campaign trail. This result holds even though other inducements to deviate from such positions are present during their terms in office (Dougan and Munger 1989).

A candidate may have complete control over the position he or she announces, but variance from that position imposes costs. Enelow and Hinich (1981; 1984) posit that voters view each candidate as a probability distribution with a mean located at the candidate's announced position during the campaign.

Ingberman (1989) shows that though the incumbent is a less risky candidate (more certainty about the mean through reputation) than the challenger in the eyes of the voter, the candidate is constrained to policies because his or her ideological reputation makes departures from that position less credible. Beyond this, divergence devalues the incumbency advantage generated through the building of an ideological reputation. Enelow and Munger (1993) demonstrate that a candidate's electoral chances are determined by his or her ideological reputation and credibility. Disadvantages in one can be offset by advantages in the other. Thus, they conclude, "a candidate's record is both a liability and an asset. It enables voters to predict what a candidate will do in office, but it also restricts the candidate's ability to move in the policy space" (Enelow and Munger 1993, 771).

These studies provide a logic, based solely on the electoral connection, whereby the position a candidate takes on the campaign trail is closely related to those taken on proposed legislation once in office. Because MMD legislators face centrifugal incentives in taking campaign positions, should they respond to those incentives, ideological branding commits them to reveal extreme preferences on legislation once in office. Of course, legislators develop a "home style," use constituent service, and generate a "personal vote" to create credibility for variance from the announced mean of their spatial distributions (e.g., Fenno 1978; Cain, Ferejohn, and Fiorina 1987; Jewell 1982a). But, the conditions facing contemporary state legislators in many states—and particularly in Arizona—reduce their ability through "presentation of self" to create the trust with their constituency necessary for "voting leeway" (Fenno 1978, 151).

One factor reducing the power of presentation of self is the lack of legislative professionalism. Members of Congress and legislators in more professional institutions, such as the Pennsylvania legislature, have more staff resources, higher salaries to support full-time legislative activities, and longer sessions to provide constituent services (Squire 1992). These resources help legislators to secure reelection (Berry, Berkman, and Schneiderman 2000), but legislators in many states in the middle range of legislative professionalism, such as Arizona, do not enjoy these resources (King 2000).[3]

Term limits may also inhibit a legislator's presentation of self. Term limits were enacted in Arizona as a result of an initiative passed by voters in 1992, limiting legislators in both chambers to no more than four consecutive two-year terms with no lifetime ban. Conceptually, term limits reduce the incentive for legislators to provide constituent service, "keep in touch" with constituents, spend time on casework requests, and garner "pork" project allocations (Carey, Niemi, and Powell 2000a, 51-56). These effects may be compounded for legislators in MMDs, such as Arizona House districts, where the probability of incumbency reelection diminishes due to their lack of monopoly representation of districts and reduced name recognition (Carey, Niemi, and Powell 2000b; Cox and Morgenstern 1995). The electoral environment facing Arizona legislators may provide them with little room or incentive to move away from their stated ideological positions.

It might be argued that term limits provide an alternative hypothesis regarding extremism apart from issues of branding or electoral mechanisms. However, Carey, et al. (2000, 34) find that "the initial effects of term limits on state legislator ideology appear to be marginal, if not negligible." Additionally, the first Arizona legislators to be turned out of office as a result of term limits left at the end of the 44th legislature (2000).[4] Our data include roll calls from the 42nd through 45th legislatures (1995-2002), and thus covers periods both pre- and post-implementation. Consequently, we can assess this alternative hypothesis in the procedures described below.

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[3] Arizona is considered a hybrid legislature—neither professional nor citizen—with a score of .279 on King's (2000) professionalism scale. By comparison, the professional legislature in Pennsylvania has a score of .403, and the citizen legislature in North Dakota has a score of .108.

[4] Turnover in the three elections (1994, 1996, 1998) prior to the full implementation of term limits in 2000 is 31 percent, as compared to 28 percent for the previous six elections (Moncrief, Niemi, and Powell 2003). There is also little movement from the House to Senate, with only 8 percent of House members running for Senate seats during the elections in our sample.

Hypotheses and Methods

Our general research question relates the effect of multimember districts to the revealed ideological extremism of legislators in roll call voting. Testing our hypotheses requires a measure of legislators' ideological preferences. The use of revealed preferences in office provides a rich source of data for the careful testing of theories of electoral regimes. Roll call voting in the legislature provides data for the calculation of ideal point estimates for the measurement of revealed ideology (Poole and Rosenthal 1997) that allows us to test several hypotheses on the relationship between MMDs and ideological extremism. We test two versions of extremism, which we shall call (a) *legislative extremism* and (b) *district extremism*.

Legislative extremism is measured relative to the legislative median as the absolute difference between the ideal point estimate of representative *i* and the ideal point estimate of the median member of the legislature. It captures the concept most students of legislative politics identify as ideological extremism, identifying the most conservative and most liberal legislators as the ideological extremists relative to the median legislator. This view of ideological extremism, however, does not reflect whether a particular legislator is extreme relative to his or her district constituency. If a liberal legislator represents a liberal district, then the legislator's roll call record reflects the district median preference for liberal policies.

District extremism is defined as the absolute difference between representative *i* and the median representative of district *j*, where district *j* is represented by three legislators, one senator and two representatives. We invoke the median voter theorem (Hotelling 1929; Downs 1957) to equate the ideal point estimate of the senator in district *j* with the revealed spatial location of the median voter in district *j*. The median voter theorem shows that a candidate in an SMD election must ideologically converge to the median to win. By this logic, elected Arizona senators represent the median district policy preferences. Because senators and representatives are elected in precisely the same geographic districts, the senator's ideal point derived from roll-call patterns can serve as a theoretically valid proxy for district preferences for both of the representatives in the district. Therefore, we can compare each representative's ideal point estimate to that of the senator from his or her district as a measure of extremism relative to the constituency median.

