A Bridge to Somewhere: Mapping State and Congressional Ideology on a Cross-Institutional Common Space*

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Abstract

Two major problems exist in applying ideal point estimation techniques to state legislatures. First, there has been a scarcity of longitudinal roll call data. Second, even where such data exists, scaling ideal points within a single state is inadequate. No comparisons can be made across institutions, whether to other state legislatures or to the US Congress. Our project is a solution to both of these problems. We use a new comparative data set of state legislative roll calls beginning in the mid-1990s to generate ideal points for legislators. We take advantage of the fact that state legislators sometimes go on to serve in Congress to create a common ideological scale between Congress and the various legislatures. These "bridge actors" are similar in concept to members of the House who go on to serve in the Senate, thereby providing the glue necessary to scale the House and Senate together. We use this approach for California, Colorado, Florida, Illinois, Michigan, New York, Ohio, Pennsylvania, and Virginia. Using these bridge actors, we create a new state-federal congressional common space ideological scores. We conclude by using these common space scores to address important topics in legislative politics.

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1 Introduction

Following seminal contributions of Poole and Rosenthal (1985, 1991, 1997), the estimation of legislative "ideal points" has become an active and influential research agenda in political science. Quantities of interest in their own right, ideal point estimates have also become essential ingredients in studies of legislative politics grounded in spatial voting models.[1] More recently, Bayesian item response theory models have come to complement the Poole-Rosenthal NOMINATE algorithm (Jackman 2000; Martin and Quinn 2002; Clinton, Jackman and Rivers 2004; Jackman 2004).

Recently scholars have applied ideal point analysis to comparative contexts (Poole and Rosenthal 2001). In the last half decade, scholars have begun estimating ideal points for state legislatures. A crucial limitation of existing state ideal point estimates, however, is that they cannot be compared across states or with Congress because each ideological space is defined solely *within* a single state, because any estimated ideal points are identified only up to a linear transformation.

In this paper, we exploit a method for estimating ideal points of multiple state legislatures and Congress in a single, comparable true common space. Our method exploits the voting records of so-called bridge actors–legislators who graduate from a state legislature to Congress–to produce a universal spatial map for state and Congressional politics. We illustrate the use of our new scores to explore several questions of longstanding interest to scholars of legislative politics.

The paper proceeds as follows. The next section describes previous efforts to measure state-level ideology using ideal point estimates and other methods. Next we describe our methodology and data. We then present our major results. We analyze the dimensionality of state legislative politics, use our new spatial map to address issues of partisan polarization, and assess the relationship between state legislatures and their respective Congressional delegations. The concluding section evaluates the advantages and limitations of our approach relative to earlier work in this area and describes our agenda for future research.

2 Measuring Ideology Across States

A large literature in state politics seeks to understand the relationships between the ideology of citizens, the ideology of their elected representatives, and the ideological orientation of resulting state policies. Erikson, McIver and Wright (1987); Erikson, Wright and McIver (1993) were

[1] See Poole (2005) for an introduction and survey of ideal point estimation.

among the first to attempt to estimate the ideology of citizens and government officials within states. They use pooled CBS News/New York Times polling data to estimate the partisanship and liberalism of state public opinion. In addition, they produce a measure of party elite liberalism based on surveys of congressional candidates, state legislators, county party chairpersons, and party convention delegates. Erikson et al conclude that the link between party control and policy outcomes is mediated by public opinion. Specifically, they contend that both parties will tend to be more liberal in states where the electorate is more liberal, making it difficult to isolate the effects of party control on policy outcomes across states. Only after controlling for state public opinion are significant effects of party control evident.[2]

Such data is important but limited by its inherently cross-sectional nature. Berry et al. (1998) [BRFH] were the first to produce annual estimates of citizen and government ideology for all 50 states, for the period 1960 to 1993. Their estimates of citizen ideology are based on interest group ratings of members of Congress representing the state. Their estimates of government ideology are also based on the interest group scores for the state's Congressional delegation, derived separately by party and weighted to reflect the distribution of partisan control in the state legislative and executive branches. Berry and his coauthors show that their measure of citizen ideology is highly correlated with the EWM measure of public opinion liberalism.

A notable limitation of both the Berry et al. (1998) and the Erikson, Wright and McIver (1993) measures of government ideology is that they pertain to the state government writ large. They can tell us nothing about the ideology of individual legislators or the distribution of preferences more broadly. In addition, neither approach yields ideological measures for the state government that can be meaningfully compared with standard Congressional measures of ideology. In the Berry et al. (1998) framework, state ideology is inferred from state congressional delegations, scaled by the proportionate size of party delegations in the legislature. This assumes that ideological differences in parties across states are fully reflected in state congressional delegations. We find, in fact, significant differences between the two. Meanwhile, the EWM measure relies on idiosyncratic and isolated surveys of state and local officials, which have no obvious counterpart at the Congressional level.[3]

Within the last few years, several scholars have estimated ideal points of state legislators

[2]Originally developed as cross-sectional measures, the authors have recently produced longitudinal estimates of state opinion liberalism and public partisanship-though not party elite ideology-from 1977 to 2003 (Erikson, Wright and McIver 2006).

[3]Since the same survey is given across states, however, cross-state comparisons of partisan elites are obviously valid.

by using roll call data to produce NOMINATE scores. Aldrich and Battista (2002) produce NOMINATE scores for eleven state legislatures in the late 1990s to investigate party polarization and committee representativeness. Gerber and Lewis (2004) generate NOMINATE scores for the California state legislature. McCarty, Poole and Rosenthal (2006) used NOMINATE scores to estimate polarization measures for nine states. Kousser, Lewis and Masket (2007) estimate NOMINATE scores for California Assembly members to investigate whether legislators changed their voting behavior after the 2002 gubernatorial recall election. Bertelli and Richardson (2004) create NOMINATE scores for the Arizona House and Senate from 1995 to 2002 to examine the effects of single-member versus multi-member districts on legislator extremism. Finally, Wright has assembled roll-call data for all states in 1999-2000 (Wright 2007) and produced a comprehensive set of within-state NOMINATE scores. With a series of coauthors, Wright uses state roll call data to explore the extent to which legislative politics is one-dimensional (Wright and Winburn 2003; Wright and Clark 2005) and the effects of parties on the structure of roll call voting (Wright and Schaffner 2002).

Relative to the government ideology measures of Berry et al. (1998) and Erikson, Wright and McIver (1993), the ideal point approach has the advantage of providing estimates of the ideological positions of individual legislators. Moreover, preference estimates are based on the actual behavior of state legislators rather than assumed correlations with the state's Congressional delegation.

Two principal difficulties exist with ideal point estimation applied to state legislatures. First, access to data on state legislative roll calls is sparse, to say to the least. Worse, existing state-level ideal point analyses have been conducted one state at a time. Because the estimated latent ideological dimensions need not be on the same scale for separate roll call matrices, the existing ideological scores are not directly comparable across states. Nor, for that matter, can existing state-level scores be directly compared with Congressional scores. In the remainder of this paper, we propose a method for estimating ideological scores on a common dimension across states and Congress, and present preliminary comparative analyses using these new scores. Our results are estimation technology agnostic: we have used both NOMINATE and item response models equally successfully.

3 Methodology

The need for comparable preference estimates across political institutions is hardly new. The existing literature includes, for example, efforts to produce common ideological scales for the US House and Senate (Poole and Rosenthal 1997; 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. 2005). Indeed, connecting overlapping generations of political actors within a single institution over time presents similar challenges of estimating comparable ideal points for actors whose choices are not observed simultaneously (Poole and Rosenthal 1997; Martin and Quinn 2002). To our knowledge, however, no one has attempted to put multiple state legislatures onto a common ideological map using ideal point techniques.

All of the efforts to place multiple institutions in a common space rely, in varying ways, on bridge actors. These are political actors who make choices that can be construed as votes in more than one institutional setting. Common examples of bridge actors include members of Congress who serve multiple terms, members who migrate from the House to the Senate, solicitor generals who advocate for one side in front of the Supreme Court, and presidents who express views on congressional bills.

In the present exercise, we rely on bridge actors to make three types of connections within and between institutions: first, those who serve multiple sessions in the state legislature and Congress connect institutions longitudinally, second, those who move from the lower to the upper chamber of a state legislature connect those two institutions, and third, those politicians who rise from a state legislature to Congress connect the state and national ideological maps. Although we never observe a bridge actor who serves in more than one state legislature, we are nevertheless able to place all the states on a unified spatial map through their common connection to Congress.

Gerber and Lewis (2004) is the sole example of placing a state legislature on a common scale with Congress. They do for a single state, California, by using interest group ratings of US Representatives and state Assembly and Senate legislators for 1993-1994 as the bridges. Specifically, phantom legislators that stand for the League of Conservation Voters, the Chamber of Commerce, and the AFL-CIO are constructed based on the votes that underlie their respective ratings.[4] While innovative, using interest group rating may be problematic. Interest groups choose

[4]Interestingly, they also put voters on the same space through scaling ballots of Los Angeles County voters,

votes to score in a nonrandom fashion, and longitudinal and cross-chamber comparability is not always assured (Groseclose, Levitt and Snyder 1999), as groups may arbitrarily shift and stretch their scales. Finally, Gerber and Lewis do not tie other states besides California on a common space.

Poole (2005) (chapter 6) provides an overview of methods for estimating a common spatial map across institutions using bridge actors. He suggests two approaches. The first, which we call *linear mapping*, extracts spatial maps for the two institutions separately and then connects them by regressing the two sets of coordinates for the bridge actors. The latter, which we call *pooled scaling*, combines the roll call matrices across institutions into one large matrix. Using bridge actors as the glue, one executes the scaling simultaneously for all the legislators across all chambers. In principle, the two methods should produce largely similar results (though see Shor, McCarty and Berry (2008) for caveats). In practice, the vast size of a matrix containing all votes and legislators for all available time for all states and Congress means it is computationally challenging to do the latter all at once, even with substantial sampling.

3.1 Mapping and Scaling

For this paper, we adopt both approaches, but for different purposes. The latter we apply to create within-state scores, as well as for state-Congress comparisons. We begin by pooling roll call voting decisions by state legislators across the entire time period and for both chambers. Thus, the data matrix includes rows for each state legislator had ever served anywhere or anytime in the legislature. The columns include all votes taken over the entire time period in both chambers. Votes are marked as missing if the legislator was not present in a chamber.

We repeat the exercise for the 104th through the 110th Congress (1995-2007).[5] We scale within-Congress scores across time. We now have two separate scores, one for the a given state, and another for Congress.

Finally, we use linear mapping to translate within-state, bichamber scores to congressional common space. We do so by regressing the within-Congress scores of each state's bridge legislators on their within-state scores, using bivariate OLS. We repeat this mapping for each state. Finally, we use the estimated coefficients from each regression to create predicted congressional common space scores for the non-bridge legislators in each state. Because all predicted scores are now on the same scale, they can be directly compared across states (and Congress itself).

treating their voting decisions on initiatives as legislative "votes."

[5]Voting data on the 110th is current as of July 2, 2007.

Our analysis relies on three sets of bridge actors. First, legislators who serve in more than one session facilitate longitudinal comparisons. These represent the vast majority of all legislators. Second, legislators who serve in both state Assembly and Senate facilitate cross-chamber comparisons. There are dozens of these in our states.

The last set of bridges–those state legislators who later go on to serve in Congress–allow us to rescale scores in cross-institutional common space. They are typically limited in number due to the high cost of acquiring and processing historical roll call data from individual state legislatures. We explore the consequences of this data limitation below.

In addition to the methods developed by Poole, we also experiment with a one dimensional Bayesian item response model (Jackman 2000; Martin and Quinn 2002; Clinton, Jackman and Rivers 2004; Jackman 2004) based on Markov Chain Monte Carlo (MCMC) methods.[6] In the interests of space, we have largely left out these results from the paper. However, estimates of ideal points via both methods correlate extremely highly, confirming suspicions that both scaling techniques yield similar results in data-rich environments.

3.2 Ideological Consistency Assumption

Because the state legislative scores are estimated after pooling across chambers and sessions, individual state legislator scores are assumed to be constant throughout their careers. Aggregate ideological change over time comes from replacement, not conversion or adaptation. The exception are party switchers, who are treated as if they were two separate individuals with two distinct scores.

Furthermore, the state legislators – our bridge actors – who go on to Congress are assumed to have a consistent (actually, identical) ideology across the institutional divide. This identifying assumption allows us to rescale state legislative ideal points to congressional common space.

But is this assumption justified? We argue it is, on two separate grounds. First, we agree with Poole that political elites exhibit both coherent belief systems (Converse 1964) and ideological intensity (Poole 2003). Issue positions are related, even if philosophically (or logically) such positions may not necessarily hang together (eg, environmentalism and gun control). These interrelationships are anchored by the ardent passion of ideologues. Second, parties structure voting agendas in legislatures and constrain individual ideological drift (Jenkins 2000). In the electoral arena, parties weed out nonconformists as they develop and promote candidates.

