The Ideological Mapping of American Legislatures*

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Abstract

The development and elaboration of the spatial theory of voting has contributed greatly to the study of legislative decision making and elections. Statistical models that estimate the spatial locations of individual legislators have been a key contributor to this success (Poole and Rosenthal 1997; Clinton, Jackman and Rivers 2004). In addition to applications to the U.S. Congress, spatial models have been estimated for the Supreme Court, U.S. presidents, a large number of non-U.S. legislatures, and supranational organizations. But, unfortunately, a potentially fruitful laboratory for testing spatial theories of policymaking and elections, the American states, has remained relatively unexploited. Two problems have limited the empirical application of spatial theory to the states. The first is that state legislative roll call data has not yet been systematically collected for all states over time. Second, because ideal point models are based on latent scales, comparisons of ideal points across states or chambers within a state are difficult. This paper reports substantial progress on both fronts. First, we have obtained the roll call voting data for all state legislatures from the mid-1990s onward. Second, we exploit a recurring survey of state legislative candidates to enable comparisons across time, chambers, and states as well as with the U.S. Congress. The resulting mapping of America's state legislatures has tremendous potential to address numerous questions not only about state politics and policymaking, but legislative politics in general.

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1 Introduction

The estimation of spatial models of roll call voting has been one of the most important developments in the study of Congress and other legislative and judicial institutions. The seminal contributions of Poole and Rosenthal (1991, 1997) launched a massive literature that is marked by sustained methodological innovation and new applications. Alternative estimators of ideal points have been developed by Heckman and Snyder (1997), Londregan (2000a), Martin and Quinn (2002); Clinton, Jackman and Rivers (2004), and Poole (2000). The scope of application has expanded greatly from the original work on the U.S. Congress. Spatial mappings and ideal points have now been estimated for the Supreme Court (Martin and Quinn 2002; Bailey and Chang 2001; Bailey, Kamoie and Maltzman 2005), U.S. presidents (McCarty and Poole 1995), a large number of non-U.S. legislatures (Londregan 2000b; Morgenstern 2004), the European Parliament (Hix, Noury and Roland 2006, 2007), and the U.N. General Assembly (Voeten 2000).

The popularity of ideal point estimation results in large part from its very close link with theoretical work on legislative politics and collective decision making. Many of the models and paradigms of contemporary legislative decision making are based on spatial representations of preferences. Consequently, estimates of ideal points are a key ingredient for much of the empirical work on legislatures, and increasingly on courts and executives.[1] This has contributed to a much tighter link between theory and empirics in these subfields of political science.

Unfortunately, the literature on state politics has generally not benefited nearly as much from these developments. To be sure, there is a small and growing set of studies that have estimated ideal points of state legislators using roll call data (Aldrich and Battista 2002; Gerber and Lewis 2004; McCarty, Poole and Rosenthal 2006; Bertelli and Richardson 2004, 2008; Kousser, Lewis and Masket 2007; Wright and Winburn 2003; Wright and Clark 2005; Wright 2007; Jenkins 2006). But empirical applications of spatial theory to state politics have been limited by two important factors. The first is that roll call voting data for all 50 states over time have not been collected. The efforts of Gerald Wright (Wright 2007) have resulted in a set of roll call data across all fifty states, but only for a single two-year period. Longer time series exist only for a handful of states (e.g. Lewis and Masket (2004)). The second impediment is that because ideal points are latent quantities, direct comparisons

[1] A sample of such work includes Cox and McCubbins (1993); McCarty and Poole (1995); Cameron (2000); Clinton (2007); Clinton and Meirowitz (2003, 2004).

across states or even across chambers within the same state are generally difficult to make. The researcher can only directly compare two legislators from different chambers if they vote on identical legislation in both. Some scholars attempt to avoid this problem by assuming that legislators maintain consistent positions over time and as they move from one legislature to another. To the extent that such assumptions are reasonably valid, approximate temporal and cross-sectional comparisons can be made. But this approach has only limited utility in state politics. A recent paper Shor, Berry and McCarty (2010) exploited the voting records of legislators who graduated from a state legislature to Congress to produce a universal spatial map for state and Congressional politics. Using the assumption of ideological consistency, they were able to rescale the within-state legislative scores into a single ideological common space. Unfortunately, this approach works only for the small handful of states where there is significant mobility between the state legislature and the U.S. Congress.

The conjunction of these two problems reduces the scope of spatial theory in state politics to a choice between examining within-state variation for a handful of states or dubious comparisons on a cross-section of states. Truly comparative work using the spatial model has been elusive and attempts to overcome these limitations have been unsatisfactory. One approach is to use interest group ratings in lieu of ideal points. But the problems with using interest group ratings as measures of ideal points are well known (Snyder 1992; McCarty N.d.). In particular, interest group ratings suffer from exactly the same comparability problems as ideal point estimates (Groseclose, Levitt and Snyder 1999). As we discuss below, the issues of comparison across states are considerably more daunting than those of temporal comparison.

Berry et al. (1998) take a different approach. To produce annual estimates of government ideology for all 50 states over time, they combine measures of the ideology of each state's congressional delegation with data on state legislative seat share. These aggregate measures have been heavily utilized in the literature on state politics and policy. These measures, however, suffer from two potential problems. First, because the measures are aggregates, they reveal little about heterogeneity, especially intra-party, within states. Indeed there are no individual-level measures of legislator ideology. Second, the validity of the Berry measure depends on the heretofore untested assumption that state party delegations to Congress have the same preferences as party delegations within the state legislature. Below we present evidence that undermines this assumption.

In this paper, we tackle both problems that have plagued state-level applications of the

spatial model. First, we introduce a new data set of state legislative roll call votes that covers all state legislative bodies over approximately a decade. These data covers the period from 1993 to 2009, but with variation in coverage across the states. Secondly, we employ a new strategy for establishing comparability of estimates across chambers, across states, and across time. Here we use a survey of all legislative candidates at the state and federal level over a number of years. Importantly, the survey questions are asked in the identical form across states, and many questions are repeated over time. Thus, the survey allows us to make cross-state, cross-chamber, and over time comparisons. The survey, however, does not provide any information about non-respondents. But as we justify below, we can use the combination of the survey and roll call voting data to estimate ideal points for all state legislators serving during our coverage period that are comparable across states and with the U.S. Congress.

These new estimates will open new avenues for inquiry, not just in state politics, but legislative politics more generally. In particular, our spatial mapping not only adds a much needed cross-sectional element to empirical work on legislative institutions, but will allow scholars to exploit institutional variation in ways not previously possible. Although it is not possible to do full justice to any of the new potential applications here, we discuss and illustrate several below.

The paper proceeds as follows. In the next section, we discuss the methodological issues associated with comparing ideal point estimates across different legislatures and over time. Specifically, we demonstrate how the survey of candidates can be used to ameliorate these problems. In section 3 we describe both our survey-based data and our procedures for collecting roll call voting data from the states. We also discuss the results obtained using surveys and roll calls separately. Section 4 links the survey and roll call estimates to generate a common scaling of the state legislatures and Congress. We focus on validating the model in terms of fit and dimensionality as well as comparing them with interest group ratings and the Berry et al. (1998) scores. In section 5 we sketch several substantive applications on representation, parties, and polarization. Section 6 concludes.

2 The Comparability of Ideal Points

To grossly simplify, statistical identification of ideal points comes from data on how often legislators vote with other legislators on a common set of roll calls. We identify a legislator as

a conservative because he is observed voting with other conservatives more frequently than he is observed voting with moderates, which he does more often than he votes with liberals. But when two legislators serve in different bodies, we are at a loss to make such comparisons. Being a conservative in the Alabama House is quite different from being a conservative in the Massachusetts Senate.

The concern about comparability of ideal point estimates is a long standing one. There have been efforts to produce common ideological scales for the US House and Senate (Poole 1998; Groseclose, Levitt and Snyder 1999), for presidents and Congress (McCarty and Poole 1995), for presidents, senators, and Supreme Court justices (Bailey and Chang 2001; Bailey, Kamoie and Maltzman 2005), and for Supreme Court and Court of Appeals justices (Epstein et al. 2007). Similar issues arise in the estimation of dynamic models (Poole and Rosenthal 1997; Martin and Quinn 2002).

Identification of the models relies on the existence of *bridge actors* who cast votes (or make vote-like decisions) in multiple settings. For example, Bailey and Chang (2001) compares Congress and the Supreme Court by leveraging the fact that legislators often opine on the cases that the justices have voted on. In most cases, however, the bridge actors are not making decisions in different venues contemporaneously. In most applications, bridge actors serve in different legislatures sequentially. Common scales are identified by the analyst's assumptions about the consistency of behavior when a bridge actor moves from one setting to another. For example, Shor, Berry and McCarty (2010) rely on bridge actors who first served in a state legislature and later on in Congress. The key assumption is that a bridge actor's ideal point does not change when she moves to Congress.[2] Unfortunately, the paucity of state legislators who move to Congress in the past decade makes it difficult to produce comparable estimates for all but a few states.

Given the limitations of using bridge legislators to link states, we propose using the Project Votesmart National Political Awareness Test (NPAT), a survey of state and federal legislative candidates. We can use this survey, which we describe in more detail below, to estimate the ideal points of all the respondents. But because the response rate of the survey is far from universal, the survey only provides ideal points for a fraction of state legislators. So we supplement the NPAT data with roll call voting data from all fifty states in the past decade and a half. Under the assumption that the legislator uses the same ideal point when

[2]Simulation evidence in Shor, McCarty and Berry (2008) show that estimates continue to be robust even if there is idiosyncratic movement as legislators move to Congress and when the bridge actors are not representative of their states.

answering surveys as she does when she votes on roll calls, the NPAT survey bridges ideal point estimates from one state to another.[3]

Our procedure is as follows. We use both of Poole (2005)'s methods to estimate a common spatial map using bridges. We pool congressional members' and state legislators' responses to the NPAT questionnaire together. Using their answers to the common questions as the bridges, we then scale all of these respondents to derive a common NPAT space score for each legislator in two dimensions. This produces directly comparable scores for members of Congress and state legislators that answer the NPAT survey.

Next we seek to identify comparable ideal point estimates for the NPAT non-respondents in Congress and state legislatures. We accomplish this by scaling Congress and each state legislature separately using a roll call database that covers all of the legislators. Thus, we have two scores – a roll call-based score that covers all legislators but is not comparable across states and an NPAT score that covers fewer legislators but is in a common space.

We translate the roll call based state legislative scores to NPAT common space via a least squares regression on each dimension. Using the regression parameters, NPAT common space scores are imputed for the non-responders. Because all predicted scores are now on the same scale, they can be directly compared across states (and Congress itself).

In this paper, we use Bayesian item-response theory models to estimate the spatial models (Jackman 2000; Martin and Quinn 2002; Clinton, Jackman and Rivers 2004; Jackman 2004).[4] We also performed the same analysis with Poole-Rosenthal NOMINATE scores (Poole and Rosenthal 1991). The estimates of ideal points correlate extremely highly across methods, which is to be expected given what we know about the performance of these two procedures in data-rich environments (Carroll et al. 2009; Clinton and Jackman 2009).

3 Data

3.1 NPAT Survey

The National Political Awareness Test (NPAT) is administered by Project Vote Smart, a nonpartisan organization that disseminates information on legislative candidates to the

[3] We rely on bridge legislators to connect state legislative sessions longitudinally and to connect upper and lower chambers within legislatures.

[4] See also Bafumi et al. (2005) for a discussion of the practical issues involved in this estimation strategy.

public at large.[5] The data used in this paper are based on the surveys they conducted from 1996 to 2009.

The questions asked by Project Vote Smart cover a wide range of policy matters, including foreign policy, national security, international affairs, social issues, fiscal policy, environmentalism, criminal justice, and many more. Most of the survey questions are asked in a yes/no format so that the data has a form very similar to that of roll call voting.

Despite the richness of the data, use of the NPAT surveys has been limited. Ansolabehere, Snyder and Stewart (2001) use the 1996 and 1998 surveys to distinguish between the influence of party and preferences on roll call voting (see also Snyder and Groseclose (2001) in response to McCarty and Rosenthal (2001)). One problem with the NPAT survey is that response rates are declining over time. A majority of incumbents answered the survey in the 1990s, but currently only about a third do. To overcome the small sample sizes for each state, Rigby and Wright (2007) use all major party respondents to the survey (not just incumbents), in order to generalize to state legislative parties as a whole. But the strong possibility of nonresponse bias complicates further applications. Our approach, however, avoids this bias; as long as legislators are reasonably ideologically consistent across surveys and roll calls, our imputed NPAT ideal points will have almost universal coverage.