Cox (1990b, 916, Proposition 2) derives the very specific prediction that for a bloc MMD with partial abstention, such as the Arizona House, three competitors in the election is associated with candidate positions around the median voter in the district, but the presence of more than three competitors induces dispersion of positions in the policy space. Because the median voter theorem holds that an SMD election produces candidates whose spatial positions converge on the median voter in the district, it follows that through ideological branding, it is expected that the Senator, elected in an SMD election, reveals an ideology in roll call voting at the spatial position of the median voter in his or her district. Because Cox's (1990b) Proposition 2 is shown relative to the median voter in the district, we can construct the following hypothesis.

> **H1:** Members of the Arizona House in a four or more-candidate race in the most recent general election reveal more *district extremism* than those elected in a 3-way race.

Though not a direct prediction of Cox (1990b, Proposition 2), we also hypothesize that such extremism may be represented at the legislative rather than the district level.

> **H1a:** Members of the Arizona House in a four or more-candidate race in the most recent general election reveal more *legislative extremism* than those elected in a 3-way race.

The effect of challenger magnitude on the extremism of legislators may not be expected to fall equivalently on the entire distribution of district representatives' ideal point estimates. To test hypotheses H1 and H1a, we construct quantile regression models to estimate the effect of the number of candidates in an election on specific locations in the distribution of legislators for our dependent variable, district extremism. The dependent variable "folds" the ideal point estimates for a member of the district's House delegation around the ideal point estimate of the Senator from that district, such that extreme low (more liberal) or extreme high (more conservative) relative estimates are likewise represented at higher values of district extremism.

Quantile regression permits an examination of whether legislative extremism depends on the number of electoral competitors at each quantile (percentile) along the conditional distribution of the dependent variable (Koenker and Bassett 1978). Because our hypotheses specify the effect of covariates on ideological extremism, it is reasonable to anticipate that more or less extreme legislators may be differentially impacted by these covariates. Ordinary least squares (OLS) regression presents "a grand summary for the averages of the distributions corresponding to the set of x's" (Mosteller and Tukey 1977, 266). An OLS analysis, then, would poorly estimate the conditional mean for the least and most extreme legislators in the sample (Koenker and Hallock 2001, 147). Moreover, truncating the sample by segmenting the dependent variable is "doomed to failure for all of the reasons so carefully laid out in Heckman's (1979) work on sample selection" (Koenker and Hallock 2001, 147).

More precisely, we analyze some quantile, τ, for which a weighted least squares regression is performed such that the residuals (the difference between the observed value of the dependent variable and the linear predictor) are weighted by $w_i = 2\tau$ if the residual is positive and $w_i = (2 - 2\tau)$ if the residuals are less than or equal to zero. By way of example, for $\tau = .20$ (the 20th percentile of the distribution of the dependent variable), $w_i = .40$ for positive residuals and $w_i = 1.60$ for negative residuals. The least absolute deviation estimation procedure minimizes an asymmetric loss function defined by the residuals and the weights (see e.g., Manski 1988, Section 4.2.4; Koenker and Bassett 1978).[5] The major advantage of quantile regression is that it permits examination of the full conditional distribution of the dependent variable including extreme ideological positions central to

[5] The estimation was performed in STATA 9.0 using the sqreg routine, which produces estimates of the entire variance-covariance matrix by randomly resampling the data. This permits hypothesis testing within and across equations (i.e., $\tau = .10, .20$, etc.). Bootstrapped uncertainty estimates obtained in this manner are superior to those derived analytically, since the latter may be biased given heteroskedasticity (Koenker and Bassett 1982).

the propositions we examine. Least squares regression permits only an analysis of the central tendency of that distribution.

We include two district demographic measures as control variables in the legislative extremism models. *Income Polarization* is the absolute value of household income in the legislator's district minus the median household income of Arizona legislative districts. *Racial Polarization* is the absolute value of a district's percent minority minus the statewide median percent minority. Both control variables are folded to test for the impact of extremity of the district constituent demographic characteristics.

We test hypothesis H1 by measuring the effect of two dichotomous variables. The variable *2 Candidates* indicates that a House member was elected in a 2-candidate, noncompetitive race in the most recent election, while *4+ Candidates* indicates that a representative's most recent election involved four or more candidates (with the reference category being a 3-candidate race). Testing the hypothesis requires examining the 4+candidate variable and its sign, anticipated to be positive, relative to the 3-candidate referent. As noted above, quantile regression allows us to avoid the assumption that the influence of competition in MMD elections operates in the same way at all parts of the distribution of revealed ideological extremism. We can, rather, empirically evaluate this effect.

Hypothesis H1 is a specific prediction of the impact of electoral system type on ideological extremism, but a more general research question goes to whether legislators in an MMD chamber are ideologically distinct from those in an SMD-elected chamber. As noted, members of the Arizona Senate are elected from a SMD that corresponds exactly to the geographic district lines of the MMD represented by members of the Arizona House, permitting a test of the effect of the differing electoral systems on the extremism of the legislators they elect.

> **H2:** Members of the MMD House exhibit more *legislative extremism* than members of the SMD Senate.

To test this hypothesis, we again estimate quantile regressions with a dummy variable for *senate* membership, controlling as before for income and racial polarization effects. We expect the senate variable to achieve statistical significance in higher quantiles of the distribution of the dependent variable.

In a related vein, Cox (1990a, 196) suggests the more general expectation that in MMD elections, "more candidates lead to greater dispersion." To test for this broader concept, we use a measure of the number of candidates in the general election in a quantile regression predicting the district extremism of House members. Because the original proposition refers to the median voter in the district, we employ our measure of district extremism in the test.

> **H3**: A House member elected in a district with more candidates will exhibit more *district extremism* than one elected with fewer candidates.