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

The ideological constancy of members of Congress has been empirically studied extensively and research has largely confirmed the consistency assumption. Poole and Rosenthal (1991) and Poole (2003) argue that ideological change in Congress at least has been almost entirely driven by conversion.[7] Ideological consistency remains even during retirement planning (Poole and Rosenthal 1997), getting ready to run for higher office (Poole and Romer 1993), or even after redistricting (Poole and Romer 1993).

On the other hand, there has been almost no research on the ideological consistency of state legislators. We suspect that the same ideological and institutional factors constrict the change of policy positions, but we have had little evidence in the literature on this score. On the other hand, Kousser, Lewis and Masket (2007) illustrate an example of an exogenous shock (the California gubernatorial recall election) leading to small but significant ideological change in a state legislature.

We therefore proceed with an analogue of an empirical test for ideological consistency suggested by Poole (2005). The iterative procedure involves pulling out a bridge actor at a time and treating the legislator as two separate people with two distinct ideal points (one each for state and federal). If the two match based on the information contained solely within the other bridge actors, then that particular actor is ideologically consistent.

We implemented a version of this procedure for our linear mapping approach. For each state, we looped through each of the bridge actors, dropping them each in turn from the linear regression of the bridge actors' state scores on their congressional scores. We get as many separate regression estimates as we have bridges, and therefore as many sets of predictions for all the state legislators. We use the prediction for each of the dropped bridged actors to compare it with their true Congress score.

If our bridge actors are perfectly consistent, then our predicted score should exactly match the true Congress score, and if the set of our bridges are consistent, then we could plot them and draw a 45 degree line right through them. We show the results of our consistency analysis in figure 1. The results show quite close adherence to diagonal in CA, FL, CO, MI, NY, and OH. The results are only slightly less good for PA and IL.

[7] "Since World War II, individual movement has been virtually nonexistent.... Politically, selection is far more important than adaptation." (Poole and Rosenthal 1991, 256-257). Poole (2003) writes that "members of Congress die in their ideological boots. That is, based upon the roll call voting record, once elected to Congress, members adopt an ideological position and maintain that position throughout their careers—once a liberal or a conservative or a moderate, always a liberal or a conservative or a moderate." (3)

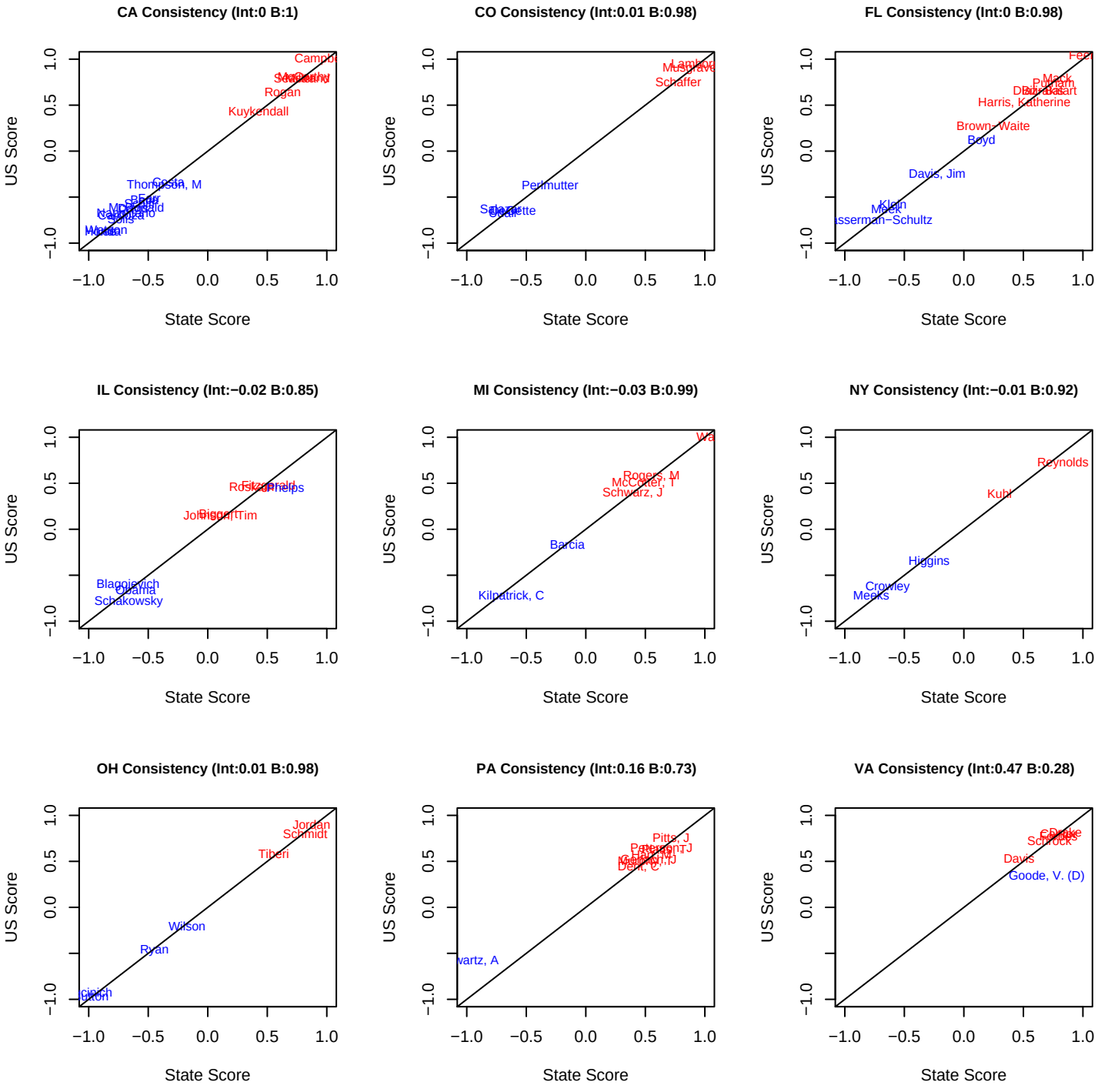

Figure 1: *Predictions of bridge actors' Congress-space scores are on the y-axis with their actual scores on the x-axis. Perfect ideological consistency would be indicated by points directly on the 45 degree line.*

3.3 Sufficiency of Bridging Observations

Even if our bridge actors are in fact ideologically consistent as they move from state legislatures to Congress, do we have enough of them? Previous attempts at creating common space scores, like those bringing together House and Senate, have enjoyed large amounts of bridge actors. But we do not yet have a good methodological rules of thumb of how few bridges are necessary. This is important because we are not likely to see huge numbers of bridges in US states given data limitations (see Table 1).

To sort out this question, we have conducted a Monte Carlo analysis of the performance of Nominate and item response model ideal point estimation techniques under a variety of theoretical conditions. First, we simulate roll call votes for two separate chambers bridged by a small number of legislators. We vary a number of parameters including the number of bridges, the size of the chambers, the party proportions, and the mean and variance of true ideological positions.

We run this simulation for a large number of iterations, creating unique sets of legislators and roll call votes for each set of parameters. We then estimate ideal points for each iteration from the revealed vote decisions of the legislators we create. The comparison of the estimated ideal points with the known true ideal points of these individuals gives us a barometer on how well we are doing, even under potentially adverse conditions. The measure of improvement is the difference in the ratio of the residual sum of squares over the total sum of squares for using linear mapping versus only within-chamber scores (averaged over the iterations).

The results of our simulations can be found in Shor, McCarty and Berry (2008). Our basic finding, however, is that a low number of bridge actors does not harm the overall fitness of estimated ideal points. In fact, even with as few as four bridge actors, bridging does very well. It recovers true ideal points much better than naively scaling chambers individually when those chambers are very different (the best case for rescaling), and hardly ever harms when the chambers are exactly alike. The latter result is impressive because–even when no rescaling is necessary at all–introducing a small number of potentially unrepresentative bridge actors does litle to no harm.

4 Data

Wright (2007) has collected roll call data on all 50 states, but only for 1999 and 2000. This leaves us with too few bridge actors to generate common space scores. This is because sparse Congressional turnover of incumbents means relatively fewer opportunities for ambitious state legislators to "graduate" to the House (much less the Senate, Barack Obama notwithstanding). We need a long enough record of votes to collect some minimal amount of bridge actors to make our methodology work.

Consequently, our state roll call data is from Lewis and Masket (2004) for California and a state legislative voting data project funded by the Woodrow Wilson School and the Russell Sage Foundation. The state legislative journals of all 50 states for approximately the past decade have been either downloaded or requested from the responsible state agencies. These journals, often thousands of pages in length, were laboriously disassembled, photocopied, and scanned. These scans were recognized using optical character recognition (OCR) software. Finally, a set of data-mining scripts were written in Perl that extracted the roll call information from the data files. Since each state's journals were unique, a high fixed cost is paid to program these scripts (though the variable cost of including more years is typically far lower). Difficulties also included OCR scanning mistakes that occur in high absolute frequency in spite of 98% recognition rates.

We have collected roll call data on most of the US states. In this paper, we analyze data from several of these states: California, Colorado, Florida, Illinois, Michigan, New York, Ohio, and Pennsylvania (see Figure 2. These states were chosen for their population of bridge actors, but a nice bonus is that they are geographically diverse. Following Poole (2005), we exclude near-unanimous roll calls where the minority was less than three percent. Table 1 describes the roll call data and presence of bridge actors across states.

5 Scaling

We begin by showing the results of estimating within-state bichamber scores and congressional common space scores for each state. These were estimated using W-NOMINATE with one and two dimensions (Poole et al. 2007) and with a Bayesian item-response model (Jackman 2007) in one dimension.

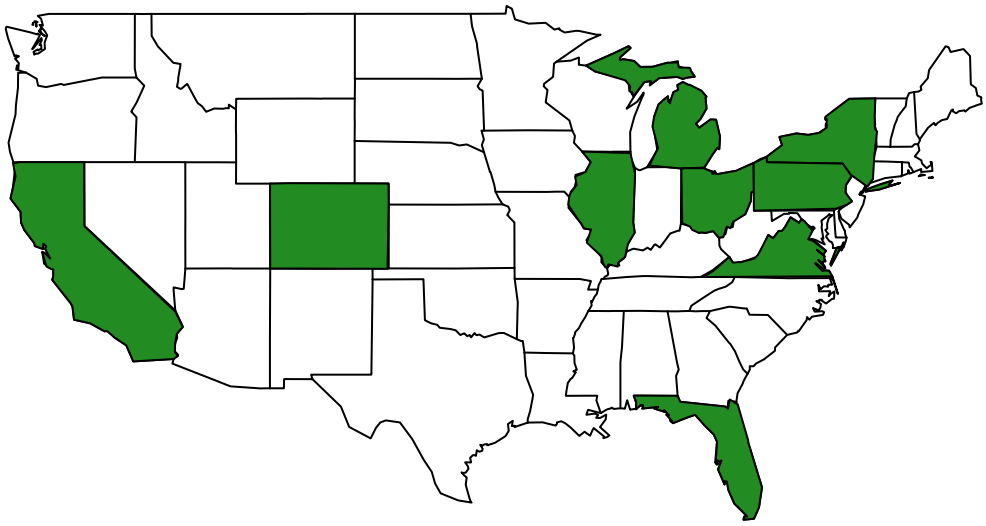

Figure 2: *States we analyze.*

5.1 Fits and Dimensionality

The overall fit of the within-state, bichamber scaling procedure was very good, as shown in Table 2. Classification with one dimension ranged from 88.2% for PA to 93.8% for CA. Average proportionate reduction in error (APRE), which measures the improvement in classification relative to a less naive null (eg, everyone voting with the majority), ranges from 53% for PA to 76.6% for CA. These fit statistics are very comparable to those for the US Congress (1996-2007), which are 89.2% and 68.7%, respectively.

These results comport nicely with previous estimates in the literature. The results for CA, for example, hew quite closely to Gerber and Lewis (2004) results of 89.7% correct classification and a 67% reduction in error for the first dimension. The improvement in fit over their results is

	Start Year	End Year	Legislators	Roll Calls	Bridges
CA	93	06	275	3000	15
CO	96	05	226	6854	5
FL	96	05	334	2199	12
IL	96	04	283	4827	8
MI	96	02	307	5808	6
NY	96	03	281	3486	5
OH	95	04	257	1478	7
PA	96	04	342	2423	8
VA	96	03	200	4027	5

Table 1: *State Data Description*

a consequence of including far more data (1993-2004 for CA, and 1996-2007 for Congress).

Poole and Rosenthal (1991, 1997) famously found that Congress showed low ideological dimensionality. One dominant dimension consistently present over the course of American history is traditionally conceptualized as liberalism-conservatism. A second dimension occasionally appears, but in recent history has receded into insignificance. Such a finding has been echoed in diverse institutional settings, overseas and in the United States (Poole and Rosenthal 2001).

There is reason to suspect that there may be more than one dimension present in the American states. The policy issues in conflict at the state level may well load onto other dimensions given state heterogeneity. For example, consider urban-rural conflict in states with dominant central cities: the Chicago-downstate conflict in Illinois[8], or the New York City-upstate conflict in New York. Or the intrastate conflict between state natives and out-of-state migrants in rapidly growing states like Florida and Nevada. Even if one dimension accounts for nearly all political conflict in any given state, that dimension may be different across the states. An urban-rural divide may be dominant in some states, an Anglo-Hispanic dimension in another, and so forth.