The questions on the NPAT do change somewhat over time. But while hot political topics like stem cell funding come and go, many questions such as those pertaining to abortion and taxes are consistently asked. Most useful for our purposes, the vast majority of the questions asked of state legislators are identical across states. This large set of common questions provides significant leverage for making cross-state comparisons. Moreover, the NPAT asks dozens of questions that are common to the states and the U.S. Congress, which allows us to link our state legislative ideal points to those of U.S. senators and representatives. Because we bridge legislatures over time by estimating a single ideal point for each legislator, we do allow for ideological drift by individuals apart from party switching.[6] In total, we have 5,747 unique questions, over 1996-2009, for incumbents in the state legislatures and Congress. This produces a sample of 563 members of Congress, and 5,638 state legislators.

Despite the fact that politicians have plenty of incentive not to answer the NPAT, the response rates are quite impressive. However, as we note above, response has declined over

[5] See their website at http://www.votesmart.org.

[6] In future work, we plan to use the survey questions as intertemporal bridges and allow legislators to adjust positions.

time. There is also substantial variation in these rates across states. Iowa and Virginia have the lowest response rate with 19% of their legislators answering the survey, while Oregon has the highest at 57%. The overall rate is 34%. Below we address the possible implications of nonresponse bias, both for the use of NPAT-based preference measures and for our bridging procedure.

3.2 Roll Call Data

Our state roll call data is from a large project generously supported by the Woodrow Wilson School and the Russell Sage Foundation.[7] Journals of all fifty states (generally from the early to mid-90s onward) have been either downloaded or purchased in hard copy. The hard copy journals were disassembled, photocopied, and scanned. These scans were converted to text using optical character recognition (OCR) software. To convert the raw legislative text to roll call voting data, we developed several data-mining scripts in `Perl`. Because the format of each journal is unique, a script had to be developed for each state and each time a state changed its publication format. The use of OCR does create a number of mistakes but the recognition rate is around 98%. Our roll call dataset now covers all 50 states and over 14,260 state legislators.

3.3 Scaling Individual State Legislatures

For each state, we estimate one and two dimension spatial models using the Bayesian item response model.[8] We begin with an examination of the predictive power of the spatial model for explaining patterns of roll call voting within each state. Following Poole and Rosenthal (1991, 1997), we assess the models based on the overall classification success as well as the aggregate proportionate reduction in error (APRE).[9] Table 1 provides these measures for all states for a one dimension model as well as the improvement associated with adding a second dimension.

Not surprisingly, there is considerable variation in the classification success of the spatial

[7] The data from California was provided by Lewis and Masket (2004).

[8] We use Simon Jackman's excellent `pscl` package in `R`.

[9] The APRE measures the improvement in classification relative to a null model where all votes are cast for the winning side. This is a more realistic benchmark than classification success, where even the naive model can do well on. It is defined as $\frac{\sum_{j=1}^{q}[\text{minority vote - classification errors}]_j}{\sum_{j=1}^{q}[\text{minority vote}]_j}$, where q is the total number of votes.

model. The one dimensional model ranges from 78% for NE to 94% for CA. The APRE ranges from 22% for AR and LA to 79% for WI. By way of comparison, a one dimension spatial model correctly classifies 90% for the 103rd-111th US Congress (1993-2009) while reducing the error rate of the null model by 72%. Table 1 also shows that the improvements associated with a two dimensional model are modest. Average classification increases only 1.4% (Congress improves less than a percent), and average improvement in the APRE is larger (5.5%) than that of Congress (2.1%). CA and WI, two of the most polarized states, have unambiguously better fit statistics than does Congress. Of course, there are individual states for which the second dimension is important. Four states have APRE improvements of 10% or more (DE, IL, KS, and MA), the first of these with a 16.7% improvement in APRE and a 4.9% improvement in classification by using two dimensions. These states run the gamut from very liberal (MA) to moderately conservative (KS). This cross-state variation needs further exploration.

Despite the cross-state variation we observe, it appears that, similar to Congress (Poole and Rosenthal 1991, 1997) and many other institutional settings (Poole and Rosenthal 2001) a single dimension explains the bulk of the voting in state legislatures. On one hand, this is somewhat surprising. One might expect the differences in institutional rules, party systems, and issue agendas to manifest themselves in more important higher dimensions. Alternatively, such a finding is consistent with the idea that in the current era of heightened left-right polarization, political conflicts in the states may have become more reflective of the national political conflict. Unfortunately, we do not have the data to examine this question of whether the dimensionality of state politics was higher in earlier periods when politics were more localized and less polarized.

	Class% 1	Class% 2	Cla2-Cla1	APRE 1	APRE 2	AP2-AP1
AL	82.9	84.5	1.6	37.7	43.7	6.0
AK	89.6	91.2	1.6	65.9	71.0	5.1
AZ	84.9	86.6	1.6	47.8	53.4	5.6
AR	83.2	84.6	1.4	21.8	28.3	6.5
CA	93.6	93.9	0.3	77.9	79.1	1.2
CO	87.3	88.1	0.9	54.1	57.2	3.1
CT	89.1	89.8	0.7	56.2	59.1	2.9
DE	79.5	84.4	4.9	29.7	46.4	16.7
FL	90.3	91.2	0.8	63.8	67.0	3.2
GA	87.5	88.4	0.9	49.5	53.0	3.5
HI	91.0	92.3	1.3	52.0	59.1	7.1
ID	84.8	86.2	1.4	32.4	38.6	6.2
IL	87.8	90.8	3.0	57.9	68.2	10.3
IN	89.1	89.8	0.7	62.1	64.6	2.5
IA	92.6	93.2	0.6	78.4	80.1	1.7
KS	84.6	87.1	2.6	38.5	48.8	10.2
KY	84.9	86.8	1.9	34.3	42.5	8.2
LA	83.8	85.1	1.3	22.3	28.6	6.3
ME	86.1	87.4	1.3	59.7	63.5	3.8
MD	89.3	90.4	1.1	39.0	45.1	6.1
MA	91.0	93.2	2.2	52.2	64.0	11.9
MI	90.6	91.8	1.1	70.4	74.0	3.6
MN	88.9	90.1	1.2	64.2	68.0	3.8
MS	86.0	87.0	1.0	28.4	33.3	4.9
MO	89.6	90.2	0.6	59.2	61.6	2.4
MT	87.6	88.4	0.8	46.3	49.9	3.5
NE	77.8	80.3	2.5	26.7	35.1	8.4
NV	85.0	86.8	1.8	45.1	51.6	6.5
NH	82.3	84.1	1.8	48.9	54.1	5.2
NJ	92.5	93.2	0.8	69.2	72.4	3.2
NM	88.2	89.4	1.1	50.5	55.3	4.8
NY	91.1	92.1	1.0	51.4	57.0	5.6
NC	88.3	89.6	1.3	46.0	52.0	6.0
ND	84.8	86.1	1.3	35.1	40.7	5.7
OH	88.5	90.1	1.6	58.2	63.9	5.7
OK	87.7	88.5	0.8	46.8	50.1	3.3
OR	87.4	88.6	1.2	50.5	55.2	4.7
PA	88.9	90.1	1.1	53.9	58.7	4.7
RI	87.5	89.0	1.5	38.8	46.1	7.2
SC	83.1	84.9	1.7	46.9	52.4	5.5
SD	81.4	83.3	1.8	31.1	37.8	6.7
TN	84.1	85.9	1.8	41.1	47.6	6.5
TX	87.3	88.1	0.9	58.0	60.9	2.9
UT	83.5	84.8	1.3	34.5	39.7	5.2
VT	87.5	89.0	1.4	63.5	67.7	4.2
VA	86.8	87.8	0.9	44.3	48.3	4.0
WA	90.9	91.6	0.7	68.1	70.5	2.5
WV	88.0	89.5	1.5	24.8	34.3	9.6
WI	92.9	94.0	1.1	79.4	82.6	3.2
WY	79.3	81.1	1.8	23.7	30.5	6.8
US	89.6	90.3	0.8	71.7	73.8	2.1

Table 1: *Fit statistics for pooled state legislatures and Congress. Reported are classification and aggregate proportionate reduction in error (APRE) in one and two dimensions.*

4 The NPAT Common Space

If computational power were not a consideration, we could estimate common-space ideal points directly using item-response models or NOMINATE. This would involve stacking a very large roll call matrix of all state legislative votes for every state and every year on top of the matrix of NPAT responses and estimating the desired model. But the computational cost of such an approach is prohibitive. Instead we take a two-step approach. After estimating roll call ideal points for each state, we project them into the space of NPAT ideal points using OLS. The fitted values of these regressions generate predicted NPAT scores for the non-respondents.[10]

To validate our measures, there are a number of concerns that we must address. First, a key concern for using NPAT surveys in cross-state research is whether its samples are ideologically representative of the universe of state legislators. This is less a concern for our method, because our Monte Carlo work suggests that the sample of bridge actors or issues need not be representative, just as OLS does not requires the independent variables to be drawn representatively (Shor, McCarty and Berry 2008). Our procedure, however, allows us to assess how ideologically representative NPAT respondents are. Using our bridged estimates for what is close to the universe of state legislators, Figure 1 plots the average score for responders and non-responders. A one-sample t-test reveals that, at the $p < .05$ level, respondents in 8 states are significantly different from the full population.[11] In three states, Republican respondents differ from the population of Republican legislators, while this is true of Democrats in four states.[12] Despite these differences, overall the NPAT responses appear to be fairly representative. While our procedure does not require bridge actors to be perfectly representative, Figure 1 provides considerable reassurance that the NPAT can be fruitfully linked to roll call measures.

A second concern is that our method requires that the NPAT survey tap into the same issue dimensions that divide legislators on roll call voting. If the primary ideological dimension varies across states and is different than that obtained by scaling the NPAT, the survey could not successfully bridge legislators from different states. Heightening this concern is the fact that the NPAT asks about a much broader array of economic, social, and foreign

[10]Projection of the ideal points into the NPAT space is simply a matter of convenience. We could also project the results into any of the roll call ideal points space (such the U.S. House). But this would involve an additional set of regressions which would induce more error.

[11]These are: AR, CA, CO, MS, NH, TN, VT, and WA.

[12]For Republicans, these are NC, RI, and WV. For Democrats, these are DE, ID, VA, and WY.

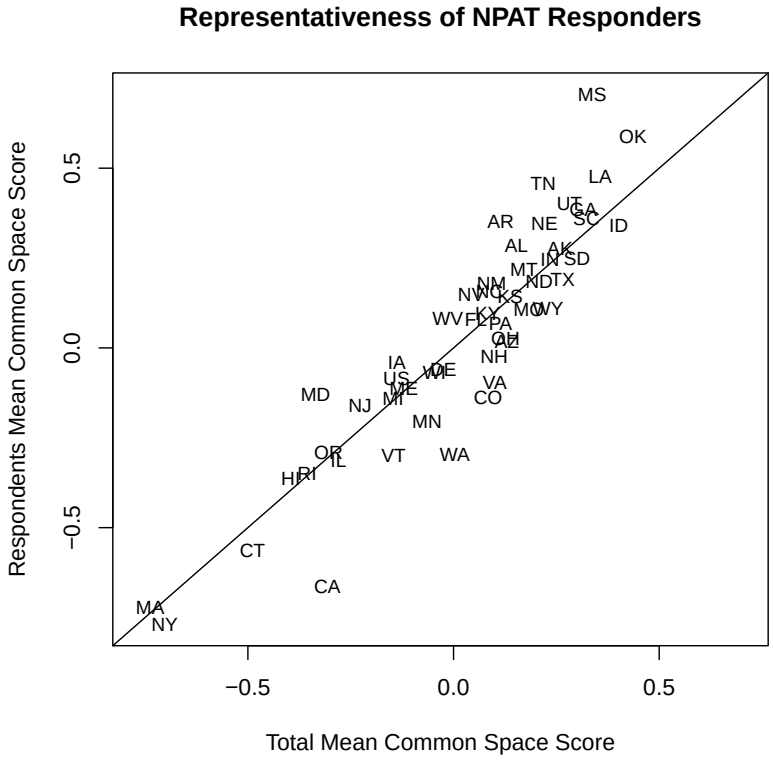

Figure 1: *Representativeness of NPAT responders. Above the 45 degree line, NPAT responders are more conservative than the legislature they come from; below the line, more liberal.*

policy issues than are found on the typical state legislative agenda. We find, however, that ideal point estimates obtained for state legislators using the NPAT correlate very highly with those obtained from state roll call votes. Figure 2 provides a histogram of the correlations of the NPAT ideal points with the roll call ideal points. While there is variation (mostly attributable to the variation in the number of NPAT respondents by state), the correlations are generally quite high and always statistically significant.