Another measure of the impact of electoral system on ideological extremism is simply to compare the dispersion of ideal points in the two chambers. If MMDs induce extremism, we would expect the dispersion of the ideal point estimates in the MMD House to be larger than those for members of the SMD Senate.

> **H4:** The dispersion in the ideal point estimates of the MMD House is larger than the ideal point dispersion in the SMD Senate.

Building on the theory advanced by Cox (1990b), Adams (1996, 129) posits that parties elected in a state legislative chamber using MMDs, in all but the rarest of cases, will be "more ideologically diverse than those elected under single member plurality," ceteris paribus. Adams shows formally that extremism at the district level aggregates into extremism in the party caucus. Although Adams uses interest group scores, we apply his test to our ideal point estimates for each of the party caucuses in both chambers. Because groups emphasize a limited number of issues that may present a misleading and polarized picture of legislative decisionmaking (Fowler 1982), our roll call based measures make it less likely that we will find polarization and serve to strengthen the implications of our results.

> **H5:** The dispersion in the ideal point estimates for a given party caucus in the MMD House is larger than the dispersion of the ideal point estimates for the same party in the SMD Senate.

Several caveats on the significance of support for these hypotheses are in order. First, the Cox (1990b) argument involves candidates in the election rather than floor behavior so our use of ideal point estimates is an imperfect translation of electoral spatial position onto a legislative policy space. Theoretically, as we have stated, significant findings are also evidence of the effect of ideological branding. If candidates make one set of campaign statements and subsequently break those promises in office, then ideological inconsistencies from the campaign to roll-call voting reduce the likelihood of finding ideological extremism based on electoral system. Thus, we must be clear that we are testing a combined theory of ideological branding and centrifugal force in MMD. Second, agenda setting in the legislature may reduce the likelihood of finding chamber differences because our estimates account only for those bills that survive the process until a floor vote. Third, the number of legislators (90 in each session) is rather small so it may be more difficult to attain significant results. Finally, partisanship may affect ideological extremism in the form of pressure from party leaders. Regardless of the source of such pressure or whether it cautions moderation or extremism, it may nonetheless reduce the likelihood of finding effects.[6] We note in summary that these factors may reduce the likelihood of finding empirical support for the hypotheses listed above.

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[6] For example, in Arizona a scandal led to the resignation of Republican Governor Fyfe Symington in 1997, and the unelected Republican Governor Jane Hull may not have been as influential in shaping the legislative agenda of the 44th session. Subsequently, in the 2000 election, Democrat Janet Napolitano was elected Governor to face a strong majority of Republicans in the House and an evenly divided Senate.

Estimating Legislator Ideal Points

Our study uses roll call data from the 42nd through 45th Arizona legislatures (1995-2002), which are publicly available on the Internet. An important issue for producing scale comparable ideal points is the "bridging" of observations across chambers (e.g., Poole 2005, ch. 6; Bailey and Chang 2001). Our hypotheses require ideal point estimates that are comparable for both members of the House and Senate. We accomplish this task through the selection of roll calls included in the dataset. To bridge the chambers, we chose roll calls in which one chamber voted on precisely the same version of a given bill as was considered in the last vote in the opposite chamber. The third reading of a bill in the House was matched with a final reading in the Senate with no new amendments or vice versa. Thus, the vote in the Senate and the vote in the House were cast on proposals having *identical* language. The dataset does not include votes on amendments, bills in which only one chamber voted, or votes prior to a conference committee. Nonetheless, it is important to point out that the bills could have been amended in either chamber prior to the final reading that was used in our dataset.[7] We treat votes from both chambers on each identically worded proposal as a single roll call, and thus bridge all observations in our dataset. Our dataset includes one roll-call matrix for each session (year) in which the legislature met between 1995 and 2002.[8]

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[7] Though it might be argued that this selection method throws out some contentious issues, the average majority margins on selected roll calls are not substantially larger than margins in the U.S. Senate. As an extreme example, they are roughly 15 percent higher than those in the highly contentious 106th Senate, which was characterized by the party-switch of Jim Jeffords from the Republican Party to an independent.

[8] We avoid pooling roll-call data across both sessions in a legislature because the uncertainty reduction due to the increased sample size does not outweigh the benefit of a greater number of temporal observations on the ideal point estimates. The average number of roll calls in the analysis for each year was 113. As Table 1 (uncertainty descriptives) and Tables 3-5 (estimation results) suggest, pooling across years is empirically unwarranted because bootstrapped standard errors on the ideal point estimates are not unreasonably large nor do the impacts of the covariates across sessions yield similar results.

To produce single-session, chamber-comparable ideal point estimates, we followed the procedure for generating W-NOMINATE estimates. Though we do not employ them in the quantile regression analyses, we generated bootstrapped standard errors (see Table 1; Lewis and Poole 2004). The process begins by running the W-NOMINATE routine until it converges. Then, the probabilities for the observed roll call votes are calculated, and a matrix with legislators as rows and roll call votes as columns is created, with the cells containing the probabilities of each observed vote choice. A random draw of roll calls is then created by (a) drawing from a $U(0,1)$ distribution, (b) recording the sampled value as the "observed" choice if the random draw is less than or equal to the probability calculated subsequent to the W-NOMINATE run, or (c) recording the *opposite* of the sampled value as the "observed" choice if the random draw is greater than the probability calculated. This generates a sampling roll call matrix, on which W-NOMINATE is run. One thousand random draws and W-NOMINATE runs on the sampling matrices are performed, and variances are calculated from these bootstrap trials. To account for uncertainty in estimation, we define an ideal point estimate for legislator i as the mean value of the first dimension point estimates for legislator i across all 1000 trials described above. Following convention, we set the standard for exclusion at participation in less than 20 roll call votes.