On the other hand, we may expect that the dominant left-right dimension explains nearly all of political conflict in state legislatures. State parties are increasingly organizational and ideological franchises of the national parties. Though historically heterogenous across states, they have drifted into ideologically distinct camps in recent times (McCarty, Poole and Rosenthal 2006; Erikson, Wright and McIver 2006). Wright and Schaffner (2002) found evidence in the comparison between Nebraska and Kansas that low dimensionality is the consequence of a two-

[8]Though much of downstate Illinois is Republican, there are several highly Democratic counties bordering Missouri.

party electoral system.

Ultimately, the question of dimensionality is an empirical one. The tools we use to assess dimensionality include observations of fit improvement and skree plots[9] when numbers of dimensions are increased. Table 2 shows that the improvements in classification going from one to two dimensions are modest across the board, averaging less than a percent across the states. The APRE improvement is also small, especially relative to Congress. If additional dimensions were present, such improvements would be considerably larger. Illinois, however, is a genuine outlier, with a small but noticeably larger improvement in fit from including a second dimension. This exception needs further exploration.

	Class% 1	Class% 2	Cla2-Cla1	APRE 1	APRE 2	AP2-AP1
CA	93.8	94.0	0.2	76.6	77.5	0.9
CO	88.6	88.9	0.3	50.6	52.1	1.5
FL	90.6	90.3	−0.3	63.9	67.2	3.3
IL	86.6	89.8	3.2	53.3	64.5	11.2
MI	90.5	91.1	0.6	70.5	72.2	1.7
NY	90.9	91.7	0.8	49.0	53.6	4.6
OH	89.2	89.9	0.7	50.8	54.2	3.4
PA	88.2	88.9	0.7	53.0	55.8	2.8
US	89.4	90.1	0.7	70.9	72.7	1.8
VA	85.1	86.2	1.1	45.7	49.8	4.1
Average	89.3	90.1	0.8	58.4	62.0	3.5

Table 2: *Intrastate Fit Statistics*

5.2 Linear Mapping

Since the first dimension so dominates all others, we drop further analysis of the other dimensions. We regress the US Congress scores for our bridge actors in each state on their bichamber, within-state scores. The results are shown in Figure 3. The two scores line up almost perfectly (correlations are above 0.97 for each state). This indicates that more conservative

[9]Skree plots graphically summarize the sizes of the eigenvalues from a NOMINATE scaling. Rules of thumb for inferring dimensionality from such plots include looking for an "elbow" where subsequent dimensions show rapidly diminishing eigenvalues. For multiple examples of skree plots, see http://voteview.com/w-nominate.htm on Keith Poole's Voteview site. Also see http://pooleandrosenthal.com/the_unidimensional_supreme_court.htm for an extended discussion on dimensionality in the context of the Supreme Court. In the interest of brevity, we do not show skree plots. However, they confirm the presence of a single dominant dimension, but appear to indicate the potentiality of additional dimensions in a few states.

(liberal) bridge legislators in the states are more conservative (liberal) in the Congress, too.

Still, a few outliers exist, primarily in Illinois. The biggest of these is Congressman David Phelps (D-IL). He voted as a moderate "Blue Dog" Democrat (socially conservative but economically liberal) in the US House following his 1998 election. He was eventually ousted by conservative Republican John Shimkus, another incumbent, following the 2002 redistricting which radically redrew his downstate Illinois district into an even more Republican direction. Yet he was far more conservative in the Illinois state legislature, substantially out of line with the consistency assumption.

These regressions produce a set of intercept and slope coefficients mapping scores from state space to congressional common space. These coefficients are used to generate predicted scores for the non-bridge legislators from each state. These predicted scores in common space are plotted as density curves in Figure 4, and with a boxplot in Figure 5.

What if we had failed to rescale within-state scores? How much of a difference does this mapping strategy make? Figure 6 tells the story. The short answer is that it differs, state by state, and party by party. Republicans and Democrats, in general would be seen as more extreme than they really are.

Now, for the first time, we can directly compare the results from different states with each other, as well as with the US Congress. We do so first by comparing the range of ideological preferences in each institutional setting. California, Florida, and Ohio stand out with the widest range. Pennsylvania, Colorado, and Illinois have the smallest range.

Second, we compare medians of each state's pooled "legislature," and compare it to Congress pooled over space and time from the 105th through the 110th Congress. We can see three distinct groups. California and Illinois have the most liberal legislative medians. On the other side, Florida and Michigan have fairly conservative medians over their respective time periods. Finally, Colorado, Pennsylvania, and Ohio have more moderate conservative medians that are comparable to that of Congress.

Third, we can compare the party medians. On the Republican side, we can also see three distinct groups. Michigan and California Republicans stick out by being quite conservative. In contrast, Illinois Republicans are notable for their liberalism. In between are Florida, Colorado and Ohio. On the Democratic side, California's are very liberal. Slightly less liberal is Florida's and Colorado's Democrats. Most conservative are Pennsylvania and Colorado Democrats. The Midwestern Democrats of Michigan, Illiniois, and Ohio are most like Congressional Democrats.

Another interesting exercise is the comparison of state congressional delegations to the state legislatures themselves. We have good reason to expect that the distributions of these two sets of preferences are not independent. First, both are anchored by state public opinion (Erikson, Wright and McIver 1993). Second, as the presence of bridge actors so prominently outlines, members of Congress are drawn from a pool of state elites that also supply state legislators.

Figure 7 show the results of the comparison of party medians between legislatures and delegations. It turns out the distribution of ideology in state congressional delegations are typically fairly different from such distributions in state legislatures. There does not seem to be a pattern of which side is more polarized across the states. California's delegation is more moderate than the state legislature, while Pennyslvania's is more extreme. Michigan, and Ohio's delegations are more liberal, while Colorado and Florida's are more conservative. It would seem wrong to use state delegation scores as proxies for state legislatures.

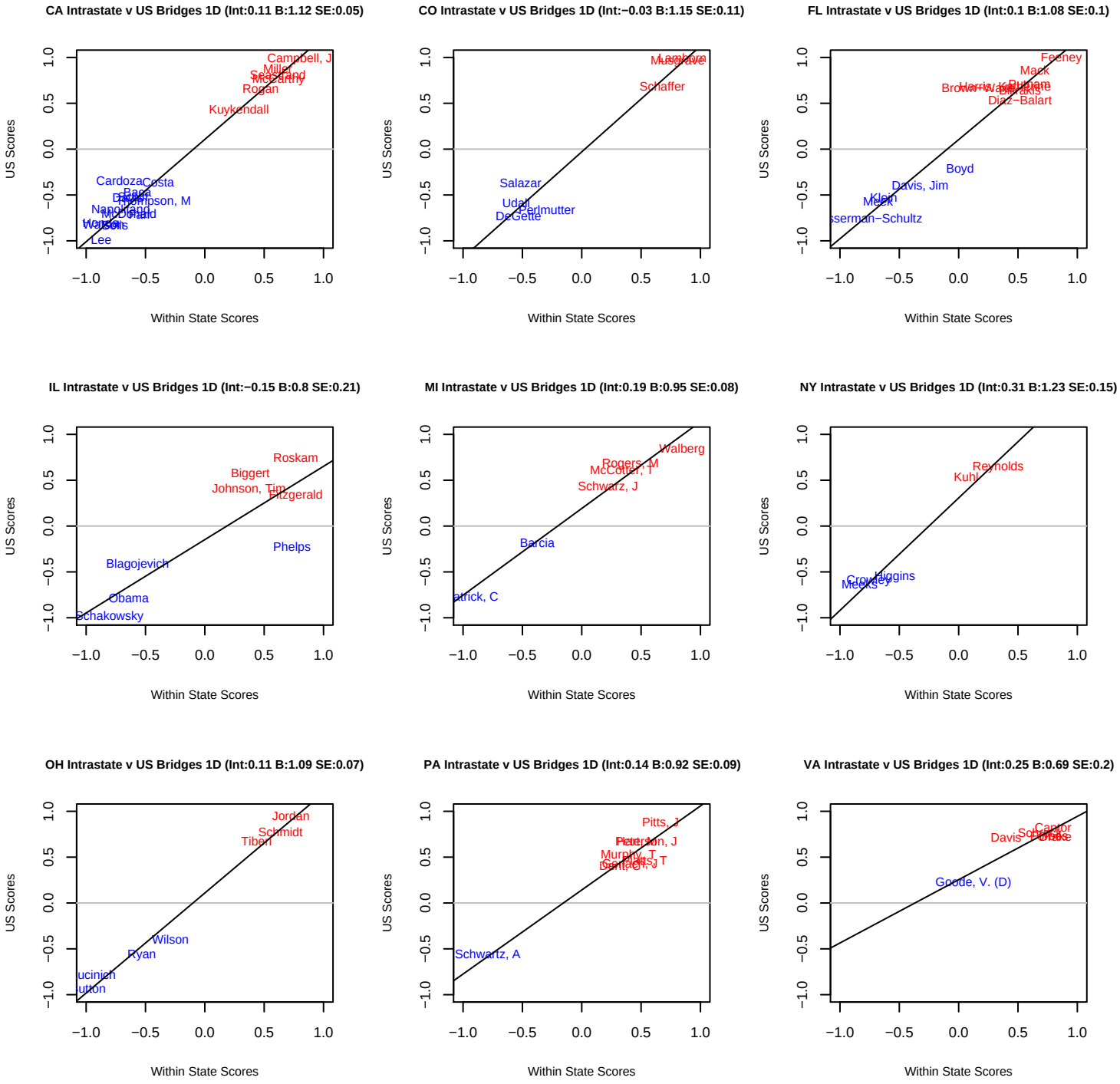

Figure 3: *Linear mapping consists of regressing state bridge legislator US Congress scores on their within-state bichamber scores. Conservative state bridge actors are also conservative in the Congress.*

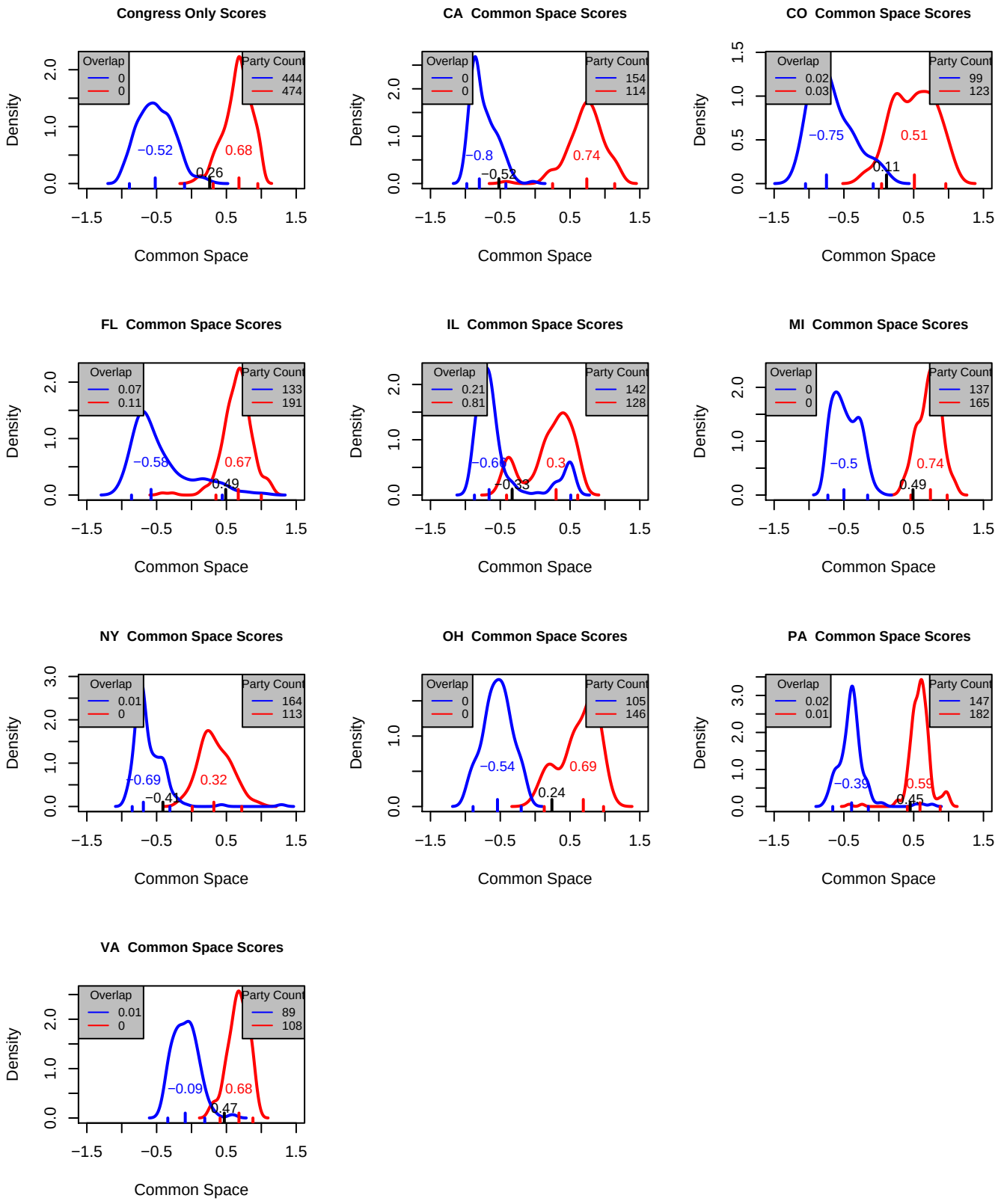

Figure 4: *Estimated congressional common space scores for nine states compared with scores for the 105th-110th US Congress. Colored numbers under density plot indicate party medians (red are Republicans), the black number on the x-axis is the bichamber median. Short bars are 5th and 95th party percentiles. Party overlap statistics are reported in the legend.*