Although we focus primarily on bridging the first dimension, it is interesting to note that the NPAT second dimension tracks the roll calls second dimension for a very large number of states. Figure 3 shows the histogram of correlations on the second dimension. The correlations are not as high as for the first dimension but are statistically significant for the vast majority of states. So while there is some cross-state variation in the content of the second dimension, the NPAT scores generally do a good job of capturing it.

A third concern is the extent to which positions on roll call measures deviate from NPAT

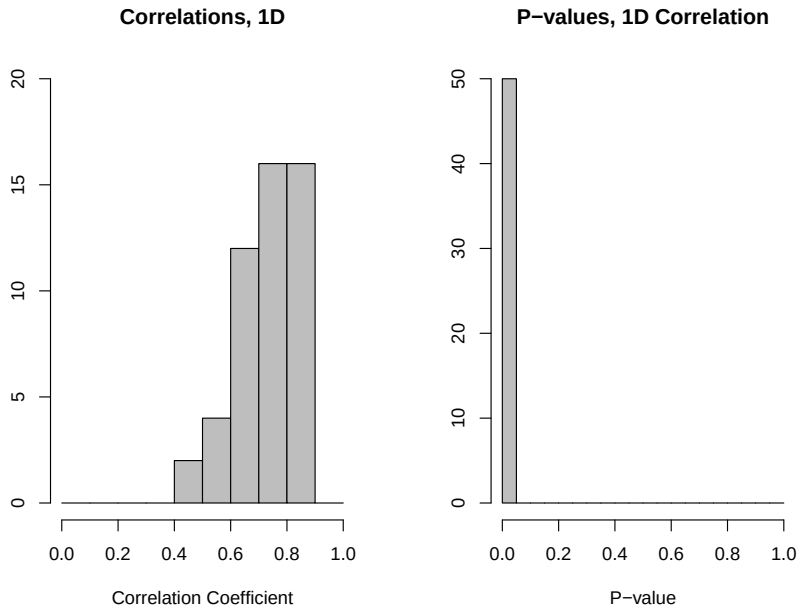

Figure 2: *Correlation of First Dimension NPAT Scores with First Dimension State Roll Call Scores.*

measures on the basis of partisan or electoral pressures. Ansolabehere, Snyder and Stewart (2001) point out that ideal points of House members estimated by roll call voting tend to be more polarized across parties than ideal points estimated using the NPAT. They attribute this difference to the effect of partisan pressure that influences roll call voting but is not present in the survey response.

To understand how we can take party effects into account, consider the following error-in-variables specification. Let x_i be the ideal point of legislator i estimated from roll call voting and x_i^* the true ideal point. We can now capture party differences in the link between true ideal points and those estimated from roll call votes as follows. Let

$$\begin{aligned} x_i &= x_i^* + \gamma_R + \varepsilon_i \text{ if legislator } i \text{ is a Republican} \\ x_i &= x_i^* + \gamma_D + \varepsilon_i \text{ if legislator } i \text{ is a Democrat} \end{aligned}$$

where γ_R and γ_D are party effects and ε_i are other sources of measurement error assumed to have mean zero.[13] Ansolabehere, Snyder and Stewart (2001) assume that roll call records are more conservative than the true ideal points for Republicans and more liberal for Democrats.

[13]We assume that there is no party effect for independent or third party legislators.

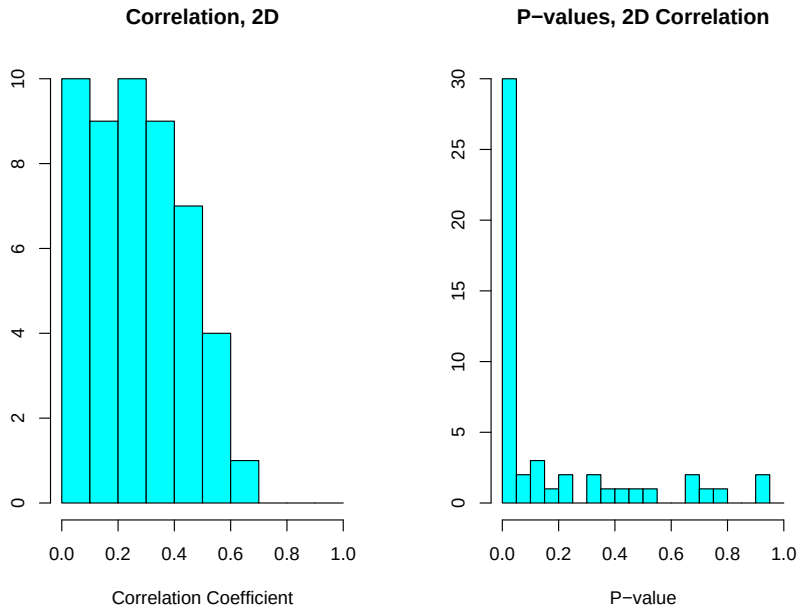

Figure 3: *Correlation of Second Dimension NPAT Scores with Second Dimension State Roll Call Scores.*

Given the convention of assigning higher scores for conservative positions, this implies that $\gamma_R > 0$ and $\gamma_D < 0$. Because the scale of ideal points is only identified up to a linear transformation, we cannot identify each party effect separately. So we instead estimate $\gamma = \frac{\gamma_R - \gamma_D}{2}$ which Ansolabehere, Snyder and Stewart (2001) predicts to be positive. Consequently we assume that the relationship between the true ideal point x_i^* and the observed roll call ideal point is given by

$$x_i = x_i^* + \gamma R_i + \varepsilon_i$$

where $R_i = 1$ if legislator i is a Republican, 0 if she is an independent, and -1 if she is a Democrat.

Now let n_i be the estimated ideal point from the NPAT survey. Suppose we tried to estimate the projection of x_i^*

$$n_i = \alpha + \beta x_i^* + \zeta_i$$

But if we used only x_i, we would have

$$n_i = \alpha + \beta x_i + (\zeta_i - \beta\gamma R_i - \beta\varepsilon_i)$$

Note that the error term of the projection contains $\beta\gamma R_i$ which is clearly correlated with x_i^*. Therefore, estimates of α and β will be biased if $\gamma \neq 0$. In that case, we would have to include R_i in the projection of x_i to n_i in order to obtain the correct relationship between x_i^* and n_i. To test for this possibility, we estimate for each state j

$$n_i = \alpha_j + \beta_j x_i + \theta_j R_i + \xi_i$$

where $\theta_j = -\beta_j \gamma_j$. It is the fitted values from this regression that we use to estimate n_i for those legislators who do not respond to the NPAT. This procedure would also correct for the possibility that NPAT scores were more moderate than roll call scores. In that case, however, $\gamma_j < 0$ so that $\theta_j > 0$.

Despite these concerns, however, partisan biases between observed NPAT and roll call ideal points do not appear to be especially important. Figure 4 plots the distribution of estimates of θ_j. Note that most of these estimates cluster around zero and have large p-values. Moreover, within-party correlations are large and highly significant, if less so than the pooled correlations due to reduced sample size (especially for states dominated by a particular party). Figure 5 shows that this is true of both Republicans and Democrats.

Given these mixed results on party effects, we will focus on the results of our party-free (i.e. $\theta_j = 0$) NPAT common scores. But those with a partisan adjustment are available on-line.

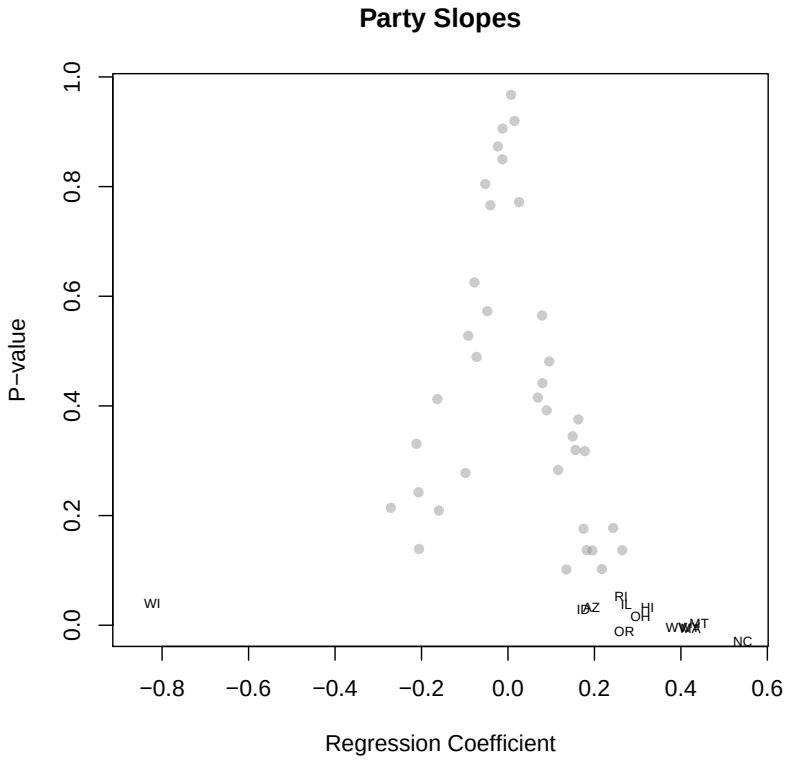

Figure 4: *Party Slopes and P-Values*

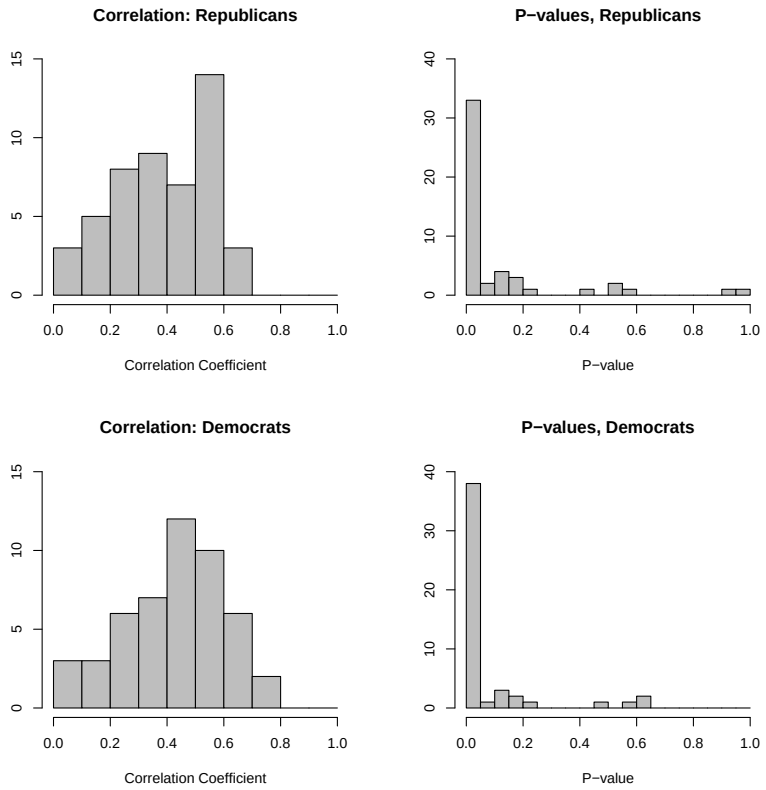

Figure 5: *Within-party correlations of NPAT and state roll call scores for Republicans and Democrats.*

4.1 Results

Having addressed several potential concerns about our method, we turn to a description of our NPAT common space estimates. The state-by-state distributions of the common NPAT scores are summarized in boxplots in Figure 6. We include the U.S. Congress for purposes of comparison. One of our most striking findings is the tremendous variation in polarization across states. This manifests itself in how party medians differ within and across states, as well as the amount of overlap within states between party distributions (see Table 2, and discussion below about polarization).

There is also a large amount of overlap among the party medians across states. The medians of some Republican state parties are more liberal than the medians of some Democratic state parties. For example, the Democratic party in Mississippi is more conservative than the Republican parties of Connecticut, Illinois, Massachusetts, New Jersey, New York and Rhode Island. The liberal Republicans of New York locate to the left of Democratic parties in Alabama, Arkansas, Louisiana, Mississippi, and Oklahoma. Given the decentralized history of the American party system, the real surprise, however, is that this much overlap remains.

It has been argued that the Democratic and Republican parties differ significantly in terms of their levels of discipline and cohesiveness (e.g. Hacker and Pierson (2005)). While this may be true of representation in Congress, our data suggest that the median positions of both parties vary equally across states. The standard deviations of the state party medians are .34 and .36 for Democrats and Republicans, respectively. We cannot reject the null hypothesis of no difference.