We chose Kenneth Cheuvront (D-25th District) as "left" (liberal) on the single dimension recovered in each legislative session between 1995 and 2002 for the purpose of identifying the W-NOMINATE estimation routine (Poole and Rosenthal 1997). Drawing on interest group scores and media accounts, we selected Cheuvront as consistently liberal. As a simple check on the face validity of the ideal points, we compared the first dimension scores to a variety of interest group scores across the years, such as the National Federation of Independent Businesses and the Arizona League of Conservation Voters. These unreported results suggest face validity.

Summary statistics for all ideal point estimates and covariates appear in Table 1. The larger standard errors in the 1997 and 1999 sessions serve as additional justification for using the means of the bootstrapped trials, rather than a single W-NOMINATE estimate, to account for uncertainty. Fit statistics for the W-NOMINATE procedure are included in Table 2. The percent of roll calls correctly classified by the spatial model ranges from 87.1 percent to 90.2 percent. The average proportional reduction in error (APRE) indicates how the classification of roll call votes using a purely spatial voting model improves on a null model under which legislators all cast identical votes. The APRE indicates the extent to which classification results achieved by the use of a spatial model of voting improve upon classification results using an unsophisticated point of reference, such as a model that predicts all members to vote identically. Higher APRE indicates better classification. Finally, the geometric mean probability (GMP) is a distance sensitive measure that imposes greater penalties on classification errors further away from the cutting lines on the roll calls in the dataset. GMP is calculated as the exponentiated average log-likelihood across all roll calls. The high GMPs (ranging from .724 to .782) suggest votes consistently classify according to the spatial model. For purposes of comparison, the one-dimensional spatial model produces an average GMP of .682 across the history of the U.S. Congress (Jenkins 1998, 1156). Overall, the fit statistics suggest the spatial model of voting is sufficiently evident in the behavior of the Arizona legislators over the roll call votes in the sample so that our scores are reasonable estimates of legislator ideology.

Results

Quantile regression estimates are presented in Table 3 through Table 5. They include estimates of the coefficients of quantile functions, $Q(\boldsymbol{\tau})$, where $\boldsymbol{\tau} = \{.10,.20,.30,.40,.50,.60,.70, .80,.90\}$ as well as OLS (mean regression) estimates. Each table includes p-values for all regression results reported. OLS p-values are based on Huber-White-Sandwich robust standard errors, and the R^2 is reported for each OLS model estimated. We do not present the results of our control variables, racial and income polarization, but generally observe that racial polarization is a positive and significant predictor of legislative extremism in many sessions and quantiles. Income polarization is rarely significant with mixed directional impact.

Legislative Extremism

The results presented in Table 3 make it possible to test Hypothesis H1a for each of the eight legislative sessions in our sample. Hypothesis H1a predicts that four-or-more-candidate races induce more legislative extremism (represented by positive coefficients). The dependent variable employed to measure legislative extremism is the absolute difference of a legislator's ideal point estimate from the median of the legislature, House and Senate. Consequently, higher quantiles in the distribution of the dependent variable capture the most ideologically extreme legislators such that the hypothesis suggests the 4+ candidate variable will be significant and positive in the upper quantiles, i.e., τ = .70, .80, and .90.

A quick glance of Table 3 makes it readily apparent that no significant coefficients show the hypothesized positive direction for the 4+ candidate variables. Indeed, only the OLS (mean) estimate for the 42nd second session is significant, but *negative*, indicating—contrary to hypothesis H1a—that legislators elected in races having four or more candidates were *less* extreme in their voting records than their counterparts elected in three-candidate races. Significant results for the two candidate coefficients in the 42nd first session are in the hypothesized negative direction, but those in the 45th first session show a positive effect. Overall, the results presented in Table 4 provide virtually no support for the specific candidate competition hypothesis in the context of legislative extremism.

The results in Table 4, which compare the legislative extremism of House versus Senate members (Hypothesis H2), provide much stronger evidence for the influence of MMD electoral regimes on legislative extremism. Membership in the SMD Arizona Senate is significantly associated with less legislative extremism than membership in the MMD Arizona House in most quantiles in seven of the eight sessions (excepting the 43rd second) shown in Table 4.

The quantile function estimation is performed via least squares, so coefficients can be interpreted as the marginal change in the τth quantile for a marginal change in an independent variable. This does not, however, imply that a legislator whose ideal point falls in the τth quantile would still have been measured there if the value of a particular independent variable changed (Koenker and Bassett 1978). So, the magnitude of quantile regression coefficients is interpretable, but with caution. Given that caveat, we note that the coefficients are large relative to the dependent variable. For example, most of the senate coefficients for the 44th legislature's second session are approximately .35. Overall, it appears that extremism relative to the legislative median is related to the electoral system that selects representatives, and the effect of the more generally formulated Hypothesis H2 is much stronger than the specific impact of the number of candidates in a particular race from Hypothesis H1a.

District Extremism in the House

Given the median voter theorem, as noted above, we take the ideal point estimate of a district's Senator (SMD) as representative of the median voter in the district. Our measure of district extremism among members of the House is the absolute difference between a House member's ideal point estimate and that of the Senator from his or her district. As with our measure of legislative extremism, the most extreme legislators, conservative or liberal, will be indicated by the highest values in the distribution of the dependent variable. Hypothesis H1 states that legislators elected in a race with 4 or more candidates in the most recent general election should be associated with more district extremism than those elected in three-candidate races. Hypothesis H3, like H2, is more general; facing more candidates in the general election leads to more extreme positioning, which, through ideological branding, corresponds to a more extreme legislative voting record relative to the district median. As indicated by the results presented in Table 5, neither hypothesis H1 nor H3 is strongly supported in the context of district extremism.