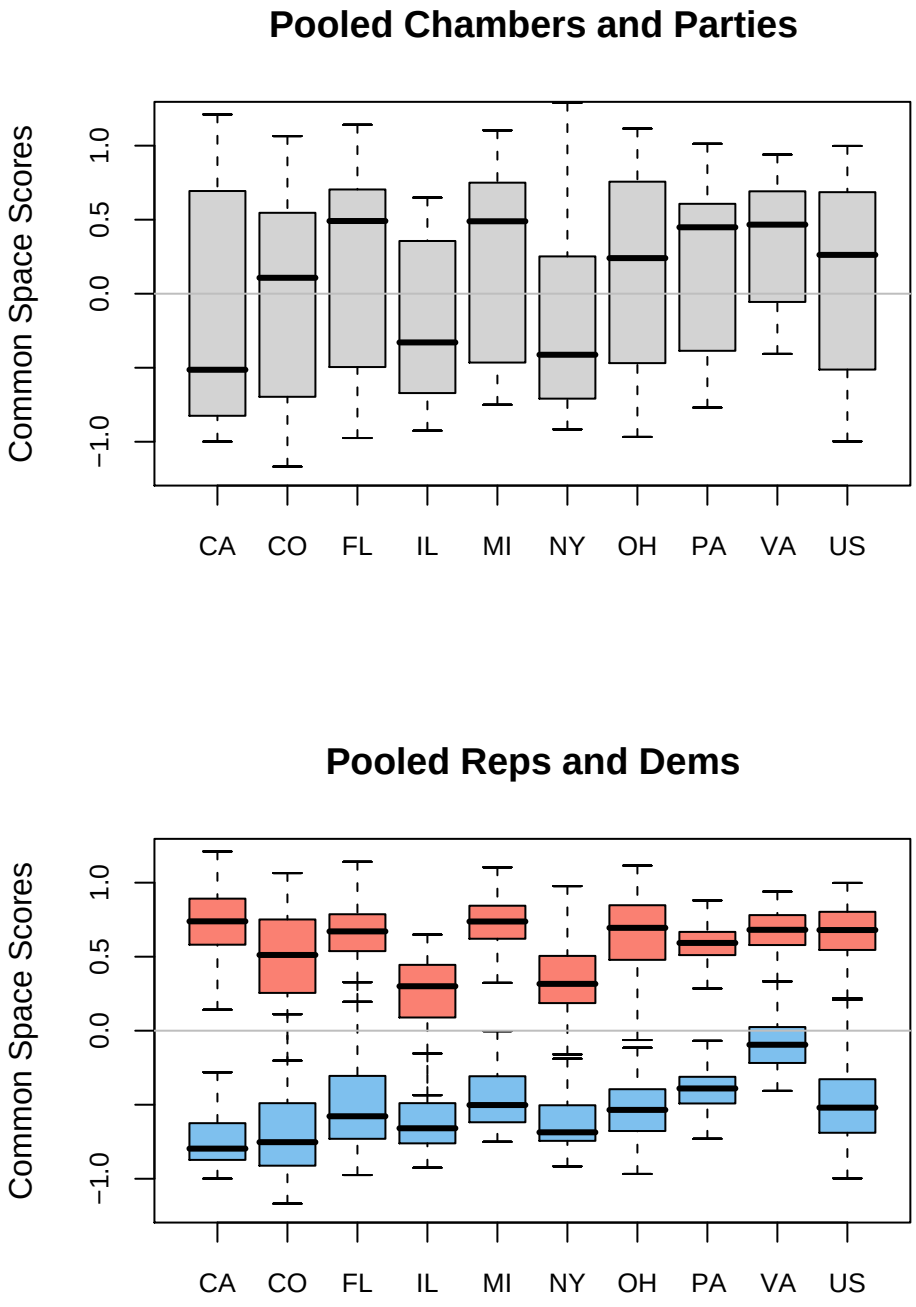

Figure 5: *Estimated congressional common space scores for nine states compared with scores for the US Congress, 1996-2006. Top plot pools both parties, while the bottom plot separates them.*

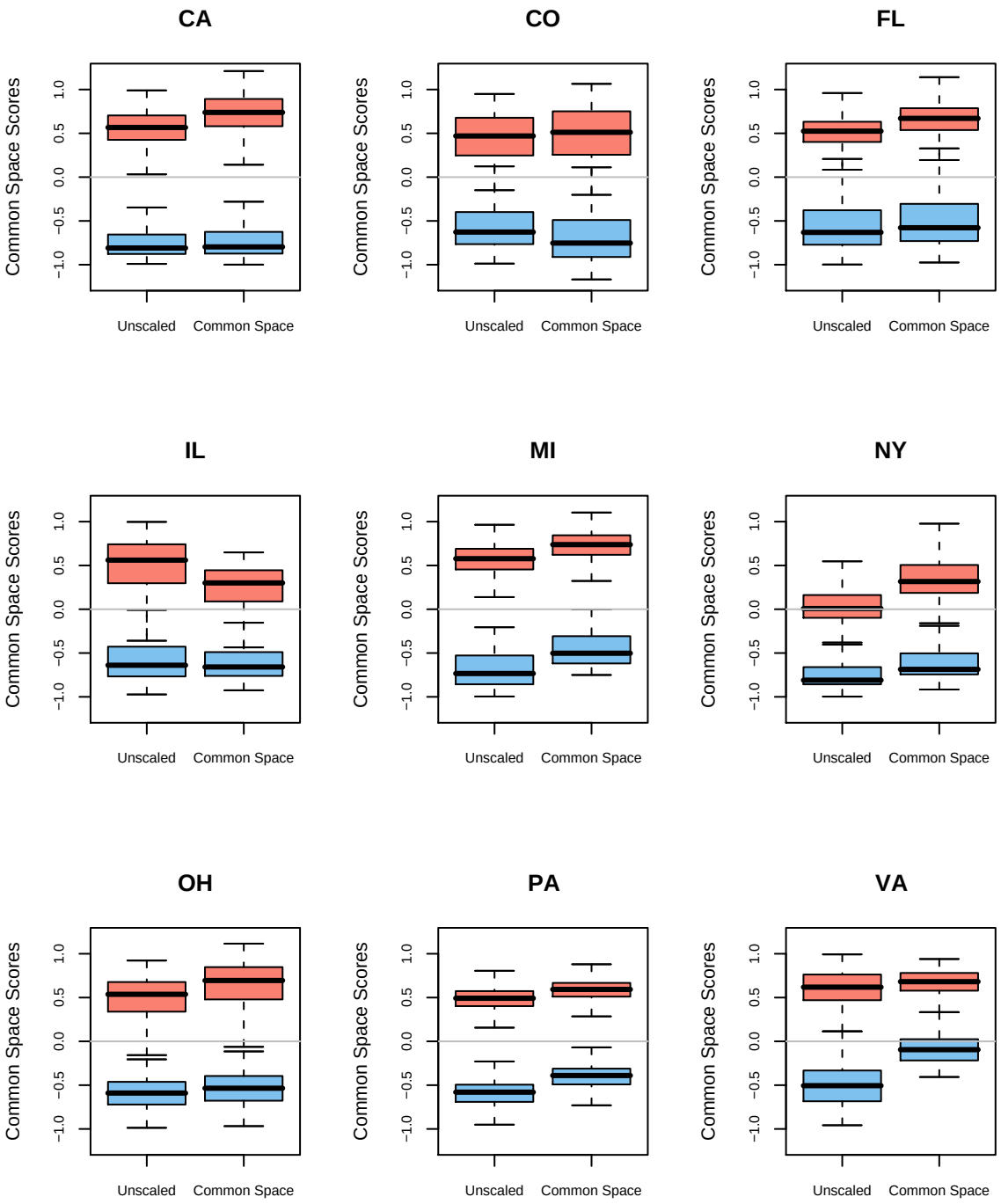

Figure 6: *Comparison of ideological distributions of state legislatures in common space and in within-state space.*

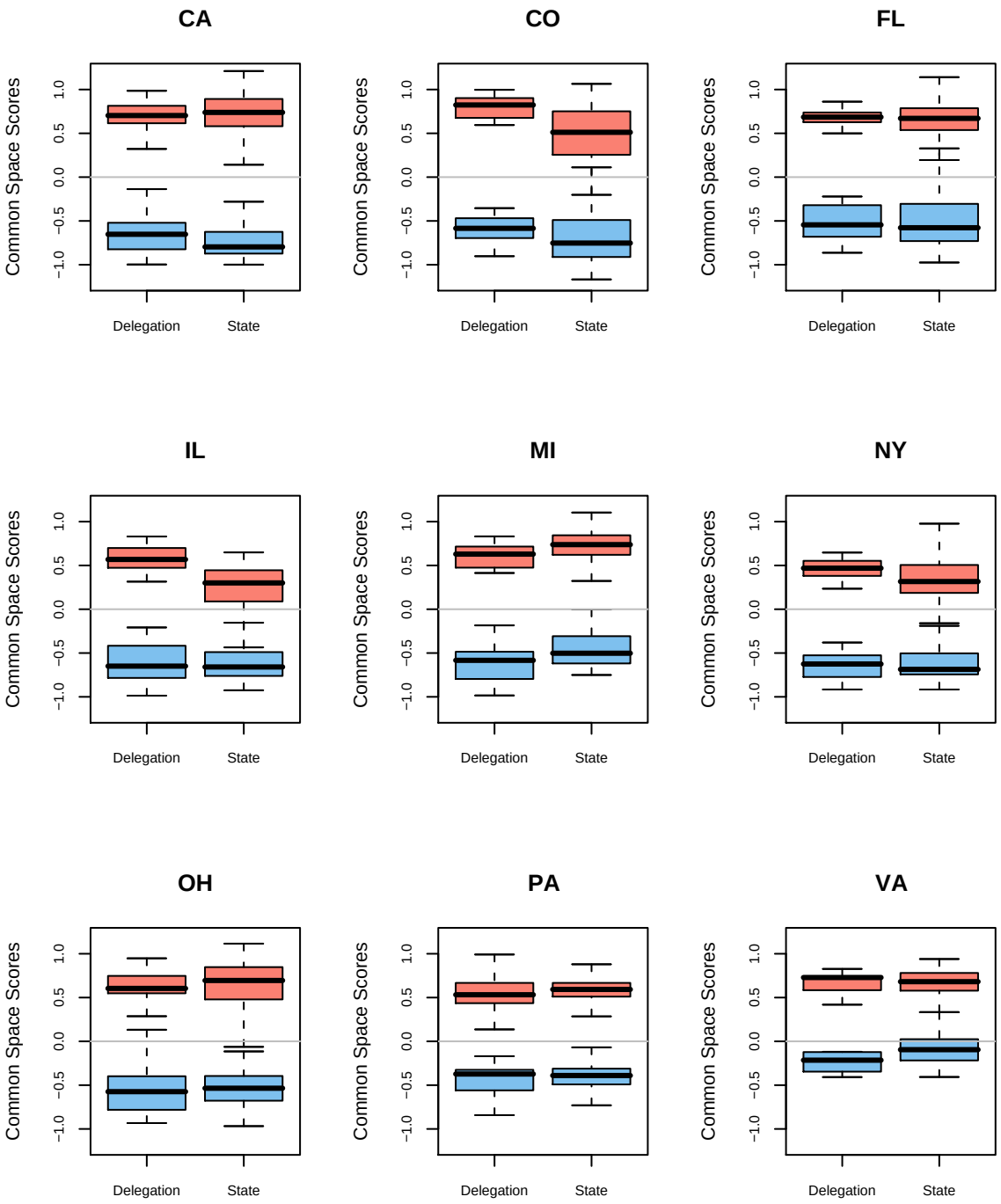

Figure 7: *Comparison of state congressional delegation ideological distributions with state legislatures, all in congressional common space.*

5.3 Disaggregating Scores

Estimated congressional common space scores are fixed by assumption over the course of each legislator's career (see above for justification of this assumption). Thus, the only way we observe shifts in aggregate chamber ideal points is through replacement.