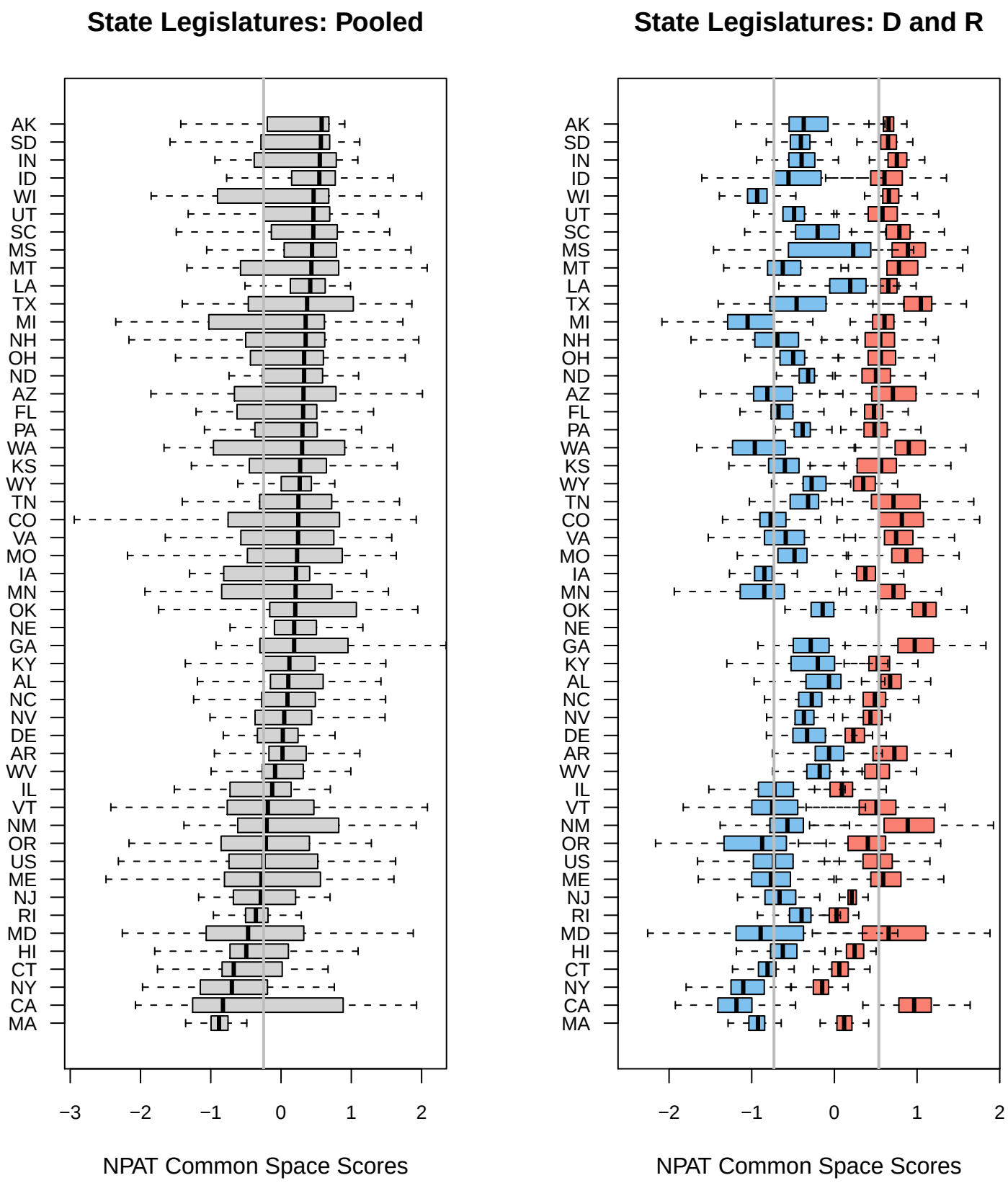

Figure 6: *Estimated NPAT common space scores for state legislatures compared with scores for the US Congress, 1996-2006. Left plot pools both parties, while the right plot separates them. Vertical line are drawn at the pooled Congressional median, overall and by party.*

	Legislative Median	Republican Median	Democratic Median	Difference
AL	0.17	0.88	-0.12	1.00
AK	0.69	0.83	-0.58	1.41
AZ	0.23	0.94	-1.09	2.03
AR	0.10	1.04	-0.07	1.10
CA	-1.01	1.17	-1.45	2.61
CO	0.43	1.00	-0.97	1.98
CT	-0.81	0.13	-0.97	1.10
DE	-0.10	0.20	-0.62	0.82
FL	0.34	0.53	-0.80	1.33
GA	0.24	0.94	-0.41	1.35
HI	-0.57	0.03	-0.67	0.70
ID	0.54	0.69	-0.33	1.02
IL	-0.13	0.17	-0.92	1.08
IN	0.55	0.81	-0.40	1.21
IA	0.26	0.52	-1.01	1.52
KS	0.43	0.62	-0.54	1.16
KY	0.17	0.65	-0.08	0.73
LA	0.25	0.61	0.06	0.54
ME	-0.27	0.36	-0.58	0.94
MD	-0.47	0.59	-0.96	1.55
MA	-0.94	-0.01	-0.99	0.98
MI	0.39	0.68	-1.03	1.71
MN	-0.32	0.83	-0.86	1.69
MS	0.48	0.86	0.30	0.56
MO	0.02	0.98	-0.49	1.46
MT	0.62	0.93	-0.69	1.61
NE	0.30			
NV	0.04	0.64	-0.39	1.03
NH	0.32	0.62	-0.88	1.50
NJ	-0.54	-0.13	-0.72	0.59
NM	-0.01	0.95	-0.78	1.73
NY	-0.84	-0.20	-1.26	1.07
NC	0.09	0.71	-0.36	1.07
ND	0.56	0.73	0.08	0.66
OH	0.54	0.82	-0.61	1.43
OK	0.36	1.21	0.01	1.20
OR	-0.15	0.25	-0.64	0.88
PA	0.31	0.55	-0.57	1.11
RI	-0.51	0.02	-0.56	0.57
SC	0.58	0.75	0.19	0.55
SD	0.67	0.74	-0.13	0.87
TN	0.34	0.84	-0.16	1.01
TX	0.45	1.17	-0.64	1.80
UT	0.69	0.90	-0.52	1.42
VT	-0.29	0.49	-0.83	1.32
VA	0.34	0.62	-0.52	1.13
WA	0.05	1.01	-1.16	2.17
WV	-0.03	0.56	-0.17	0.73
WI	0.51	0.69	-1.08	1.77
WY	0.36	0.56	-0.59	1.15
US	-0.21	0.64	-0.78	1.42

Table 2: *State legislative medians, pooled over the entire time period. Some Republican parties are more liberal than Democratic parties, and some Democratic parties are more conservative than some Republican parties.*

4.2 State Legislative and Congressional Delegations

One of the primary advantages of our measures is that we can compare the ideological composition of state legislatures with that of state delegations to Congress. This not only allows us to consider questions about differences in representation at the state and national levels, but also allows us to consider the accuracy of state-based ideology scores based on Congressional scores (Berry et al. 1998, 2010).

In Figure 7, we plot the pooled state legislative medians against the median of each state's congressional delegation. While there is a positive relationship, the correlation is considerably lower than one might expect. The relationship is also considerably flatter than the 45 degree line that represents the equality of the medians. This implies that on average state congressional delegations are more moderate than state legislatures. Consequently, measures of state ideology such as those developed by Berry and his colaborators will understate the cross-section variation.

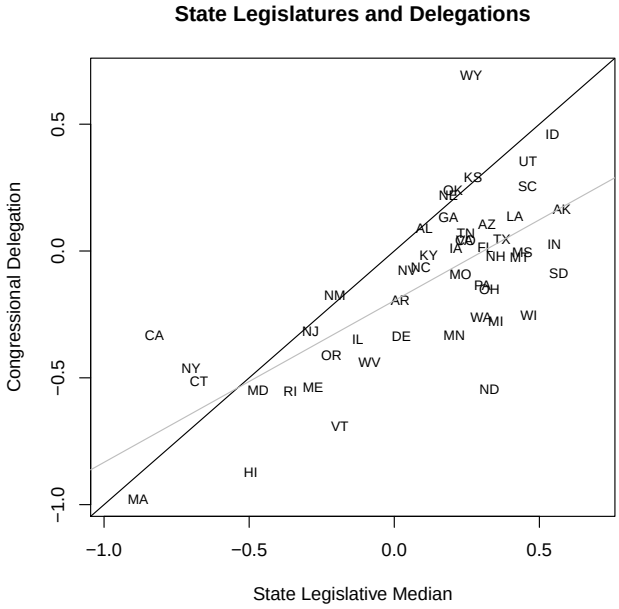

Figure 7: *Scatterplot of pooled state legislative medians (x-axis) against pooled state congressional delegation medians (y-axis). Dark line is 45 degrees, representing equality of state legislative and state delegation medians. Gray line is best fit.*

4.3 Interest Group Ratings

Interest group ratings have been frequently used as a roll call based measure of legislator ideology in the literature. One advantage of such scores is that at least few of the broad-based organizations score nearly all state legislatures. Here we look at ratings from two conservative groups–the National Federation of Independent Business (NFIB) and the National Rifle Association (NRA)–and two liberal organizations–the AFL-CIO and the League of Conservations Voters (LCV).

For example, Overbee, Kazeee and Prince (2004) uses NFIB ratings to examine committee representativeness in 45 states. The Fortune-magazine ranked most influential business lobby has 350,000 members and affiliates in all 50 state capitols plus Washington. The conservative organization takes public positions on a small number of bills that receive roll call votes in the state legislatures that relate to business, such as tort reform. Legislators who vote in perfect alignment with the state NFIB position receive a score of 100, and those who vote not at all with the NFIB receive 0. In 2007-2008, for example, the NFIB considered 5 House and 6 Senate votes in the Illinois ratings, include those on tax increases, a resolution on the Employee Free Choice Act ("card check"), the governor's universal health care plan, and an expansion of the Family and Medical Leave Act.

A few issues appear to make the use of interest group ratings for comparative research problematic. The first is the lack of a common agenda across states. When state chapters score legislators only on legislation voted on the floor, we may doubt they are using a comparable scale across states. Second, since agendas change over time even within states, scores would not be comparable over time (Groseclose, Levitt and Snyder 1999). Third, without sufficient bridging observations, scores are not even comparable across chambers within states. Finally, even were all this not the case, using a small handful of bills to score legislators inevitably leads to a loss of much information in capturing the underlying continuous latent ideology of legislators.

We collected 10,271 NFIB ratings (49 states), 7750 NRA ratings (41 states), 5819 AFL-CIO ratings (20 states), and 6,915 LCV ratings (29 states) for 2004, 2006, and 2008. Put together, the scores show a rather peculiar distribution. Figure 8 shows that the mean Republican scores are extremely right-skewed for the conservative interest groups, and equally left-skewed for one of the two liberal ones (AFL-CIO). For these three groups, members of the favored party are barely differentiated from each other, while the opposing party doesn't converge on any dominant position. The LCV scores show less skew, but they also show far

more overlap for legislators (and are available for only a subset of states).

Interest group scores are correlated positively with common space scores. This correlation masks considerable heterogeneity, and some perverse outcomes. For example, small but significant numbers of chambers either had no variation at all in interest group scores, were not significantly related to common space scores, and worst of all some were negatively related to common space scores.

4.4 Aggregated Scores

To what degree are the congressional common space scores for the state legislatures in this paper consistent with other measures of state ideology? We start the comparison with Berry et al. (1998)'s popular state elite scores. They are derived from a formula that is a weighted average of party proportions in both chambers multiplied by state delegation congressional ideology.[14]

We replicate the Berry scores, but with some slight modifications. We do so for two reasons. First, to strip out the inferred gubernatorial ideology because we do not have common space scores for governors to compare. However, because the governor's position is itself merely the average of own-party ideology, we should consider it only a reweighting of the inferred legislative ideology. We also separate out the component calculations for the upper and lower chambers to have a more fine-grained comparison between the two series of scores. We thus generate what we call Berry component scores for two chambers in 49 states (excepting NE) over 1993-2008.

As we have shown, congressional delegations are not a perfect proxy for state legislatures. But what effect does this imperfect proxy have on the Berry scores? We investigate this question longitudinally and cross-sectionally. That is, within each state (or year), to what degree are the Berry component scores correlated with congressional common space chamber medians?