The first row below each labeled legislative session in table 5 offers evidence regarding hypothesis H1 -- the impact of 4+ candidates on district extremism. Results from the 43rd second session are supportive in only the 10th percentile, while those from the 45th first session likewise show significant positive 4+ candidate effects for the 50th and 60th percentiles. Results for the 44th first session are also supportive, with 2-candidate races negatively associated with district extremism in the 50th through 80th quantiles of that measure. These results are contradicted, however, by significant and negative coefficients in the 42nd second session. Further, the absence of significant results for all quantiles of four sessions and only one significant quantile in a fifth session offers reason to reject hypothesis H1a.

Hypothesis H3—more candidates are associated with greater district extremism—receives no support in any session as seen in the second row below each session label in table 5. The number of candidates variable is never significant and the coefficients often run counter to the hypothesized direction of impact. Overall, the effect of numerical candidate competition in MMD elections on district extremism is nonexistent.

Dispersion of Legislator Ideal Points

Our remaining hypotheses relate to the dispersion of candidate ideal point estimates across chambers (H4) and in party caucuses across chambers (H5). If MMDs produce more extreme legislators than SMDs, we expect a greater dispersion of ideal point estimates across the House relative to the Senate (H4). The first two columns of Table 6 indicate the standard deviation of the distribution of ideal point estimates in each chamber for each legislative session. Beneath the standard deviations for each session, the p-value of a variance ratio test is presented for a null hypothesis that the standard deviations of House and Senate ideal point estimates are equal against the alternative hypothesis that the standard deviation of House members' ideal points is greater than that of Senators. As Table 6 shows, the dispersion of House ideal point estimates exceeds that of the Senate in seven of the eight sessions, and the standard deviation of House estimates is significantly larger in five sessions.

Similarly, Table 6 presents the standard deviations and variance ratio test results comparing the party caucuses in each chamber. Columns four and five compare the Democratic caucus in each chamber by session. The ideal point estimates of House Democrats are more widely dispersed than those of Senate Democrats in four of the eight sessions, and that difference in dispersion is significant only once.

Alternatively, House Republicans have significantly more dispersion in their ideal point estimates than their Senate counterparts in six of the eight sessions.

The evidence for the effects proposed in H5 is more complex than hypothesized, with clear support from the Republican caucus but virtually no support in the Democratic caucus. This finding differs from Adams' (1996) results, which revealed no party caucus differences. We note, however, that an important dynamic characterized the time period in our sample. Democrats were a minority in the House (20-24 of the 60 House members in each of the eight sessions), and constituted a minority in the 42nd, 43rd, and 44th Senates (9, 12, 14 of 30 senators respectively). Democrats were numerically tied with Republicans for control of the 45th Senate. Democrats were a substantial minority in the House throughout the sampled sessions, so their caucus may have required more cohesion than the large Republican House majority, which consistently exhibits greater variation in ideal point estimates. Interestingly, the ideal point estimates of Senate Republicans vary considerably during the 1999 session but not in 2000 even though they held the majority in both years. In 2001 and 2002, when sharing control of the Senate with Democrats, these Republican caucuses show a much tighter dispersion of ideal point estimates. Partisan control may therefore have some impact on the potential for a party to exhibit ideological extremism, but House party caucuses generally show more dispersion than their Senate counterparts, particularly for the majority party.

Conclusion

Electoral structures provide the crucial link in a representative democracy between the preferences of the citizenry and decisions made by their representatives. In this study, we examined the impact of one electoral structure, multimember districts in a bloc with partial abstention form, on the ideological extremity of Arizona state legislators as expressed in roll call votes. This study identified a natural experiment for the examination of theories of MMD versus SMD elections, namely that MMD elections are conducted for the Arizona House and SMD elections for the Senate in geographically redundant districts. We extended the reach of the electoral theories of Cox and others to the voting behavior of legislators once in office by incorporating theories of ideological branding. Once a candidate takes a position on the campaign trail, incentives flow from the electoral connection that hold him or her to roll call voting patterns that are consistent with the ideology he or she revealed in the race for office.

We find strong support for the general notion that MMD elections produce more ideologically extreme legislators as well as a chamber with wider variances in ideal point estimates relative to one elected by SMD elections. These general results are generally consistent with previous findings (Adams 1996; Richardson et al 2004). Strikingly, however, the more precise predictions regarding numerical candidate competition in elections derived by Cox (1990a; 1990b) generally are not supported. This is a new and, we believe, significant finding. Moreover, the extremism that these electoral institutions produce is displayed more starkly in the legislature as a whole rather than in individual districts. Finally, the results suggest majority party caucuses display greater variation in the comparison of the MMD House to the SMD Senate than does the minority party in the same comparison; a result at odds with Adams's (1996) findings.

Several interesting implications flow from our results. Research on legislative representation in MMDs has focused more directly on descriptive rather than substantive concerns, but clearly they also have an important impact on substantive representation. Scholars have found evidence that MMDs reduce minority representation (Herrick and Welch 1992; Grofman, Migalski, and Noviello 1986; Moncrief and Thompson 1992, but see Rule 1992) but may increase the number of female legislators in state legislatures (Arceneaux 2001; Darcy, Welch, and Clark 1985, 1987; Hogan 2001; King 2002; Rule 1990, but see Welch and Studlar 1990). Overall, the evidence suggests MMDs produce a different distribution of legislators, and our study provides support for a substantive effect as well. We believe our results suggest the importance of future work on the substantive impact of electoral institutions on representation.

Another implication of our research is that electoral structure may interact with partisan control of a legislative chamber in shaping ideological extremity. Some attention has been devoted to the impact of MMDs on party caucuses, but it has primarily focused on whether MMDs reduce minority party representation (Walker 1976; Rosenthal 1981, 15; Niemi, Hill, and Grofman 1985). Our findings suggest the ideological extremity related to electoral structure occurs in the majority party caucus rather than the minority party caucus in the MMD House, but more research will be needed to determine if this is a unique feature of Arizona politics, a result of legislative agenda control or a consequence of minority party strategic efforts. Because caucus members from the same district must compete against each other in a multimember district election, legislators in an MMD environment face very different incentive structures for partisan cooperation as well as motivation to maintain distinct ideological brands in roll call voting.