We measure the party and chamber medians to get a sense of the aggregate distribution of ideology in the state legislature. Figures 8 and 9 shows these medians for the upper and lower chambers of each state. The first thing to notice is how different the states are from each other. Pennsylvania's chamber and partisan medians barely budge over the time period, while California, Colorado, and Florida change rather rapidly.

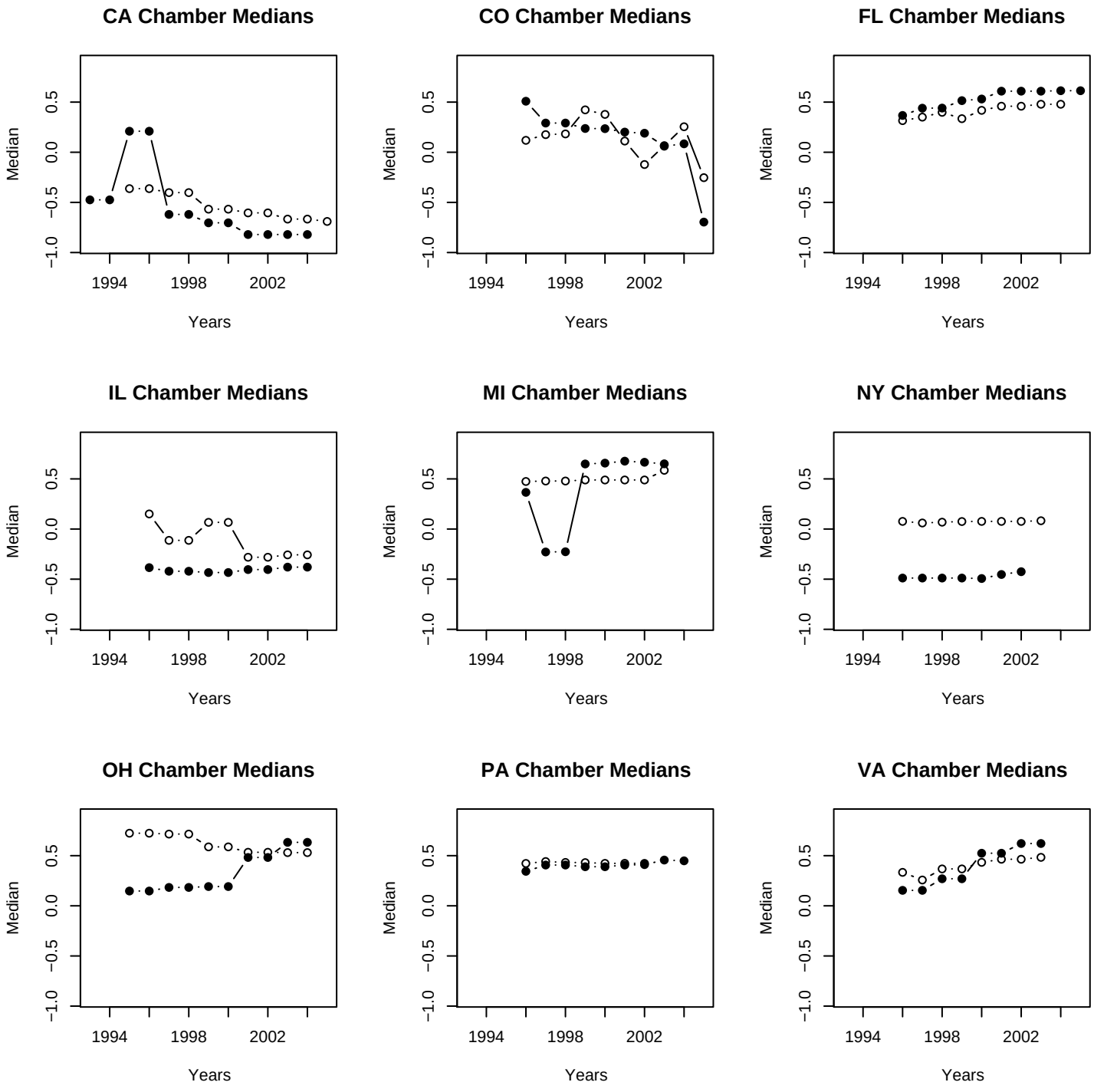

Figure 8: *Chamber medians over time. Open circles are for the upper chamber, and closed circles for the lower chamber.*

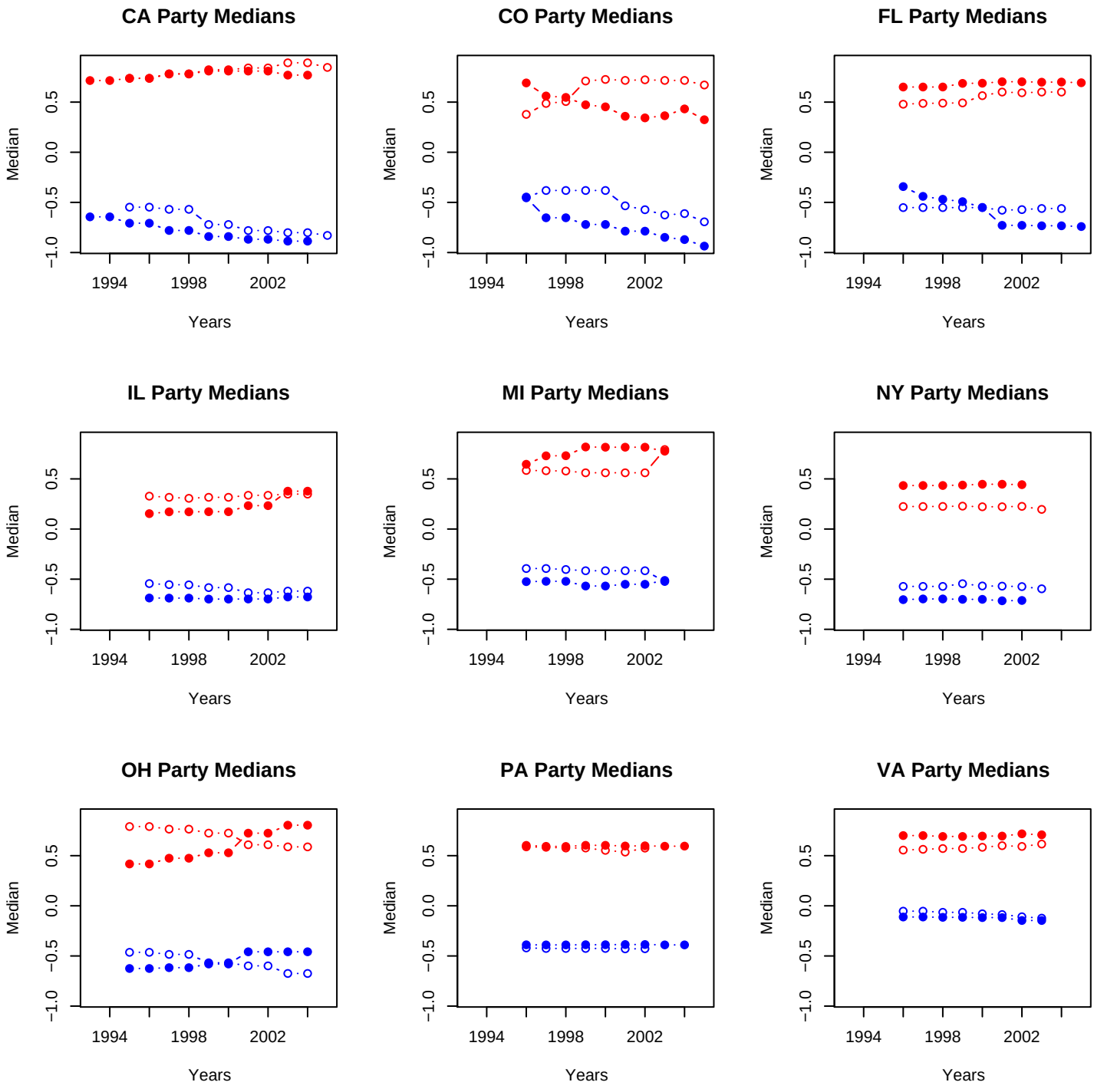

Figure 9: *Party medians over time. Open circles are for the upper chamber, and closed circles for the lower chamber.*

5.4 Comparing 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 [BRFH] state elite scores which are publicly availably from 1968-2002. The BRFH elite scores indicate more liberal state elites with smaller numbers. They are derived from a formula that is a weighted average of party proportions in both chambers multiplied by state delegation congressional ideology. [10]

We recreate the Berry scores for three reasons. First, to strip out the inferred gubernatorial ideology because we do not have common space scores for governors to compare. However, since 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*.[11] Finally, we want to extend the comparison to beyond 2002.

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. Figure 10 show that their cross-sectional performance is not too bad (though not perfect). The correlation coefficient averages 0.79 and 0.80 for the upper and lower chamber, but falls as low as 0.67 for the upper chamber, and 0.69 for the lower chamber. The p-values are at 0.10 or below. Comparing party proportions in the state legislatures to common space score evidence somewhat higher correlations, averaging 0.91 and 0.84, but falling as low as 0.55 in 1996.

The longitudinal performance, on the other hand, is often wrong–and often disastrously so, as seen in Figure 10. Longitudinal correlations between the Berry component scores and common space chamber medians were insignificant ($p < 0.10$) or incorrectly signed 8 of 18 times. Worst of all, in some cases, the Berry component scores were correlated *negatively* and significantly so, with chamber medians recovered by our procedure.[12] Using mere party proportions improves

[10] 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%.

[11] No relation to one of us!

[12] We also averaged the component scores together as do Berry et al., but the results hardly change; three states

matters. However, in 3 of the 18 chambers, the correlation was insignificant.

As seen in Table 3, this is the consequence of two trends in Ohio: a leftward tilt by Ohio congressional Democrats that was not matched by their state counterparts, and a strong rightward drift by Ohio state Republicans not match by the Republican congressional delegation. Since the Berry scores cannot directly reflect these trends, this leads to an incorrect estimate of Ohio legislative ideology.

	% Rep	Rep Median	Dem Median	Chamber Median	Cong Rep	Cong Dem	Berry
1995	0.59	0.60	−0.54	0.44	0.60	−0.50	0.15
1996	0.59	0.60	−0.54	0.44	0.60	−0.50	0.15
1997	0.62	0.62	−0.55	0.45	0.60	−0.53	0.17
1998	0.62	0.62	−0.55	0.45	0.60	−0.53	0.17
1999	0.61	0.63	−0.57	0.39	0.57	−0.51	0.15
2000	0.61	0.63	−0.57	0.39	0.57	−0.51	0.15
2001	0.62	0.67	−0.53	0.51	0.57	−0.51	0.16
2002	0.62	0.67	−0.53	0.51	0.57	−0.51	0.16
2003	0.65	0.70	−0.57	0.58	0.57	−0.65	0.14
2004	0.65	0.70	−0.57	0.58	0.57	−0.65	0.14

Table 3: *Comparison of common space scores with Berry component scores for Ohio, 1995-2004. First column is the two chamber average proportion, next three columns are average party and chamber medians, next two columns are the average Nominate scores for the state party delegations, and the final column is the average Berry component score for two chambers.*

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. This result should disquieting for researchers in state politics. Since we do not have scores for all 50 states for a long time period, what are they to do when working with time-series cross-sectional data that is so prevalent in the subfield? On the basis of this analysis, we would urge them to use raw party proportions instead of the Berry scores.

are signed incorrectly: CO, PA, OH.