The performance of the Berry scores is very uneven. The correlation coefficient averages 0.70 and 0.75 for the upper and lower chamber, but falls as low as 0.6 for both chambers, and all are highly significant. Comparing party proportions in the state legislatures to common space scores evidences similar correlations, averaging around 0.68 and highly significant for

[14]Berry et al. (1998) used interest group scores, while the updated Berry et al. (2010) recommend NOMINATE scores. In any case, these are weighted 25% for each chamber. Gubernatorial ideology is assumed to be the average of the own-party ideology (eg, the congressional delegation) and is weighted 50%.

both chambers.

The longitudinal performance, on the other hand, is often wrong. Longitudinal correlations between the Berry component scores and common space chamber medians were insignificant ($p > 0.10$) in nearly half of the 98 chambers, and significant and incorrectly signed in 2 of them (both in Hawaii).[15] Using simple party proportions improves matters. However, a fifth of the chambers were insignificantly correlated, and two chambers (the Hawaii Senate and the Rhode Island House) had significant and negative correlations.

The Berry scores, then, perform relatively well in assessing state legislative ideology across states within a given year, but do quite badly in assessing ideological change within states across time. Raw party proportions fare just about as well in the cross-section, but do significantly better longitudinally. For applied work that utilizes ideological proxies before the early 1990s, we advise using the latter.

[15] We also averaged the component scores together as do Berry, but the results hardly change.

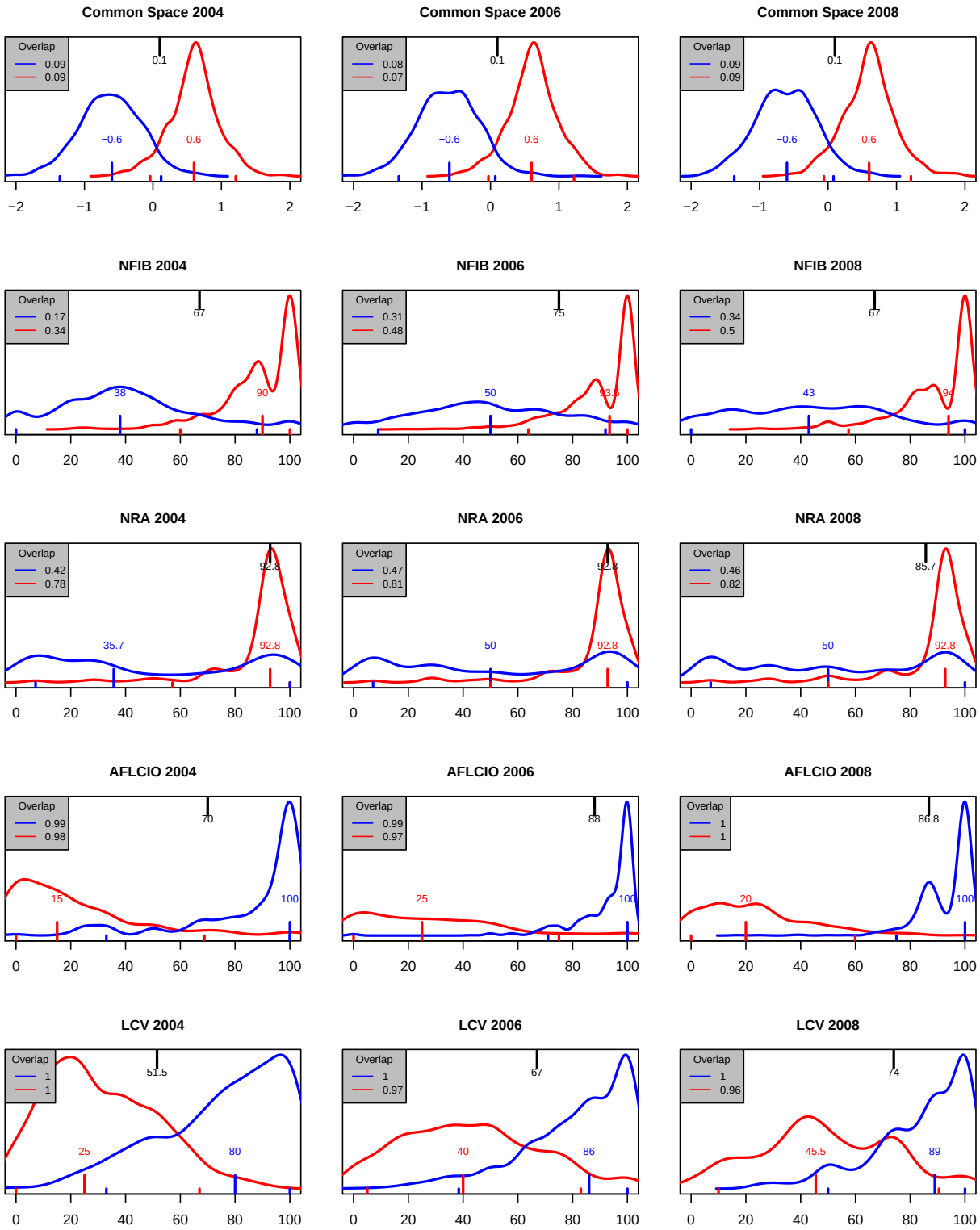

Figure 8: *Density plots of special interest group ratings for state legislators, 2004-2008. These include the conservative National Federation of Independent Business and the National Rifle Association, and the liberal AFL-CIO and the League of Conservation Voters. Comparison made to common space scores (top row). Numbers under curves indicate medians.*

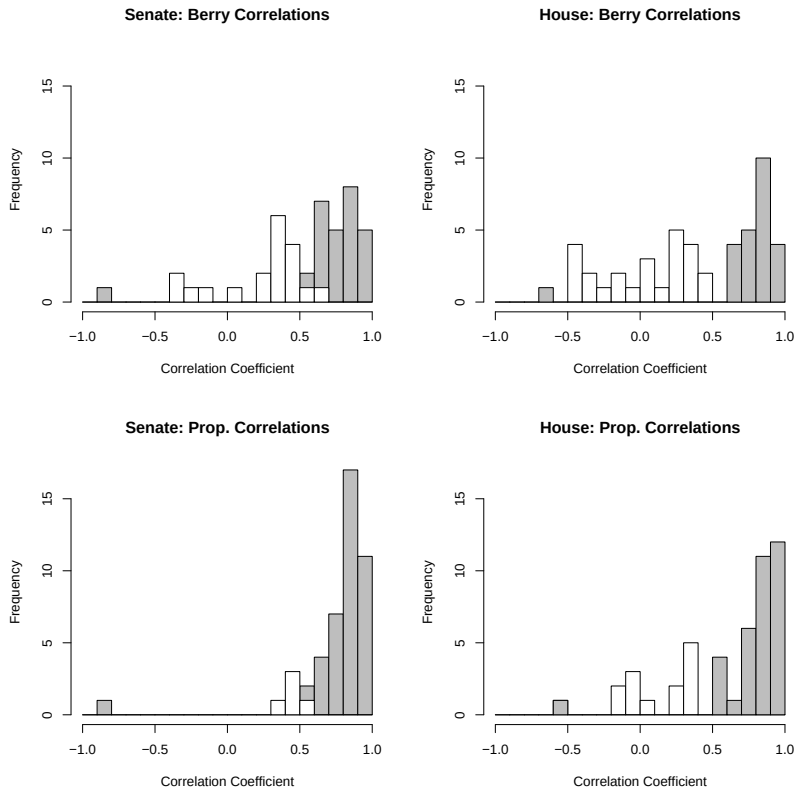

Figure 9: *Plot of histograms of correlation coefficients. Significant correlations are in grey, insignificant ones are clear.*

5 Applications

5.1 Representation in State Legislatures

Another question our data allows us to consider is the extent to which state legislators are representative of the ideology of their district. For districts in the U.S. House, the typical approach is to employ some proxy, such as U.S. presidential vote, perhaps supplemented with other data (Levendusky, Pope and Jackman 2008). Unfortunately, presidential vote data is nearly always unavailable at the state legislative district level, with California and Texas being the sole exceptions.

As a second-best alternative, we obtained county-level presidential vote data from Leip (N.d.), and then we imputed the presidential vote for legislative districts. The principal difficulties using this imputation approach are places were multiple districts are embedded within a county,[16] or places where counties cross district lines or vice versa. In addition, districts from states that assign nonstandard names (AK, MA, VT) could not be easily merged and were dropped. We validated the imputed vote for districts by comparing the imputed vote in the upper and lower chambers against the actual presidential vote for 2004 for Texas in those chambers. The correlation coefficients were above 0.8 for both district types, and quite statistically significant. This imputation, then, is basically a noisy proxy.

To begin with, we compare the imputed 2004 presidential vote with legislator ideology from 2005 (eg, following the 2004 November election). The two are highly correlated, both within and between parties, as can be seen in Figure 10. The picture is quite reminiscent of the relationship between the ideology of members of Congress and their constituencies; a cloud of Republicans in the upper right, a cloud of Democrats in the lower left, and a substantial gap between the two at any fixed level of presidential support.

We can also assess representation at the state level. Here, we consider how cross-state variation in voter preferences can account for variation in the overall and party medians of state legislatures. For measures of voter preferences, we simply aggregate the self-reported ideology questions from the 2000 and 2004 Annenberg National election Survey. Of course, such measures can only address responsiveness, not congruence.[17] Figure 11 plots the mean voter ideology placement against the pooled legislative median for each state. While the lack

[16] For example, the several districts within Cook County, IL all obtain the same presidential score.

[17] A new literature on congruence via estimation of common space ideal points for voters has recently arisen (Jessee 2009; Shor 2009; Shor and Rogowski 2010).

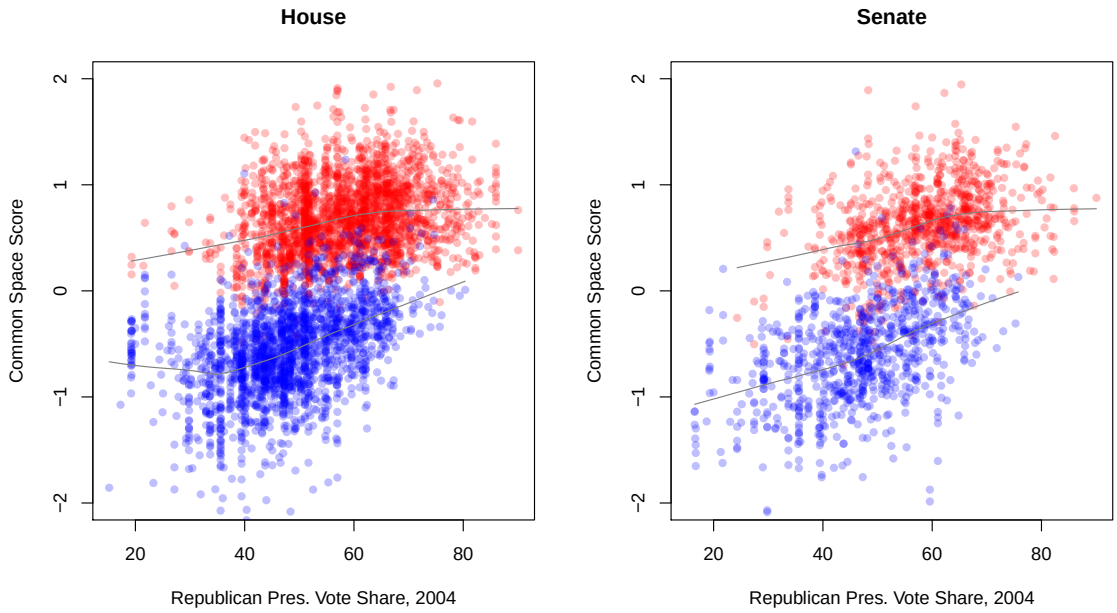

Figure 10: *Scatterplot of imputed 2004 presidential vote by legislative district (x-axis) for upper and lower chambers, against 2005 common space ideal points. Lowess lines included for within-party correlation.*

of common scale prevents us from evaluating the congruence of legislative median with voter preferences, the strong correlations indicate a substantial amount of responsiveness between voter preferences and legislative medians.

An alternative approach compares presidential vote shares to legislative medians. Figure 12 shows that the correlation between the two is quite strong for the 2004 and 2008 elections, undergirding our case that state legislatures are ideologicaly responsive to their electorates.

Our measure also allows us to disaggregate legislative ideology by party to assess the extent to which state party medians are responsive to the preferences of their voting constituencies. Figure 13 plots mean ideological placement by party against the legislative party medians. Here, too, the level of responsiveness is quite impressive.