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Table 1: Summary Statistics for Ideal Point and Uncertainty Estimates

Session	Mean		Std. Dev.	
	IP estimate	Bootstrapped Std. Err.	IP estimate	Bootstrapped Std. Err.
42nd, 1st Regular (1995) N=88	.069	.113	.591	.023
42nd, 2nd Regular (1996) N=89	-.097	.137	.524	.025
43rd, 1st Regular (1997) N=90	-.017	.193	.492	.047
43rd, 2nd Regular (1998) N=89	.026	.145	.593	.028
44th, 1st Regular (1999) N=90	.005	.182	.583	.060
44th, 2nd Regular (2000) N=90	.016	.128	.555	.030
45th, 1st Regular (2001) N=91	-.193	.138	.525	.028
45th, 2nd Regular (2002) N=88	-.273	.141	.510	.021

Table 2: Spatial Fit Results for Initial W-NOMINATE Estimates by Legislative Session, 42nd - 45th Arizona Legislatures (1995-2002)

	Percent Correctly Classified	APRE	GMP
42nd, 1st Session (1995)	.881	.396	.746
42nd, 2nd Session (1996)	.878	.362	.747
43rd, 1st Session (1997)	.883	.405	.751
43rd, 2nd Session (1998)	.877	.310	.724
44th, 1st Session (1999)	.874	.401	.736
44th, 2nd Session (2000)	.871	.383	.735
45th, 1st Session (2001)	.902	.446	.782
45th, 2nd Session (2002)	.896	.463	.781

Table 3: Quantile Regression Analysis of Legislative Extremism for 2 or 4+-Candidate Elections

Variable	τ =.10	τ =.20	τ =.30	τ =.40	τ =.50	τ =.60	τ =.70	τ =.80	τ =.90	μ
										N=59
42nd First										R^2=.48
2 Candidates	-.153	-.160	-.248	-.239	-.234	-.209	-.227	-.286	-.269	-.176
	(.413)	(.264)	(.049)	(.039)	(.033)	(.071)	(.045)	(.004)	(.026)	(.028)
4+ Candidates	-.250	-.257	-.190	-.126	-.146	-.165	-.149	-.189	-.143	-.152
	(.264)	(.100)	(.156)	(.294)	(.123)	(.083)	(.182)	(.163)	(.419)	(.094)
										N=59
42nd Second										R^2=.39
2 Candidates	-.206	-.028	-.116	-.126	-.013	-.175	.006	.007	-.044	-.055
	(.228)	(.851)	(.374)	(.332)	(.101)	(.204)	(.963)	(.950)	(.658)	(.574)
4+ Candidates	-.179	-.149	-.124	-.175	-.163	-.247	-.220	-.146	-.150	-.166
	(.131)	(.115)	(.198)	(.106)	(.222)	(.082)	(.091)	(.223)	(.160)	(.029)
										N=60
43rd First										R^2=.31
2 Candidates	.019	-.081	-.051	-.044	-.148	-.052	.052	-.014	-.125	-.011
	(.908)	(.641)	(.752)	(.785)	(.338)	(.692)	(.674)	(.911)	(.313)	(.903)
4+ Candidates	.131	.066	.041	.078	.076	.044	.101	.093	.042	.069
	(.181)	(.577)	(.771)	(.531)	(.510)	(.665)	(.376)	(.447)	(.746)	(.407)
										N=59
43rd Second										R^2=.31
2 Candidates	.021	.043	.093	-.065	-.020	-.052	-.034	-.051	-.065	-.009
	(.895)	(.813)	(.599)	(.638)	(.880)	(.696)	(.794)	(.573)	(.404)	(.913)
4+ Candidates	.021	-.007	.009	-.025	.015	.087	.121	.055	.047	.032
	(.845)	(.963)	(.958)	(.855)	(.912)	(.542)	(.302)	(.527)	(.498)	(.696)
										N=60
44th First										R^2=.02
2 Candidates	.283	.111	-.006	.059	.103	-.004	-.006	.022	.011	.032
	(.242)	(.604)	(.966)	(.659)	(.410)	(.971)	(.958)	(.821)	(.894)	(.715)
4+ Candidates	.213	.003	.007	-.008	.028	-.140	-.134	-.106	-.038	-.021
	(.318)	(.988)	(.966)	(.950)	(.830)	(.417)	(.388)	(.422)	(.707)	(.821)
										N=60
44th Second										R^2=.04
2 Candidates	.061	.073	.084	.165	.171	.013	.021	-.009	.030	.077
	(.705)	(.672)	(.642)	(.338)	(.287)	(.920)	(.870)	(.935)	(.731)	(.431)
4+ Candidates	-066	-.023	-.052	.080	.100	.015	-.050	-.119	-.096	-.037
	(.689)	(.903)	(.815)	(.705)	(.613)	(.920)	(.738)	(.299)	(.366)	(.745)
										N=60
45th First										R^2=.17
2 Candidates	.432	.334	.255	.379	.364	.257	.263	.217	.296	.327
	(.009)	(.047)	(.079)	(.010)	(.016)	(.087)	(.087)	(.231)	(.099)	(.005)
4+ Candidates	.066	.006	-.060	-.010	-.031	-.078	-.066	.035	.232	.006
	(.518)	(.956)	(.569)	(.929)	(.807)	(.608)	(.722)	(.882)	(.273)	(.958)
										N=59
45th Second										R^2=.08
2 Candidates	.129	.085	.016	.149	.116	.133	.127	.363	.097	.145
	(.353)	(.535)	(.914)	(.363)	(.420)	(.559)	(.631)	(.206)	(.687)	(.304)
4+ Candidates	.182	.187	.045	.024	.027	-.082	-.052	-.058	-.056	-.022
	(.116)	(.145)	(.704)	(.833)	(.835)	(.634)	(.811)	(.849)	(.823)	(.851)

The conditional densities for each decile of legislator ideology are estimated: τ = 0.10 denotes the 10th percentile and so forth; μ denotes the conditional density of the mean estimated via OLS regression with robust standard errors. OLS R^2 for the mean regression is included. Constant and demographic terms are not reported. Coefficients significant at the .05 level or better are indicated in grey.