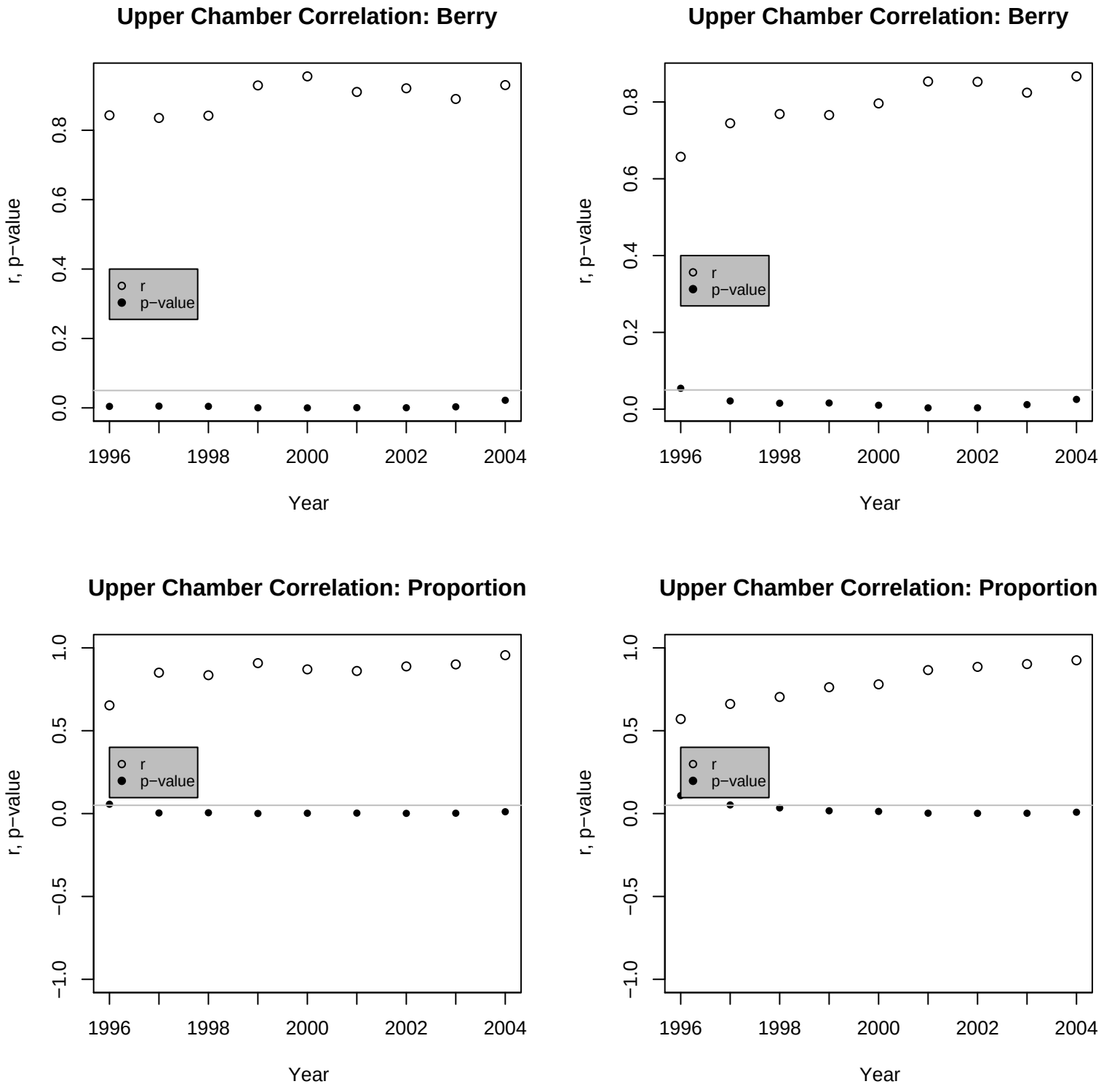

Figure 10: *Upper row is the correlation of BRFH component scores for the state upper and lower chambers with state average congressional common space scores cross-sectionally, by year. Lower row is the corresponding correlation of the upper and lower chamber party proportions with common space scores.*

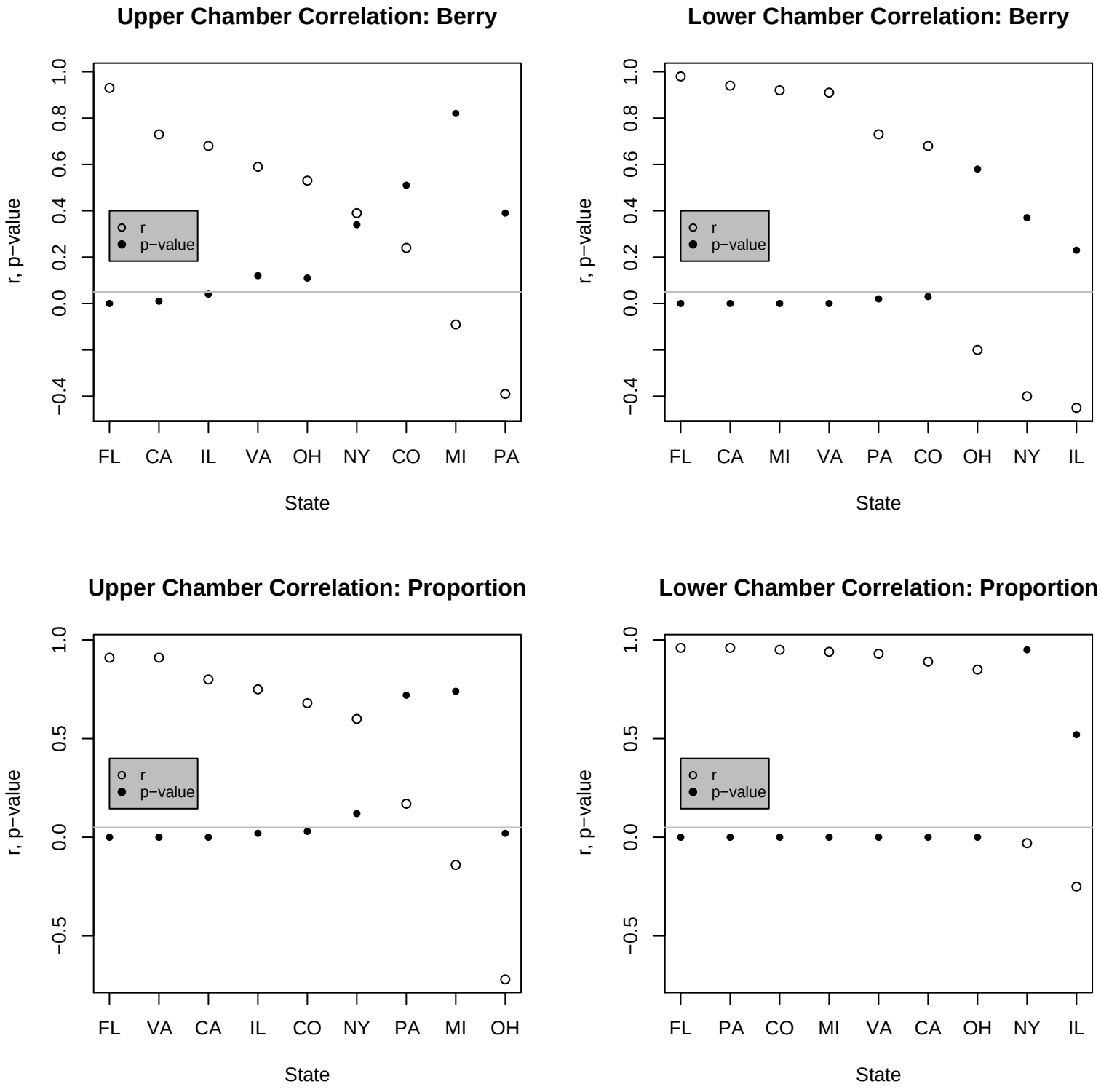

Figure 11: *Correlation of BRFH component scores for the state upper and lower chambers with state average congressional common space scores longitudinally, by state. Lower row is the corresponding correlation of the upper and lower chamber party proportions with common space scores.*

6 Applications

Our estimates of congressional common space scores allow us to speak to a number of debates in the legislative and state politics literatures such as partisan polarization and state policy differences.

6.1 Polarization

Studies of the US 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. Aldrich and Battista (2002) investigate single sessions of single chambers of several states. They find examples of polarized state legislatures in more-or-less competitive states, and unpolarized state legislatures in essentially one-party states (Rhode Island House 1997, Louisiana House 1999).

We examine partisan polarization across states and over time in the nine states. But which measures should we use? Because scholars have heretofore been unable to estimate state legislatures on a single scale, comparisons of legislative polarization have been limited to the use of scales that are invariant to linear transformations of the ideal points. These scale-invariant measures come in two different classes. The first are measures that depend only on the ordinal properties of the ideal point measures. A commonly used measure of this class is party overlap, generally measured by the number of Democrats to the right of the most liberal Republican and the converse. The key problem with this measure is that it is not very robust to outliers. A single conservative Democrat can depress this polarization measure for an entire chamber. This specific problem can be mitigated by using some other percentiles to compute the overlap region, such as the number of Republicans to the left of the 90th centile Democrat. There are two problems with such an approach, however. First, the measure ignores all information about partisan distributions other than the density of their moderate tails. Information about the rest of the distributions is thrown away. Second, the more the Democratic centile is raised and Republican lowered, the more likely the overlap measure is to be zero, independently of actual polarization. Thus, making the measure more robust makes it less informative.

The second class of scale-invariant measures involve normalizing the measures. Ideal point measures are assumed to be identified up to a linear transformation $x^* = a + bx$ where x^* is the estimated measure and x is the true measure. So if we had estimates of b for each state,

we could compute comparable differences-in-means and differences-in-medians across states by simple dividing each sample measure by the state's b. Of course, we do not observe b. So some authors use the fact that $se(x^*) = b \cdot se(x)$ and normalize by $se(x^*)$. Of course, this assumes that $se(x)$ is constant across states. This is a very strong assumption especially when one wants to measure differences in polarization across states.[13]

Because we are able to estimate state legislators on a common scale, we are able to avoid many of the problems associated with the scale invariant measures. Not only are we able to use cardinal, as well as ordinal information, we are able to use measures that take the full distribution of each party's positions into account. And because all states are on the same scale, there is obviously no reason to normalize when computes differences in medians or means.

Of course, because we can compute a common space for only a small number of states, we are still limited in terms of a full analysis of polarization at the state level. So to facilitate future studies of state legislative polarization, we will attempt to cross validate some scale invariant measures against benchmarks based on our common scaling.

Aldrich and Battista (2002) apply a number of measures of party polarization at the state level (suggested in Aldrich and Rohde (1998)). They incorrectly employ differences in party medians because this measure is scale-variant and it is thus inappropriate to use raw within-state estimated ideal points. The others they use are scale-invariant, including the ratio of the standard deviation of ideal points in the majority party to the standard deviation of ideal points in the chamber, the R^2 resulting from regressing legislator's common space ideal point estimates on their party, and the proportion of the minimum number of party members that would need to be altered to achieve complete separation between the parties. While using within-state scores here is appropriate, we question the informativeness of these measures.

The correlations between these polarization measures, including the scale-invariant measures are all very high, confirming Aldrich and Battista (2002)'s findings about individual sessions of selected state legislatures. There seems to be an underlying common polarization factor driving these measures. What is striking is how polarized the legislatures are, especially with respect to Congress. Illinois stands out for being relatively unpolarized. California, on the other extreme, is extremely polarized. This confirms the finding of Jacobson (2004) who used indirect methods to measure the ideological polarization of the California legislature.

If we had not rescaled the estimates of state legislator scores coming from a purely within-

[13]Measures based on such normalizations are not meaningless. They just need to be interpreted appropriately as measures of partisan differences relative to total variation in ideal points.

	Party Diffs	Avg Distance
VA	0.74	0.45
IL	0.92	0.58
NY	0.97	0.57
PA	0.99	0.57
US	1.11	0.68
MI	1.17	0.68
FL	1.22	0.69
OH	1.22	0.71
CO	1.31	0.76
CA	1.55	0.84

Table 4: *Scale-variant polarization measures. Ordered from smallest to largest differences in party medians.*

state analysis, we would have drawn wrong conclusions regarding the extent of polarization in each state relative to each other and to Congress as a whole. Figures 12 and 13 illustrates this graphically. Notice substantial differences, for example, in the relative position of Congress, Illinois, and Colorado.

Where does legislative polarization come from? We can imagine two sources: first, from the electorate itself, second, from the party system in a state. That is, voters choose more or less extreme politicians and we observe polarization between those politicians in some states and some times but not others. McCarty, Poole and Rosenthal (2006) argue, in the context of the United States as a whole, that increasing income inequality (itself driven partly by immigration) leads politicians in both parties to polarize. This is because of increased electoral returns to specializing by ideology. Though necessarily a longitudinal story for the US, we can see if the argument holds up in cross section. Figure 14 provides some evidence in the affirmative. Highly polarized states, like California, also exhibit very high levels of income inequality. This inequality is in large part driven by its very high level of immigration. The Midwestern state of Ohio, on the other hand, shows far less polarization and inequality.