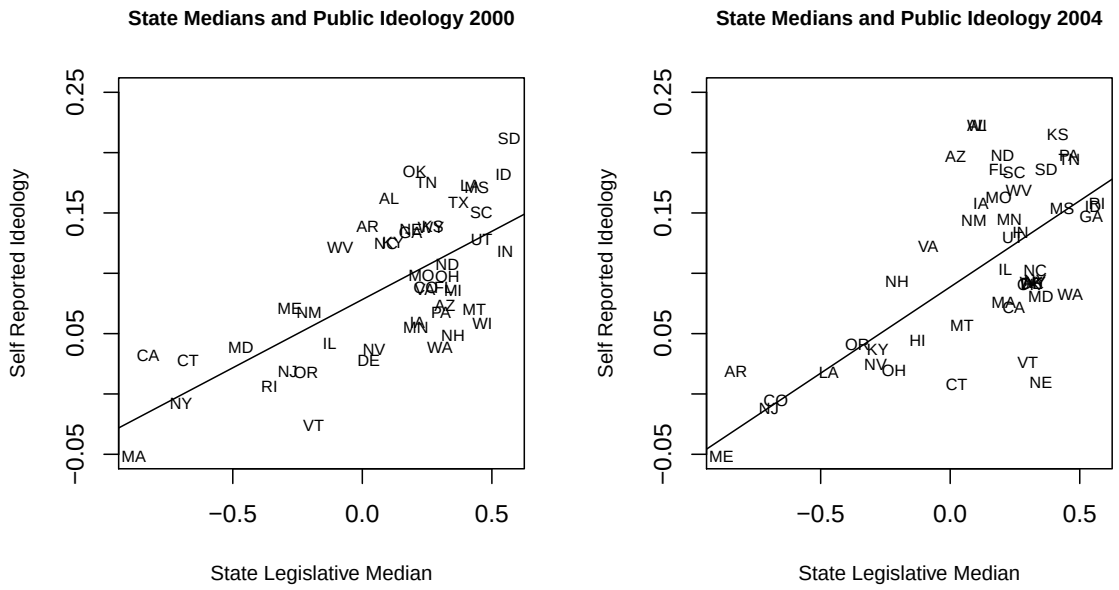

Figure 11: *Scatterplot of pooled state legislative medians (x-axis) against 2000 and 2004 Annenberg mean self-reported ideology (y-axis). Line is best fit.*

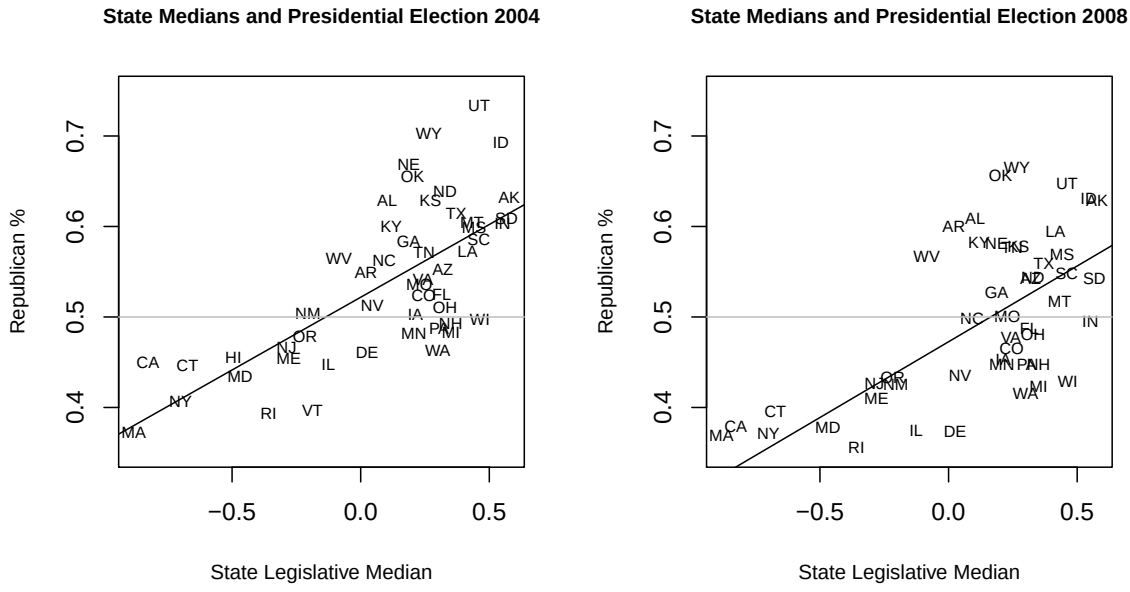

Figure 12: *Scatterplot of pooled state legislative medians (x-axis) against 2004 presidential election results (y-axis). Line is best fit.*

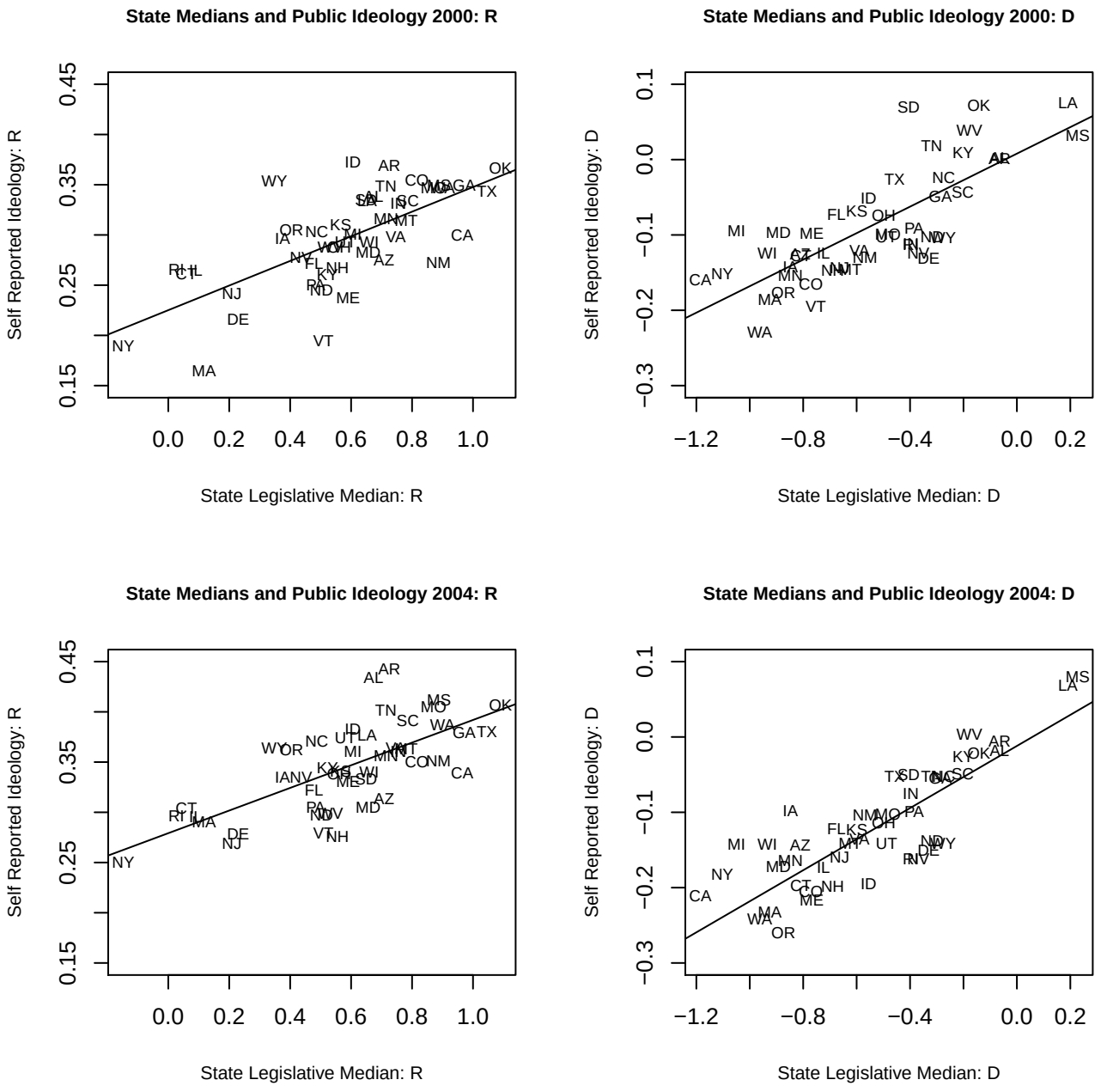

Figure 13: *Scatterplot of state legislative party medians (x-axis) against 2000 and 2004 Annenberg mean self-reported ideology (y-axis) for both parties. Line is best fit.*

5.2 Polarization

Studies of the U.S. Congress find that parties have become highly polarized in Congress in recent years (Poole and Rosenthal 1984; McCarty, Poole and Rosenthal 2006; Layman, Carsey and Horowitz 2006). Due to the lack of data, scholars have not been able to ascertain whether such a trend is apparent at the state level. The new data estimated in this paper can more definitively answer this question.

Figure 14 shows that polarization at the state legislative level is real, at least in the previous 15 years.[18] Moreover, it reveals how much polarization varies across states. In comparison to Congress, the majority of state legislatures are less polarized, while 15 are actually more polarized. California is by far the most polarized state legislature, and Congress looks decidedly bipartisan by comparison.[19] On the other end, Rhode Island and Louisiana are the least polarized. In the former, Democrats are liberal, but so too are the Republicans. In the latter, the converse is true.

What can account for the spatial variation in polarization? One simple account links ideological polarization in the legislature to a divide in the electorate. Figure 15 illustrates that the two are indeed highly correlated.

What about longitudinal variation within states? Figure 16 illustrates that polarization is an ongoing process, but does not move in a strictly upward fashion over time. Even over a comparatively short time period, most states continue to experience increased polarization, while a significant minority are apparently depolarizing (22 chambers in total).

Next, we examine the possibility that legislative polarization enhances representation. While polarization is often reviled in the popular and research literatures for coarsening politics and turning off voters, others have hailed the rise of this phenomenon as undergirding the ideological distinctiveness of American political parties. The clearer "brand names" that result give voters an easier decision rule at the ballot box and allow them to more reliably vote for the more ideologically proximate alternative. When parties overlap ideologically, it is less clear for whom to vote. Figure 17 shows that increased polarization within a chamber is associated with a stronger relationship between presidential voting behavior (presumably driven by more ideological concerns) and legislator ideology.

[18] Aldrich and Battista (2002) also find this variation in polarization. But because they only examine eleven states over a single session, they claim that the differences are binary: fully polarized or not. With a far larger sample, we show that this variation is in fact continuous.

[19] See Masket (2009) on the causes and consequences of polarization in this state.

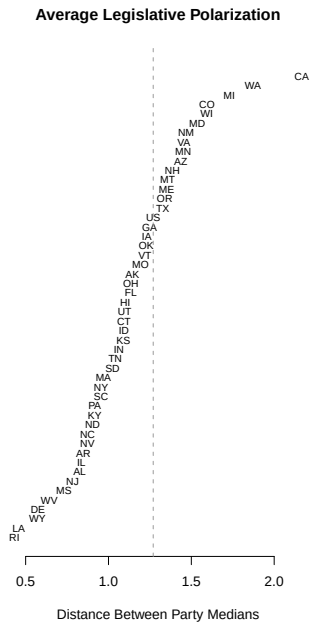

Figure 14: *Plot of mean levels of state legislative polarization (measured by distance between party medians) over the full time period available for each state, averaged between both chambers. Dotted line represents average of U.S. Congress polarization for comparison.*