Table 4: Quantile Regression Analysis of Legislative Extremism with a Comparison of House and Senate Members

Variable	τ =.10	τ =.20	τ =.30	τ =.40	τ =.50	τ =.60	τ =.70	τ =.80	τ =.90	μ
42nd First										N=88 R^2=.45
Senate	-.035	-.066	-.143	-.170	-.196	-.161	-.163	-.197	.013	-.102
	(.745)	(.336)	(.038)	(.007)	(.003)	(.023)	(.041)	(.083)	(.935)	(.084)
42nd Second										N=89 R^2=.36
Senate	.013	-.110	-.088	-.078	-.161	-.160	-.132	-.087	-.020	-.120
	(.876)	(.200)	(.233)	(.287)	(.042)	(.057)	(.107)	(.351)	(.856)	(.017)
43rd First										N=90 R^2=.45
Senate	-.117	-.116	-.178	-.213	-.318	-.343	-.378	-.381	-.398	-.276
	(.044)	(.052)	(.007)	(.010)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
43rd Second										N=89 R^2=.21
Senate	.073	-.023	.015	-.019	-.006	.009	.023	.060	.030	.015
	(.440)	(.850)	(.898)	(.841)	(.948)	(.926)	(.791)	(.342)	(.528)	(.805)
44th First										N=90 R^2=.03
Senate	.113	-.025	-.108	-.142	-.156	.145	-.177	-.106	-.086	-.087
	(.299)	(.757)	(.165)	(.041)	(.017)	(.051)	(.056)	(.285)	(.179)	(.109)
44th Second										N=90 R^2=.23
Senate	-.224	-.177	-.324	-.342	-.398	-.349	-.353	-.346	-.376	-.280
	(.007)	(.057)	(.000)	(.000)	(.000)	(.000)	(.000)	(.001)	(.013)	(.000)
45th First										N=91 R^2=.12
Senate	-.072	-.066	-.110	-.164	-.171	-.119	-.182	-.267	-.330	-.168
	(.280)	(.322)	(.085)	(.025)	(.013)	(.105)	(.051)	(.005)	(.000)	(.007)
45th Second										N=88 R^2=.19
Senate	-.049	-.214	-.222	-.242	-.213	-.256	-.316	-.300	-.694	-296
	(.549)	(.000)	(.000)	(.000)	(.001)	(.001)	(.002)	(.070)	(.001)	(.000)

The conditional densities for each decile of legislator ideology are estimated: τ = 0.10 denotes the 10th percentile and so forth; μ denotes the conditional density of the mean estimated via OLS regression with robust standard errors. OLS R^2 for the mean regression is included. Constant and demographic terms are not reported. Coefficients significant at the .05 level or better are indicated in grey.

Table 5: Quantile Regression Analysis of District Extremism

Variable	τ =.10	τ =.20	τ =.30	τ =.40	τ =.50	τ =.60	τ =.70	τ =.80	τ =.90	μ
										N=58
42nd First										R^2=.02
2 Candidates	.033	.016	.024	-.008	-.171	-.121	-.202	-.166	-.409	-.107
	(.398)	(.802)	(.771)	(.946)	(.160)	(.321)	(.151)	(.376)	(.078)	(.192)
4+ Candidates	-.044	-.020	.053	.045	-.021	-.027	-.037	-.036	.086	-.015
	(.519)	(.840)	(.629)	(.696)	(.848)	(.799)	(.788)	(.867)	(.734)	(.871)
										N=58
										R^2=.02
Number of	-.038	-.015	.031	.027	.089	.078	.065	.124	.040	.046
Candidates	(.226)	(.761)	(.527)	(.599)	(.177)	(.298)	(.428)	(.242)	(.790)	(.312)
42nd Second										N=59
										R^2=.23
2 Candidates	.006	.039	-.012	.008	-.087	-.121	.028	-.044	-.079	-.059
	(.917)	(.547)	(.874)	(.943)	(.557)	(.512)	(.901)	(.805)	(.674)	(.483)
4+ Candidates	-.066	-.114	-.167	-.185	-.304	-.342	-.395	-.407	-.337	-.261
	(.079)	(.001)	(.000)	(.006)	(.000)	(.000)	(.002)	(.001)	(.088)	(.000)
										N=59
										R^2=.00
Number of	-.006	-.038	-.039	.011	.006	-.017	-.070	-.043	.051	-.001
Candidates	(.828)	(.150)	(.197)	(.806)	(.910)	(.805)	(.440)	(.629)	(.607)	(.978)
43rd First										N=60
										R^2=.02
2 Candidates	-.019	-.052	-.167	-.091	-.211	-.184	-.087	-.127	-.137	-.099
	(.841)	(.638)	(.163)	(.477)	(.120)	(.179)	(.469)	(.326)	(.321)	(.236)
4+ Candidates	.019	-.064	-.135	-.105	-.137	-.171	-.005	-.034	.021	-.038
	(.805)	(.525)	(.227)	(.383)	(.281)	(.205)	(.967)	(.770)	(.950)	(.646)
										N=58
										R^2=.00
Number of	.010	-.010	-.026	-.051	-.083	-.051	.013	-.008	.075	.002
Candidates	(.535)	(.638)	(.429)	(.319)	(.228)	(.545)	(.871)	(.917)	(.416)	(.964)
43rd Second										N=59
										R^2=.01
2 Candidates	.021	-.023	.087	.000	-.067	.005	-.138	.072	.167	.029
	(.720)	(.784)	(.446)	(1.000)	(.716)	(.980)	(.628)	(.801)	(.501)	(.805)
4+ Candidates	.110	.084	.155	.079	-.035	.104	-.042	-.142	.083	.058
	(.047)	(.214)	(.139)	(.547)	(.811)	(.502)	(.819)	(.470)	(.668)	(.514)
										N=56
										R^2=.00
Number of	.030	.036	.011	.022	-.031	.017	.016	-.092	-.059	.004
Candidates	(.199)	(.209)	(.791)	(.672)	(.665)	(.852)	(.880)	(.422)	(.511)	(.914)