Alternatively, polarization may be emanating from political parties themselves. One version of this is Fiorina (2005), who notes that given a binary voting choice, moderate voters have no true alternatives. Democrats and Republicans are free to drift in a more extreme direction. Another version of this is Aldrich and Battista (2002) who claim that the presence of a competitive party system is a necessary condition for polarization, drawing a connection between electoral fortunes (in the spirit of (Key 1949) who saw in one-party Southern states a lack of debate on ideological

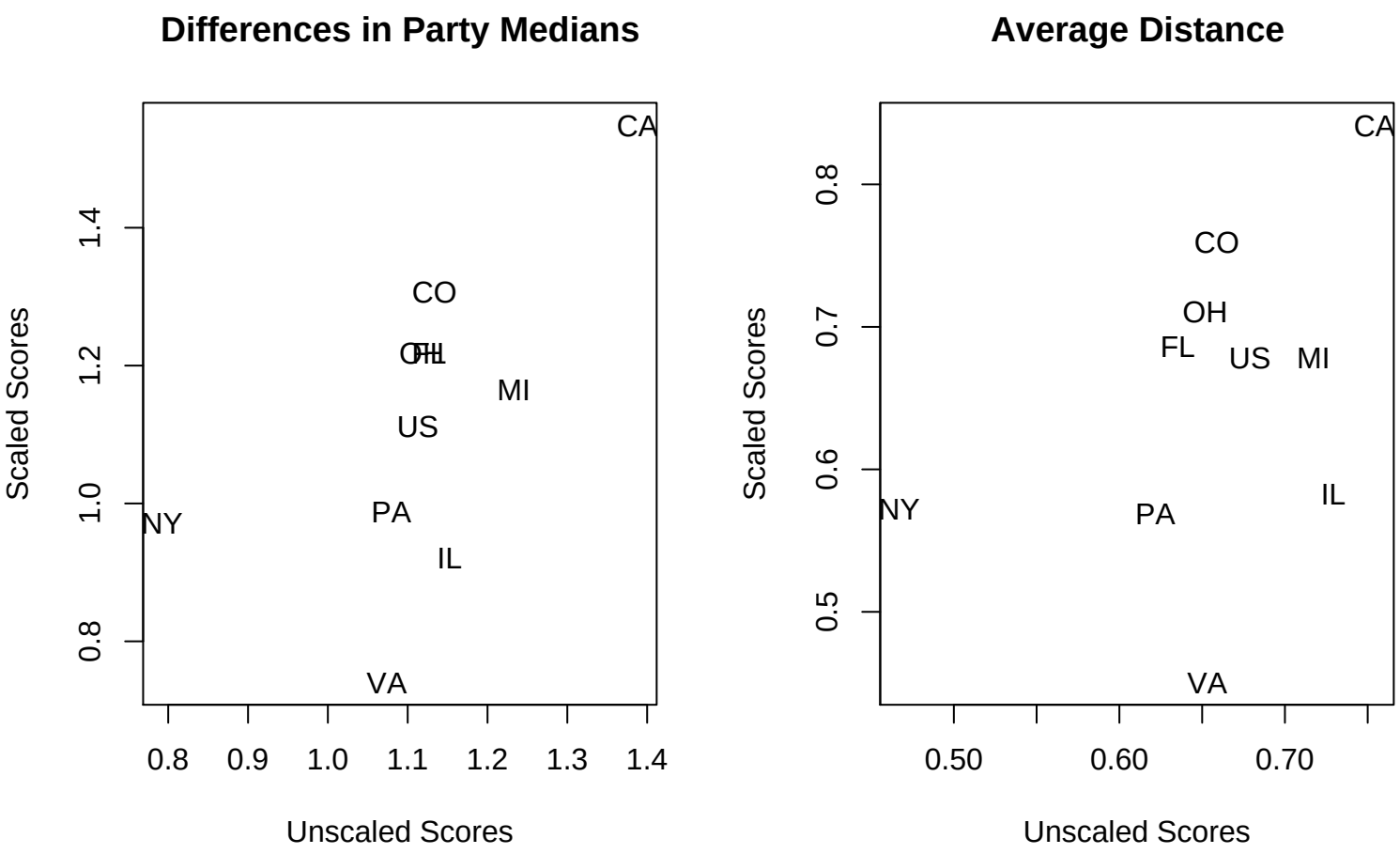

Figure 12: *Scatterplot of polarization measures of state legislatures between unscaled within-state scores and congressional common space scores. On the left, the measure is differences between party medians. On the right, the measure is the average chamber distance.*

grounds). However, we do not find any such relationship. In Table 5, we see that all nine states we examine differ only very slightly in the overall competitiveness of the two parties, at least as measured by the number of elected representatives. IL–the least polarized legislature–is about as Democrat dominated as Pennsylvania is Republican dominated, yet the latter is quite polarized. There is a positive correlation between polarization in public opinion as measured by average ideological differences between parties and polarization in legislatures, but it isn't significant.

So far we have been looking at cross-sectional variation in polarization. Our new data allows us to examine longitudinal variation, as well. Figures 15 and 16 plots party polarization over time in state upper and lower chambers. In most of the states, polarization appears to have

	Party Diffs	Eff Parties	Public Diff	Public R2	Gini
NY	0.97	1.98	0.34	0.13	0.39
PA	0.99	2.12	0.34	0.14	0.36
FL	1.22	1.94	0.34	0.13	0.38
OH	1.22	1.95	0.36	0.14	0.35
IL	0.92	2.01	0.39	0.16	0.36
VA	0.74	2.04	0.39	0.17	0.37
MI	1.17	2.00	0.40	0.18	0.36
US	1.11	2.00	0.42	0.22	0.47
CA	1.55	2.02	0.46	0.22	0.41
CO	1.31	1.98	0.52	0.29	0.37

Table 5: *Measures of polarization in the electorate, calculated from the Annenberg 2000 survey. Ordered from smallest to largest differences in difference in mean ideology. First column is the distance of party medians in the state legislature in common space. The second column is the effective number of political parties (the reciprocal of the Herfindahl index of seat shares). The third is the difference in mean ideology between Republicans and Democrats in that state. The fourth is the R^2 from a bivariate regression of political party on ideology within a state. Finally, the last column reflects the average Gini coefficient of individual income, averaged over the 1993-2004 time period.*

increased over time or remained stable. Only in the IL House do we see a sustained decrease in polarization. In sum, variance in polarization seem to be primarily cross-sectional, rather than longitudinal (at least for the decade-long data we have collected.)

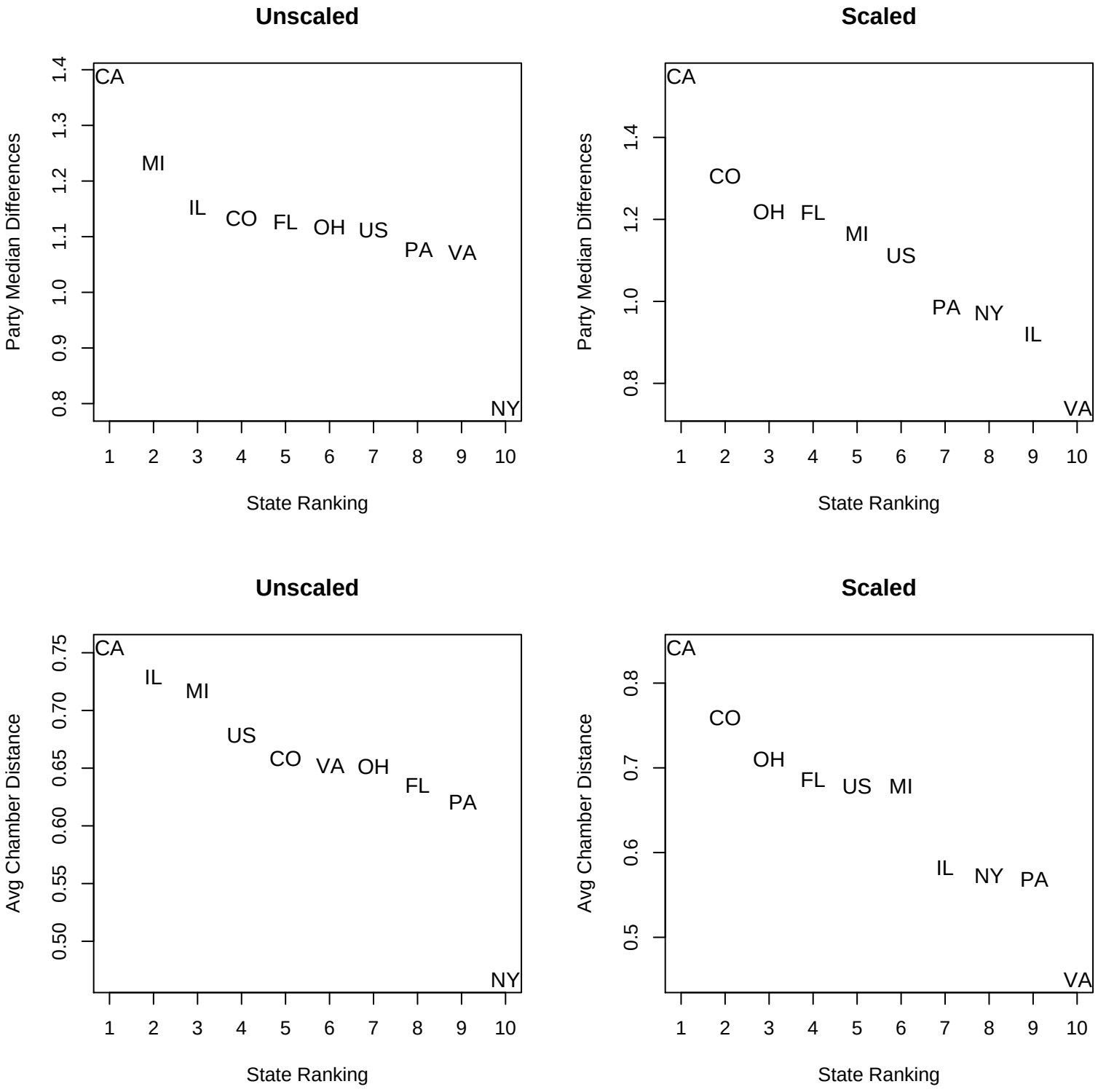

Figure 13: *Polarization of state legislatures as measured by the differences between party medians (top) and average chamber distance (bottom). On the left, these are derived from the unscaled within-state scores. On the right, the measures derive from the mapped, congressional common space scores. Note the substantial differences derived from mapping.* 34

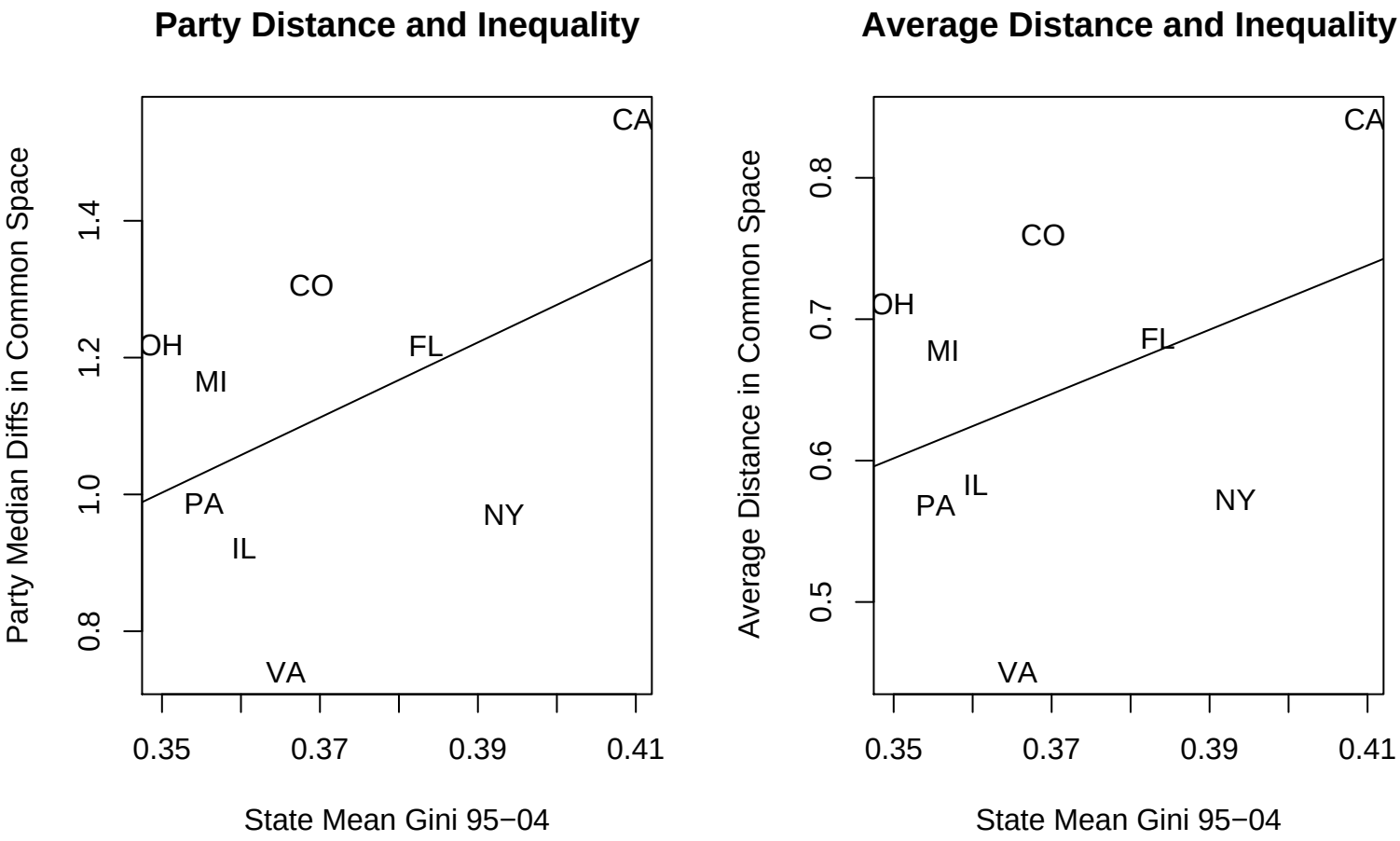

Figure 14: *Differences in state legislative party medians and average ideological distance plotted against state-level income inequality as measured by the Gini coefficient.*