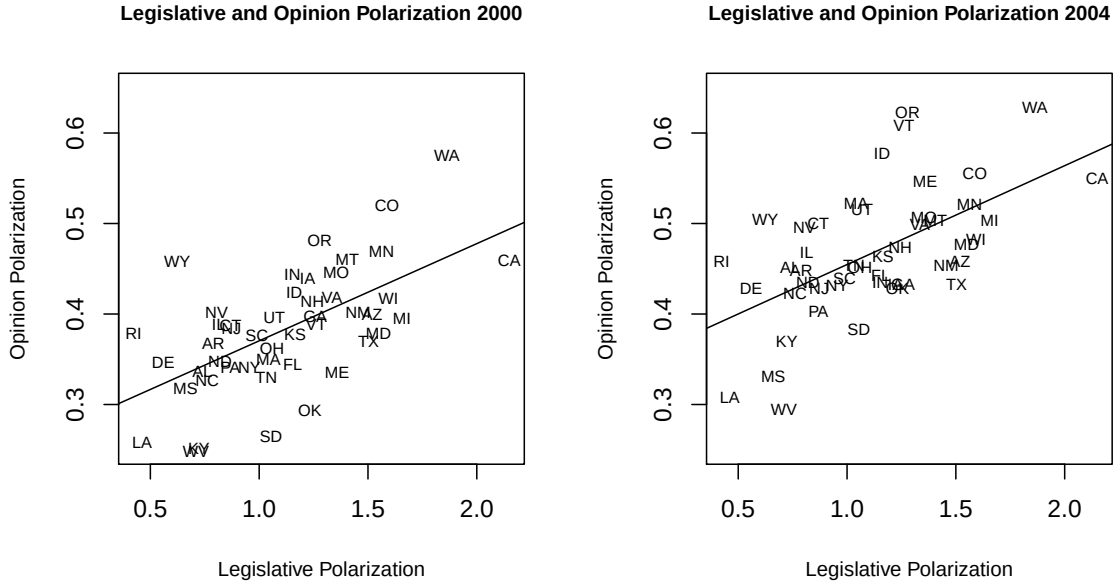

Figure 15: *Scatterplot of difference in legislative party medians (x-axis) against difference in average party medians for self-reported 2000 and 2004 Annenberg ideology (y-axis). Line is best fit.*

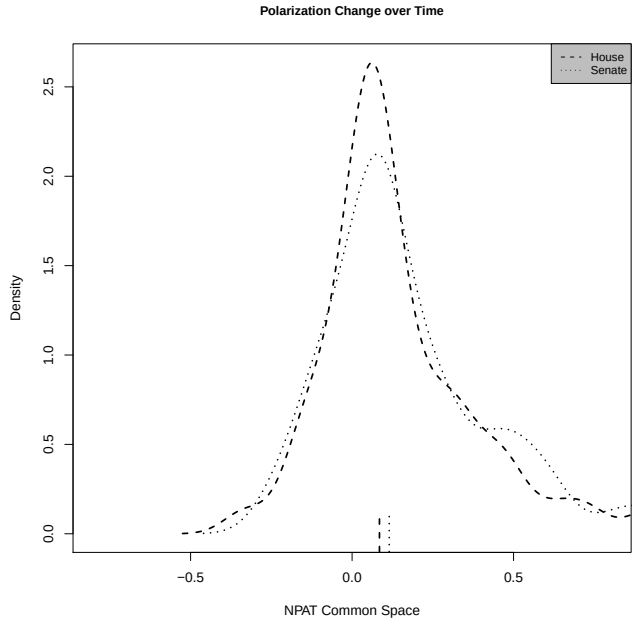

Figure 16: *Density plot of changes in polarization as measured by distance between party medians, for upper and lower chambers of state legislatures. The change is measured as the difference in levels of polarization from the first to the last year available.*

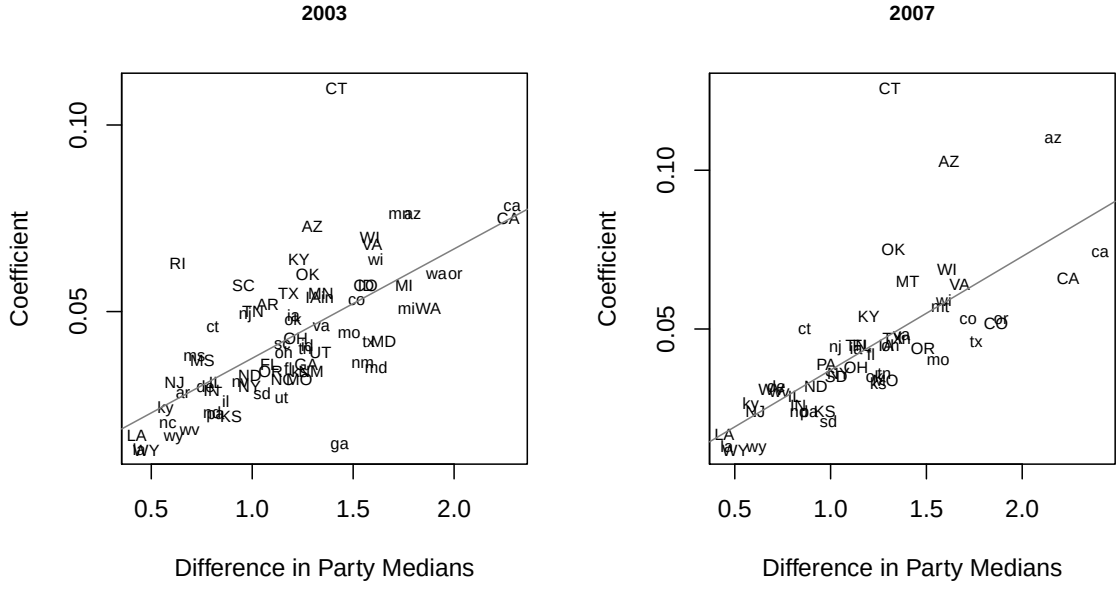

Figure 17: *Scatterplot of slope coefficients from repeated cross sectional regressions ("superplot"), plotted against state legislative chamber polarization (measured as the difference in party medians), for 2003 and 2007. Uppercase states are upper chambers, lowercase states are lower chambers.*

5.2.1 Divergence and Sorting

McCarty, Poole and Rosenthal (2009) point out that partisan polarization can be decomposed into roughly two components. The first part, which they term *intradistrict divergence* is simply the difference between how Democratic and Republican legislators would represent the same district. The remainder, which they term *sorting* is the result of the propensity for Democrats to represent liberal districts and for Republicans to represent conservative ones.

To formalize the distinction between divergence and sorting, we can write the difference in party mean ideal points as

$$E(x\,|R) - E(x\,|D) = \int \left[E(x\,|R,z)\frac{p(z)}{\overline{p}} - E(x\,|D,z)\frac{1-p(z)}{1-\overline{p}} \right] f(z)dz$$

where x is an ideal point, R and D are indicators for the party of the representative, and z is a vector of district characteristics. We assume that z is distributed according to density function f and that $p(z)$ is the probability that a districts with characteristics z elects a Republican. The term $\overline{p}$ is the average probability of electing a Republican. The average difference between a Republican and Democrat representing a district with characteristics z, $E(x\,|R,z) - E(x\,|D,z)$, captures the intradistrict divergence, while variation in $p(z)$ captures the sorting effect. When there is not sorting effect, $p(z) = \overline{p}$ for all z so that

$$E(x\,|R) - E(x\,|D) = \int \left[E(x\,|R,z) - E(x\,|D,z) \right] f(z)dz$$

The right-hand side of this equation is the average intradistrict divergence between the parties. We abbreviate it as *AIDD*. When there is positive sorting such that more conservative districts are more likely to elect Republicans, then $E(x\,|R) - E(x\,|D) > AIDD$ with the difference attributable to sorting. Thus, we can decompose polarization into $AIDD$ and sorting effects. In making cross-state comparisons, however, we will use the ratio of AIDD to total polarization which captures the amount of polarization that can be attributed to divergence.

Like McCarty, Poole and Rosenthal (2009), we estimate using matching estimators[20] as well as OLS with interactions between the covariates and party indicators (Wooldridge 2002). Our covariate vector z includes presidential vote, median family income, the poverty rate, the percentage of African-Americans and Hispanics, the percentage of college graduates,

[20] We use the bias-corrected estimator developed by Abadie and Imbens (2002) and implemented in STATA by Abadie et al. (2001).

and the percentage of renters. Because Nebraska is non-partisan, its legislature is excluded from our analysis. Moreover, data problems in linking presidential election returns to state legislative districts made it difficult to include Massachusetts, New Hampshire, and Vermont. We estimate state fixed effects in the OLS models and match on state in the matching estimates. While both techniques produced similar results for the U.S. House, we find that the OLS generally produces larger, but more erratic, estimates than matching on our data. So we will focus on those from matching.

Table 3 reports estimates of $AIDD$ annually for state lower houses (excluding Nebraska, New Hampshire, Massachusetts, and Vermont). To eliminate concerns about the effects of including districts that are highly unlikely to elect a Democrat or a Republican, we use an algorithm proposed by Crump et al. (2006) to eliminate districts that have a very high or very low estimated propensity score for electing a Republican. The size of this "trimmed" sample is given in column 3. Columns 4 and 5 present the estimates of $AIDD$ from OLS and matching. Standard errors of these estimates are in parentheses. In column 6, we report an overall measure of polarization of state lower houses. This is estimated from a regression of the NPAT score on party with state fixed effects.

Year	Total Sample	Trimmed Sample	AIDD (OLS)	AIDD (Match)	Total Polar	Ratio (Match)
2003	4301	3348	1.083 (.011)	1.057 (.010)	1.212(.011)	.872
2004	4085	3188	1.102 (.015)	1.079 (.010)	1.223 (.011)	.882
2005	3938	2666	1.096 (.016)	1.080 (.011)	1.263 (.011)	.855
2006	3904	2666	1.108 (.017)	1.089 (.011)	1.270 (.011)	.857
2007	2612	1874	1.077 (.022)	1.082 (.015)	1.279 (.014)	.845
2008	2515	1823	1.080 (.022)	1.088 (.015)	1.273 (.015)	.854

Table 3: *Divergence and Sorting By Year for State Lower Houses*

Two features of Table 3 are noteworthy. First, just as McCarty, Poole and Rosenthal (2009) found, the bulk of polarization is generated by intradistrict divergence. The sorting effect is much smaller in magnitude. By way of comparison, McCarty, Poole and Rosenthal (2009) find that the ratio of $AIDD$ (estimated by matching) to total polarization was .79 for the 108th House. So $AIDD$ accounts for a much larger proportion of state legislative polarization than it does congressional polarization. Second, while polarization appears to have grown at the state level, the ratio of divergence has grown at about the same rate. Thus, sorting does not appear to account for the increase.[21]

[21] Unfortunately, data limitations preclude us from going back before the latest round of redistricting in

Figure 18 presents the ratio of $AIDD$ and total polarization (difference in means) for each state lower house in our sample.[22] As we note above, there is much variation in the degree of polarization across states. But of interest here is the extent to which the form of polarization (divergence versus sorting) varies across states. Two states (Hawaii and West Virginia) appear to have "negative" sorting – Republicans represent slightly more liberal districts than Democrats.[23] And sorting is an extremely large contributor to polarization in some others like Idaho, Maryland, and Utah. In future work we hope to sort out the political, institutional, and socio-economic factors that lead to the different forms of polarization in different states.

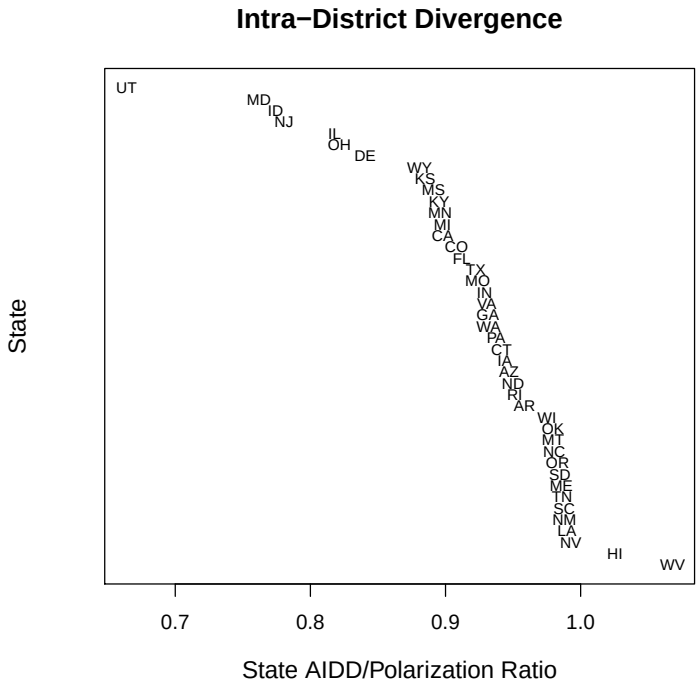

Figure 18: *Ratio of Divergence to Polarization by State.*

order to test directly whether redistricting has an effect on partisan sorting. We believe, however, that a small stable sorting effect casts doubt on the primacy of gerrymandering as a cause of polarization.

[22]To preserve what are in some cases small samples, we did not trim the observations with extreme propensity scores. We also match only on presidential vote rather than the full set of covariates described above.

[23]We cannot, however, rule out the possibility that this is the result of sampling variability in the estimates rather than a true effect.