Table continued on next page

Variable	τ =.10	τ =.20	τ =.30	τ =.40	τ =.50	τ =.60	τ =.70	τ =.80	τ =.90	μ
										N=60
44th First										R^2=.05
2 Candidates	-.070	.014	-.016	-.129	-.359	-.344	-.401	-.482	-.444	-.183
	(.181)	(.871)	(.891)	(.446)	(.036)	(.043)	(.012)	(.007)	(.102)	(.075)
4+ Candidates	-.048	.009	.003	-.115	-.344	-.285	-.162	.194	.250	-.016
	(.342)	(.914)	(.980)	(.506)	(.066)	(.254)	(.641)	(.544)	(.165)	(.897)
										N=60
										R^2=.01
Number of	.000	-.007	.007	.006	.000	.023	.013	.113	.060	.019
Candidates	(.988)	(.621)	(.525)	(.614)	(.990)	(.542)	(.850)	(.182)	(.370)	(.441)
44th Second										N=60
										R^2=.03
2 Candidates	.033	-.081	-.128	-.108	-.109	-.051	-.089	-.046	-.249	-.084
	(.721)	(.467)	(.290)	(.317)	(.386)	(.718)	(.512)	(.722)	(.211)	(.325)
4+ Candidates	-.019	-.078	-.118	-.038	.011	-.062	-.118	.145	.061	.036
	(.826)	(.508)	(.346)	(.725)	(.932)	(.680)	(.609)	(.582)	(.847)	(.750)
										N=60
										R^2=.00
Number of	-.018	-.008	-.010	.001	-.005	-.026	-.034	.028	.045	.006
Candidates	(.297)	(.654)	(.452)	(.965)	(.861)	(.471)	(.423)	(.639)	(.569)	(.776)
45th First										N=60
										R^2=.04
2 Candidates	.070	.161	.134	.120	.129	.192	.178	.261	.001	.123
	(.440)	(.115)	(.204)	(.258)	(.285)	(.236)	(.385)	(.275)	(.997)	(.255)
4+ Candidates	.022	.071	.048	.095	.104	.159	.206	.053	.357	.144
	(.742)	(.340)	(.451)	(.060)	(.051)	(.016)	(.131)	(.851)	(.348)	(.145)
										N=60
										R^2=.00
Number of	-.004	.005	-.004	.004	.001	-.003	-.004	-.037	.065	.000
Candidates	(.735)	(.757)	(.824)	(.862)	(.943)	(.879)	(.877)	(.425)	(.362)	(.982)
45th Second										N=57
										R^2=.02
2 Candidates	.002	.076	.091	.321	.333	.263	.141	.000	.227	.138
	(.985)	(.581)	(.579)	(.073)	(.061)	(.244)	(.647)	(.999)	(.578)	(.373)
4+ Candidates	.008	.031	.024	.044	.107	.134	.033	-.069	.179	.094
	(.805)	(.488)	(.669)	(.570)	(.395)	(.463)	(.901)	(.844)	(.668)	(.440)
										N=56
										R^2=.02
Number of	-.005	-.007	-.013	-.008	-.021	-.029	-.025	-.016	-.038	-.022
Candidates	(.296)	(.408)	(.283)	(.617)	(.320)	(.254)	(.581)	(.784)	(.518)	(.238)

The conditional densities for each decile of legislator ideology are estimated: τ = 0.10 denotes the 10th percentile and so forth; μ denotes the conditional density of the mean estimated via OLS regression with robust standard errors. OLS R^2 for the mean regression is included. Constant and demographic terms are not reported. Coefficients significant at the .05 level or better are indicated in grey.

Table 6: Standard Deviation by Chamber and Party Caucus
First Dimension W-NOMINATE Estimates with Lewis-Poole Standard Errors,
42nd – 45th Arizona Legislatures (1995-2002)

	Overall		*Democratic Caucus*		*Republican Caucus*	
Session	*House*	*Senate*	*House*	*Senate*	*House*	*Senate*
42nd, 1st Sess. (1995)	.619	.541	.135	.290	.354	.262
p-value	.220		.997		.082	
42nd, 2nd Sess. (1996)	.567	.432	.208	.164	.405	.208
p-value	.056		.231		.002	
43rd, 1st Sess. (1997)	.572	.270	.167	.209	.282	.121
p-value	.000		.823		.000	
43rd, 2nd Sess. (1998)	.581	.612	.102	.383	.352	.372
p-value	.643		.999		.627	
44th, 1st Sess. (1999)	.607	.520	.207	.169	.405	.411
p-value	.182		.228		.549	
44th, 2nd Sess. (2000)	.627	.351	.241	.248	.390	.234
p-value	.001		.556		.018	
45th, 1st Sess. (2001)	.582	.396	.222	.116	.471	.286
p-value	.012		.025		.006	
45th, 2nd Sess. (2002)	.577	.233	.196	.150	.453	.113
p-value	.000		.148		.000	

Ha: sd (H) > sd (S)
Ho: sd (H) = sd (S)