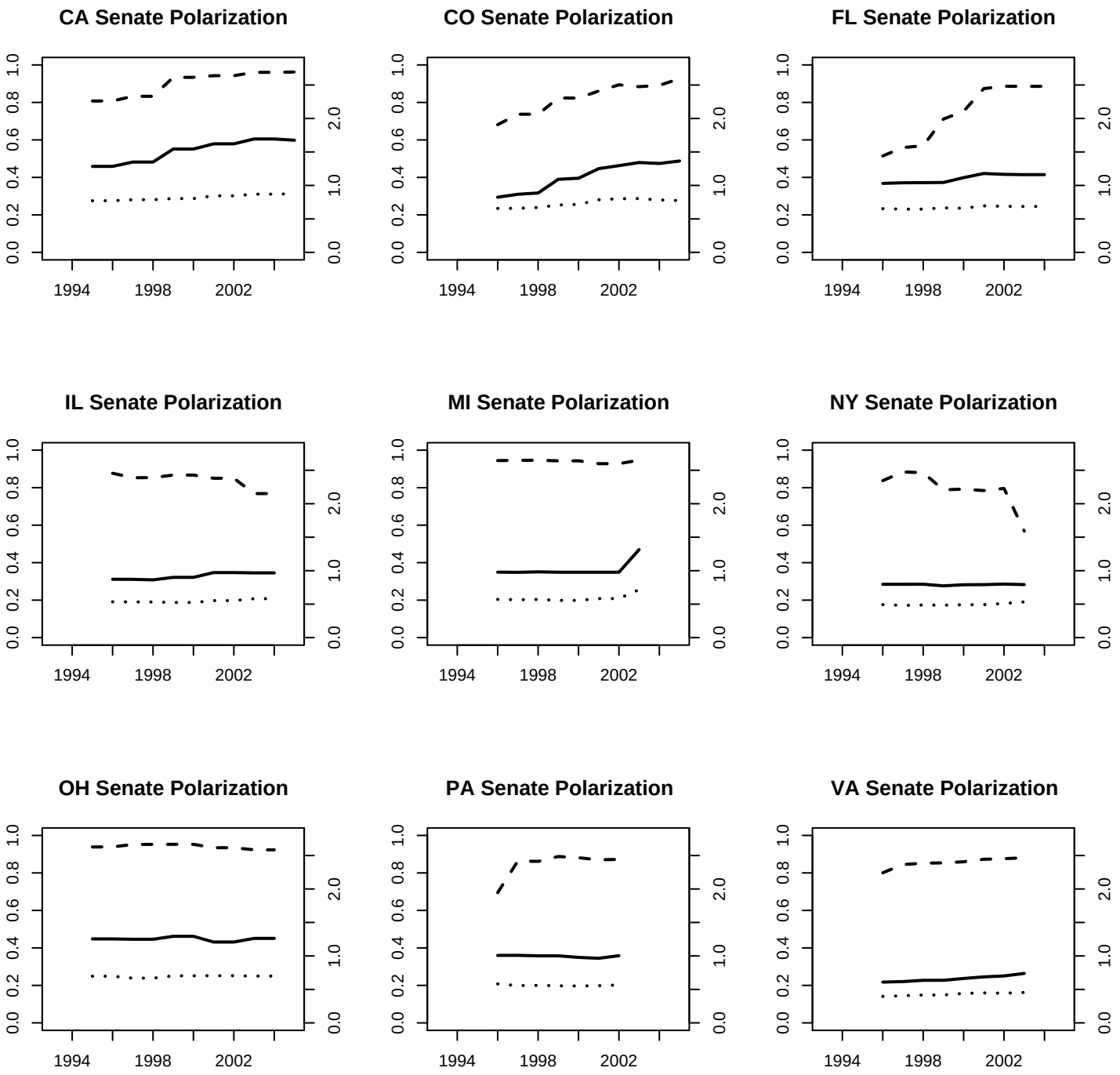

Figure 15: *Measures of polarization in the upper chamber. Dash line is R2 from a regression of party on ideology, dotted line is the average distance between members, and the solid line is differences in party medians.*

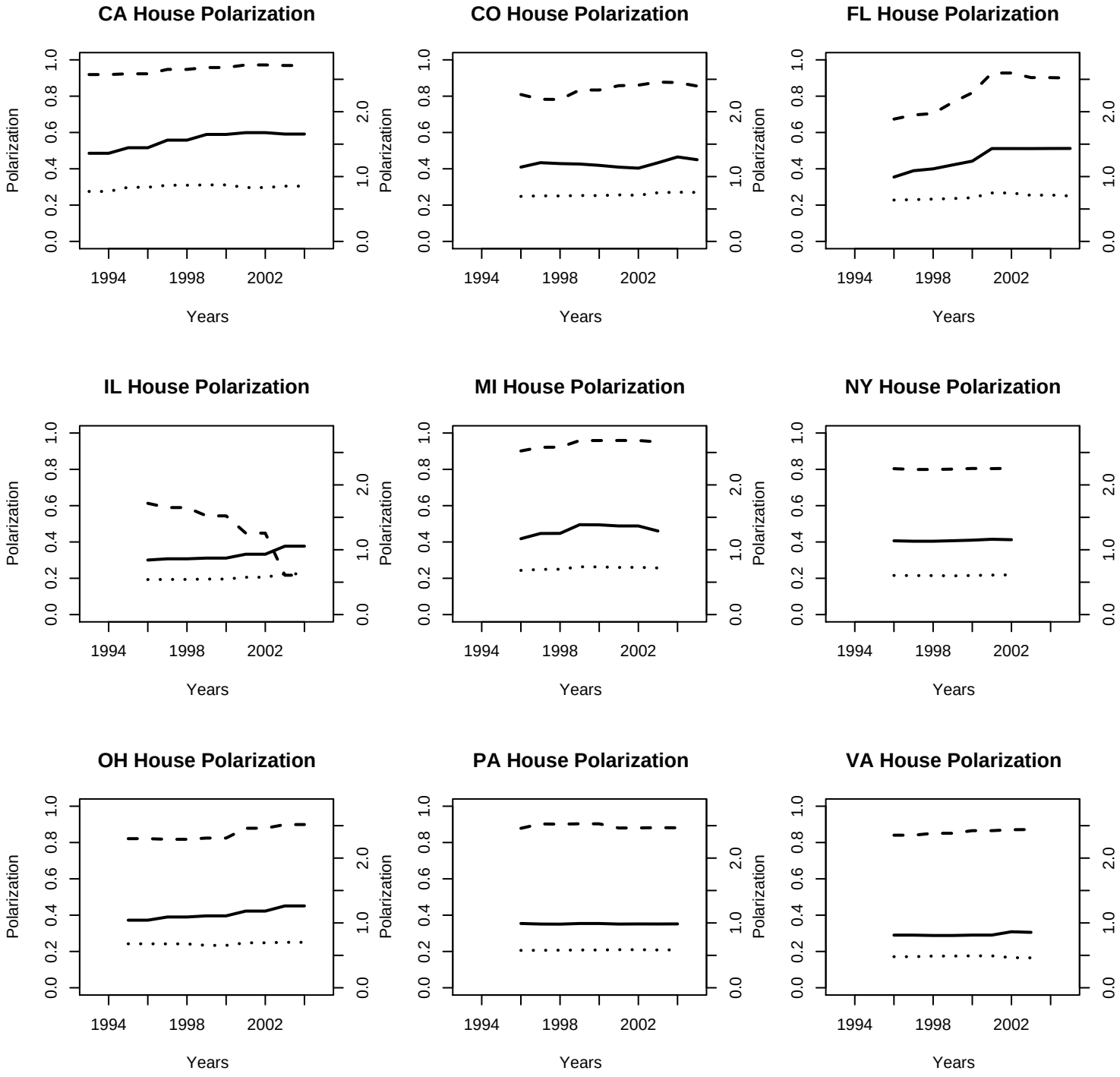

Figure 16: *Measures of polarization in the upper chamber. Dash line is R2 from a regression of party on ideology, dotted line is the average distance between members, and the solid line is differences in party medians.*

6.2 Policy

Erikson, Wright and McIver (1993) originally noted the strong link of policy outcomes to state public opinion. They composed a composite policy liberalism score.[14] Gray et al. (2004) updated the measure to reflect state policy choices relevant as of 2000.[15]

We may quarrel with such composite measures on a number of grounds, but they are widely used in the state politics literature. So we begin by analyzing the correlation of state policy liberalism in 2000 with the cross-sectional state legislative medians. As expected, we find such a correlation to be very high. Figure 17 shows that more conservative state legislatures are associated with more conservative policy outputs.

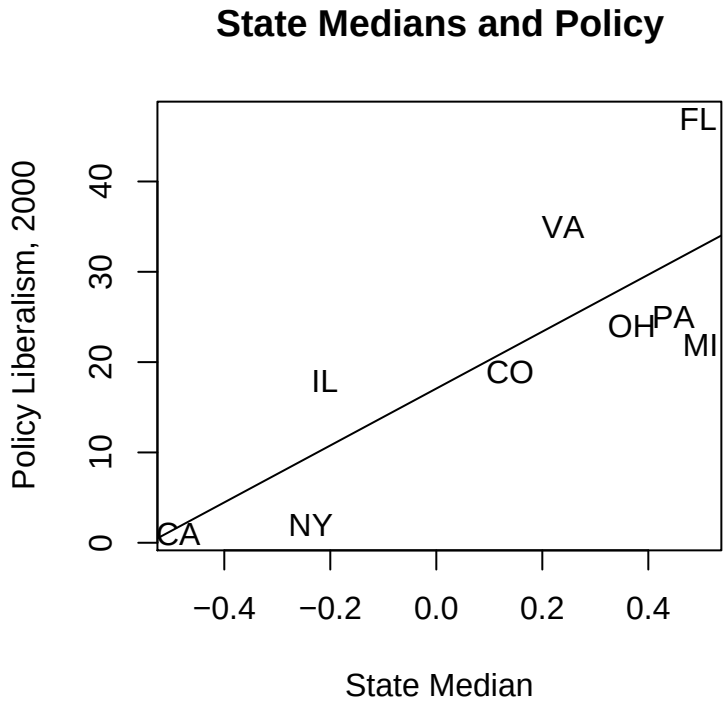

Figure 17: *Scatterplot of cross-section of pooled state legislative medians for entire time period (x-axis) against 2000 policy index from Gray et al. (2004).*

We turn to an example of where using the Berry et al. (1998) legislative ideology scores lead to

[14] These included measures of education, Medicaid, AFDC, consumer protection, criminal justice, legalized gambling, ERA ratification, and tax progressivity.

[15] The composite measure reflects state policies on gun control, abortion, welfare eligibility stringency, right-to-work laws, and tax progressivity.

conclusions that are likely to be substantively wrong. Fellowes and Rowe (2004) seek to explain the variation in welfare policy after the enactment of TANF. They test a whole host of predictors, including the Berry elite ideology scores, on 47 states for 1997-1999.[16]

Investigating the size of the TANF benefits for a family of three, Fellowes and Rowe expected to find that more liberal state legislatures would be associated with larger cash benefits. Instead, they discovered the opposite, at least as measured by the Berry scores. While the Berry scores predictor was signed incorrectly, at least it was statistically insignificant. In contrast, when testing an alternative measure of legislative ideology–legislative party composition–they found a significant effect in the presumed wrong direction: more conservative legislatures were linked to more generous welfare benefits.

We replicated their analysis, restricting ourselves to legislative ideology. We constructed a time-series, cross-sectional data set for our nine states over the 1997-2005 time period. Like Fellowes and Rowe (2004), we used the Urban Institute's *Welfare Rules Database* (Rowe and Versteeg 2005). We employ state and year fixed effects to control for omitted variables that vary at the state and year levels. We also model a panel specific AR1 process to allow for time trends that vary by state. Our primary predictors were the average of the chamber medians for a given state in a given year, along with a composite Berry legislative score and average proportion Republican.

We replicated part of Fellowes and Rowe (2004)'s result. We find that both the Berry legislative scores and the proportion Republican are signed incorrectly, with the coefficient for the former close to conventional significance levels (p¡.10), and the latter further away. Using Congressional common space scores, however, we find the expected result for the coefficient, while being strongly significant.

[16] They exclude Alaska, Hawaii, and Nebraska.

7 Conclusion

The absence of data and the right method has prevented state politics scholars from making valid comparisons of state legislative ideological preferences. Of course, generating results for nine states is merely suggestive of a true cross-state common space. We are, however, actively working on analyzing the collected roll call data of several more states. More states still are in more preliminary stages of roll call data collection. We choose to trade off breadth for depth in our roll call data because the core of our analysis relies on the precious few bridge legislators who "graduate" from the states to Congress.

Once we have analyzed more states, we will go on to connect our ideal point estimates for state legislatures to other data on state-level public opinion and state policy choices, in the spirit of Erikson, Wright and McIver (1993). Even further afield is bring other actors like governors and state Supreme Courts into the analysis via gubernatorial interaction with the legislature and the courts.

This paper should be viewed as an example of the dictum "compare, but carefully." State politics scholars have long compared across states while taking into account real state heterogeneity. By using what state legislatures have in common–their connections through ambitious politicians to Congress–we hope to accomplish just that.

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