5.3 Ideology and Parties

Wright and Schaffner (2002) compare roll call voting in Nebraska's nonpartisan legislature to that in Kansas to assess the role of political parties in structuring voting behavior. They found, relative to Kansas, roll call voting in Nebraska was unusually unstructured and chaotic, characterized by a poor-fitting multidimensional ideological structure and low chamber polarization. They ascribed this difference to the non-partisan structure in Nebraska claiming that it is "parties [that] produce the ideological low-dimensional space as a by-product of their efforts to win office. Where the parties are not active in the legislature–Nebraska is our test case–the clear structure found in partisan legislatures disappears."

But with our results, we are better positioned to assess whether in fact roll call voting behavior in Nebraska is indeed anomalous. When we pool the state's APRE statistic for the first dimension, we find that it is relatively low at 27%.[24] However, four other states (Arkansas, Louisiana, West Virginia and Wyoming) score lower on this measure of fit. Similar results hold for a two-dimensional model.

We can also use a party-free measure of polarization – the average ideological distance between members – to compare Nebraska to other states. Just like many other states, Nebraska is polarized, and becoming increasingly more so. On average, Nebraska's Senate is more polarized than 17 other chambers. In fact, it is actually polarizing faster than many other states. By the party-free measure, it polarized faster than 75 other chambers over 1996-2008.

6 Conclusion

American state legislatures provide a fruitful setting for testing numerous theories in positive political science. The combination of common features and diversity is extremely inviting. Yet many of those theories, particularly those based on the spatial model, rely on empirical estimates of ideology. Those estimates have, to date, been lacking, and this paper presents two new data sets to create them.

Bridging allows us to compare ideological preferences of individuals across institutions. This much is known, but the devil is in the details. On what basis are bridges to be selected? One answer is to choose bridge legislators – that is, those who have voted in more

[24] By comparison, the average APRE for all 50 states in one dimension is 49%, and 72% for Congress.

than one legislature in their career (Shor, Berry and McCarty 2010). However, the supply of these ambitious and successful politicians is quite limited. In this paper, we have used another bridging strategy, relying on Project Vote Smart's long-running political candidate questionnaire, the National Political Awareness Test. Originally designed to foster a more informed voter, we use it instead to illuminate a common ideological space for members of Congress and state legislators.

Doing so gives a far more nuanced picture of the ideological breakdown of a state than cruder proxies employed in the past would allow, both across states and over time. While party and ideology are ever-increasingly synonymous in an ever more polarized Congress, this is emphatically not (always) the case in the states. There are large numbers of conservative Democratic parties, as well as liberal Republican parties. State parties are not mere microcosms of their national counterparts; they do in fact have a distinct faces. For the first time, however, we can distinguish party and ideology through the use of a common ideological metric. Doing so allows us to pick up the real world consequences of political worldviews that animate state politicians.

Having generated these estimates on a common scale, future work can turn to testing important theories in American politics. For example, partisan theories of lawmaking could be tested (Cox and McCubbins 1993). For example, conditional party government models (Aldrich 1995; Aldrich and Rohde 2001) hold that policy change in favor of party-desired outcomes is easier when party heterogeneity is lower. Such measures can easily be calculated using our NPAT common space scores.

Our new preference measures can be combined with the vast institutional variation that states afford. Rather than rely solely on longitudinal variation in the US Congress, we can test institutional theories of policymaking with spatial variation at the state level. For example, because supermajority rules and gubernatorial veto powers vary across states, pivotal politics (Krehbiel 1998) models can be tested directly.

This paper represents the first step toward a more widely available ideological common space in American state legislatures. We leave to future work extensions in measurement, such as to governors and supreme court judges, as well as to individual voters.

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7 Appendix A: NPAT 2006 Questions: Congress

1. The federal government should continue affirmative action programs.
2. Allow laboratories to create new lines of stem cells for additional research.
3. The federal government should consider race and gender in government contracting decisions.
4. Do you support using military tribunals to try suspected terrorists when ordinary civilian courts are deemed inappropriate or impractical?
5. Should the United States grant law enforcement agencies greater discretion to read mail and email, tap phones, and conduct random searches to prevent future terrorist attacks?
6. Should the United States hold foreign states accountable for terrorists who operate in their country?
7. Do you support a policy of pre-emptive military strikes against countries deemed to be a threat to U.S. national security?
8. Should the United States support the creation of a Palestinian state?
9. Should the United States maintain its financial support of the United Nations?
10. Should the United States use diplomatic and economic pressure to encourage North Korea to abandon its nuclear weapons program?
11. Should the United States increase military support to Afghanistan?
12. Do you support the North American Free Trade Agreement (NAFTA)?
13. Support national standards for and testing of public school students.
14. Allow parents to use vouchers, (equal opportunity scholarships) to send their children to any public school.
15. Allow parents to use vouchers, (equal opportunity scholarships) to send their children to any private or religious school.
16. Allow teachers and professionals to receive authorization and funding to establish charter schools.
17. Reward teachers with merit pay for working in low-income schools.
18. Increase the federal minimum wage.
19. Increase the federal minimum wage.
20. Support the right of workers to strike without fear of being permanently replaced.
21. Increase funding for child care programs.
22. Include sexual orientation in federal anti-discrimination laws.
23. Encourage further development and use of alternative fuels to reduce pollution.
24. Support opening a portion of the Arctic National Wildlife Refuge for oil exploration.
25. Support the Kyoto Protocol to limit global warming.
26. Encourage further development and use of alternative fuels to reduce pollution.
27. Support the use of the death penalty for federal crimes.
28. Decriminalize the possession of small amounts of marijuana.
29. Impose stricter penalties for those convicted of corporate crimes.
30. Minors accused of a violent crime should be prosecuted as adults.
31. Require that crimes based on gender, sexual orientation, and disability be prosecuted as federal hate crimes.
32. Support mandatory jail sentences for selling illegal drugs.
33. Require that crimes based on gender, sexual orientation, and disability be prosecuted as federal hate crimes.
34. Allow citizens to carry concealed guns.
35. Require a license for gun possession.
36. Require welfare recipients to spend at least 40 hours a week in a combination of work and training programs.
37. Continue to give states and local governments flexibility in and responsibility for welfare programs

through federal block grants.

38. Direct federal poverty aid through religious, community-based, or other non-profit organizations.
39. Decrease the number of legal immigrants allowed into the country.
40. Establish English as the official national language.
41. Support a temporary worker program that would enable illegal immigrants to work in the United States legally.
42. Support amnesty for illegal immigrants already working in the United States.
43. Implement a universal health care program to guarantee coverage to all Americans regardless of income.
44. Allow doctors to recommend marijuana to their patients for medicinal purposes
45. Establish limits on the amount of punitive damages awarded in medical malpractice lawsuits.
46. Abortions should always be illegal.
47. Abortions should always be legal.
48. Abortions should be legal only within the first trimester of pregnancy.
49. Prohibit public funding of abortions and to organizations that advocate or perform abortions.
50. Allow workers to invest a portion of their payroll tax in private accounts which they manage themselves.
51. Increase the payroll tax to better finance Social Security in its current form.
52. Lower the annual cost-of-living increases.
53. Raise the retirement age for individual eligibility to receive full Social Security benefits.
54. Abortions should be legal when the pregnancy resulted from incest or rape.
55. Abortions should be legal when the life of the mother is endangered.
56. Increase the amount individuals are permitted to contribute to federal campaigns.
57. Prohibit PAC contributions to candidates for federal office.
58. Support programs to provide prison inmates with educational, vocational, and job-related skills and job-placement assistance when released.
59. Reduce prison sentences for those who commit non-violent crimes.
60. Increase funding for school capital improvements(e.g. buildings, infrastructure, technology).
61. Support affirmative action in public college admissions.
62. Support federal tax incentives to help families save for college.
63. Increase funding for national job-training programs that re-train displaced workers or teach skills needed in today's job market.
64. Reduce government regulation of the private sector in order to encourage investment and economic expansion.
65. Provide tax credits or grants to businesses that offer child care services to employees.
66. Support increased development of traditional energy resources (e.g. coal, natural gas, oil).
67. Maintain and strengthen the current level of enforcement of existing federal restrictions on the purchase and possession of guns.
68. Ease federal restrictions on the purchase and possession of guns.
69. Repeal federal restrictions on the purchase and possession of guns.
70. Require background checks on gun sales between private citizens at gun shows.
71. Providing health care is not a responsibility of the federal government.
72. Collect taxes on commercial Internet transactions.
73. Do you support the permanent repeal of the federal estate tax?
74. Do you support making President Bush's tax cuts permanent?
75. Support public taxpayer funding for federal candidates who comply with campaign spending limits.
76. Allow unregulated soft money campaign contributions to political parties or committees.
77. Remove all contribution limits on federal campaigns and parties.

78. Require Section 527 organizations to register with the Federal Election Commission as Political Action Committees.
79. Do you support instant run-off voting?
80. Should Election Day be a national holiday?
81. Do you support a constitutional amendment that would define marriage as a union between a man and woman?
82. Eliminate the use of the death penalty for federal crimes.
83. Support programs to provide prison inmates with drug and alcohol addiction treatment.
84. Expand federally sponsored drug education and drug treatment programs.
85. Increase border security to stop the flow of illegal drugs into the United States.
86. Eliminate federal fundings for programs associated with the war on drugs.
87. Support a federal law to standardize testing and penalties for steroid use in professional sports.
88. Increase funding of programs such as Pell grants and Stafford loans to help students pay for college.
89. Encourage employers to offer flex-time scheduling, comp-time, and unpaid leave for family emergencies.
90. Eliminate all federal programs designed to reduce unemployment.
91. The federal government should discontinue affirmative action programs.
92. Strengthen the regulation and enforcement of the Clean Water Act.
93. Strengthen the regulation and enforcement of the Clean Air Act.
94. Support Clear Skies Act to reduce power plant emissions by setting a national cap on pollutants.
95. Require states to compensate citizens when environmental regulations limit uses of privately-owned land.
96. Relax logging restrictions on federal lands.
97. Relax standards on federal lands to allow increased recreational usage.
98. Strengthen emissions controls and fuel efficiency standards on all gasoline and diesel-powered engines, including cars, trucks, and sport utility vehicles.
99. Support the use of ethanol as an alternative fuel.
100. Allow energy producers to trade pollution credits.
101. Reauthorize the ban on the sale or transfer of semi-automatic guns, except those used for hunting.
102. Expand eligibility for tax-free medical savings accounts.
103. Support expanding prescription drug coverage under Medicare.
104. Offer tax credits to individuals and small businesses to offset the cost of insurance coverage.
105. Support automatic enrollment of children in federal health care programs such as CHIP and Medicaid.
106. Support stem cell research on existing lines of stem cells.
107. Relax restrictions barring legal immigrants from using government funded social programs (e.g. public housing, food stamps).
108. Aid should be granted to countries when extraordinary circumstances cause disaster and threaten civilian lives.
109. Aid should be granted to countries when it is in the security interests of the United States.
110. Aid should be eliminated for any nation with documented human rights abuses.
111. International aid programs should be scaled back and eventually eliminated.
112. Should the United States continue to provide leadership in the Israeli-Palestinian peace process?
113. Should the United States withdraw its troops from Iraq?
114. Should the United States send more troops to Iraq?
115. Should the United States use military force to dismantle the North Korean nuclear weapons program?
116. Should the United States remove the North Korean government from power?
117. Should the United States increase financial support to Afghanistan?
118. Should the United States decrease its financial support of the United Nations?
119. Should the United States commit troops to United Nations peacekeeping missions?

120. Should the United States lift its travel ban to Cuba?
121. Should the United States increase its financial support to Colombia to combat the war on drugs?
122. Should aid to African nations for AIDS prevention programs fund distribution of contraceptives?
123. Do you support the Central American Free Trade Agreement?
124. Do you support the General Agreement on Tariffs and Trade?
125. Do you support continued U.S. membership in the World Trade Organization?
126. Should a nation's human rights record affect its normal trade relations (most favored nation) status with the United States?
127. Do you support the trade embargo against Cuba?
128. Should trade agreements include provisions to address environmental concerns and to protect workers' rights?
129. Should the federal government increase funding to states and cities for homeland security?
130. Do you support the prohibition of torture or cruel, inhuman, or degrading treatment or punishment of prisoners in U.S. custody?
131. Allow workers to invest a portion of their payroll tax in private accounts managed by private firms contracted through the government.
132. Invest a portion of Social Security assets collectively in stocks and bonds instead of United States treasury securities.
133. Continue the moratorium on Internet taxation.
134. Implement government regulation of Internet content.
135. Support government mandates to curtail violent and sexual content on televisions.
136. Support strict penalties for Internet crimes (e.g. hacking, identity theft, worms/viruses).
137. Support legislation to detail how personal information can be collected and used on the Internet.
138. Regulating the Internet is not a responsibility of the federal government.
139. Support housing assistance for welfare recipients.