Ideology and Interests in the Political Marketplace

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I develop a statistical method to measure the ideology of candidates and political action committees (PACs) using contribution data. The method recovers ideal points for incumbents that strongly correlate with ideological measures recovered from voting records, while simultaneously recovering positions for PACs, unsuccessful challengers, and open-seat candidates. As the candidate ideal points are estimated independently of voting records, they represent a useful new resource for testing models of legislative behavior. By incorporating nonideological covariates known to influence PAC contributions, the method also shows promise as a platform for furthering our understanding of PAC contribution behavior.

Techniques to measure the ideology of political actors are among the most important developments in political methodology. Poole and Rosenthal (1985, 2007) pioneered the use of quantitative scaling methods in political science with the introduction of NOMINATE. Methodologists have since devoted a great deal of energy to ideal point estimation, with the vast majority of the research in the area focused on methods for scaling roll-call data. While roll-call scaling methods have proven successful in recovering precise measures of legislative ideology, the demand for ideological measures extends beyond the confines of legislative bodies. This article presents a statistical method to recover ideal point estimates from campaign finance records. Ideological measures recovered from contribution data rival the reliability and precision of those recovered from voting records while accommodating a more inclusive set of political actors. In addition to estimating ideal points for political action committees (PACs), the method recovers ideal points in a common ideological space for elected members of the House and Senate as well as unsuccessful challenger and open-seat candidates.

Existing measures of PAC and interest group ideology typically use interest group ratings, congressional voting records, or a combination of the two. Poole and Romer (1985) were the first to construct measures of interest group ideology by applying a multidimensional unfolding technique to interest group ratings. In a more recent study, Poole (2005) constructs voting records for several interest groups based on stances taken in their ratings and scales them alongside members of Congress as though they were legislators. McKay (2008, 2010) identifies 75 interest groups that issue legislator ratings and constructs ideal points for each group that she calculates as the average NOMINATE score of the set of legislators with perfect scores on the group's ratings. McCarty, Poole, and Rosenthal (2006) devise an intuitive technique to recover estimates for a much larger set of PACs by modeling each PAC's ideal point as the money-weighted average of the NOMINATE scores of legislators to whom they contribute.

McCarty and Poole (1998) were the first to measure ideology with contribution records without the aid of voting records. Their model, which they term PAC-NOMINATE, adapts the spatial model of voting to PAC contributions by structuring the choice problem for PACs as a series of binary vote decisions between incumbent-challenger pairs, where a contribution to the incumbent is coded as a vote for and a contribution to the challenger is coded as a vote against the incumbent. Using incumbent-challenger pairs as the unit of observation simplifies empirics but is not without a cost. In practice, it restricts the scope of analysis to congressional races with viable challengers. In the 2008 election, only 139 House incumbents faced challengers who raised more than $100,000; the remaining House incumbents ran essentially unopposed.

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Yet, on average, unchallenged House incumbents raised 83% as many dollars as incumbents who faced competitive challengers. In fact, PACs direct a sizable majority of their dollars at uncompetitive races. Consequently, analyzing candidate pairs leaves the majority of contribution behavior unexplained.

In this article, I develop a generalized item-response theory (IRT) count model to estimate ideal points from contribution data. IRT count models originated as part of the educational testing literature (Rasch 1980; Van Duijn and Jansen 1995) and have been adapted to estimate ideological positions of legislators and parties from text (Laver, Benoit, and Garry 2003; Monroe, Colaresi, and Quinn 2008; Slapin and Proksch 2008). This approach has several desirable qualities. First, it models contribution decisions at the level of contributor-candidate pairs and thus accommodates a more comprehensive set of candidates, including safe incumbents who do not face serious challengers and losing candidates in competitive primaries who do not continue on to the general election. Second, a contribution amount contains more information than a simple binary vote decision, resulting in more precise ideal point estimates. Lastly, the flexible IRT framework can incorporate nonspatial covariates, such as incumbency status and committee assignments, that are known to influence contribution patterns.

Ideal points recovered from PAC contributions and congressional voting records tell similar stories. Each reveals that preferences largely scale to a single latent dimension that conforms to the familiar liberal-conservative dimension and that the distribution of legislator ideal points is bimodal, each mode corresponding to a major party. This finding speaks to the important role ideology plays in structuring both types of political outcomes. The results additionally reveal that the distribution of PAC ideal points is unimodal and centered between the parties, a finding that runs counter to the claim that corporations and special interests are polarizing forces in American politics.

In the following section, I motivate the method with a baseline spatial model of giving. Using the baseline model as a starting point, I extend the model to account for nonideological factors. I then introduce the IRT count model, assess model performance, and present results from a joint scaling of the 1980–2010 election cycles. The remaining sections provide examples of where the method and new ideal point estimates may apply. The first example highlights the value of using estimates recovered independently of voting records to test theories of legislative voting behavior with a test of the party influence hypothesis. The second example explores ideological and nonspatial determinants of PAC giving and their interaction.

A Spatial Model of Giving

A core tenet of spatial models of politics is that actors prefer ideologically proximate outcomes to those that are more distant. The proximity assumption can predict different outcomes depending on the structure and rules of the observed behavior. In the context of voting, when a voter is presented with a choice between binary outcomes located in a policy space, the proximity assumption simply predicts he will select the outcome nearest his ideal point. PACs face a more complex choice problem. They must decide how best to allocate funds across thousands of eligible candidates while conforming to campaign finance laws and regulations. Assuming PACs care only about ideology and give without error, the proximity assumption predicts that each PAC will observe its position in ideological space, rank-order candidates in terms of their proximity, and then move down the list, giving to each candidate until either its budget is exhausted or the distance between the PAC and the remaining candidates reaches the threshold where the ideological payoff from giving exceeds the cost. The PAC's choice problem can be formulated as,

$$\begin{aligned} & \textit{maximize}\, f(y_j|b_i(.), c_i(.), \delta, \theta_i) \\ & \quad = \sum_j (b_i(y_j) - c_i(y_j) - (\delta_j - \theta_i)^2) \qquad (2.1) \\ & \text{subject to } y_j \leq \textit{clim} \quad \text{and } \sum_j y_j \leq Q_i, \end{aligned}$$

where y_j is the amount contributed to candidate j, $clim$ is the limit on the amount a PAC can give to a candidate in a single election period, Q_i is PAC i's available budget, δ_j is candidate j's ideal point; θ_i is contributor i's ideal point, $b_i(.)$ is a payoff function for the utility gained from the act of giving, and $c_i(.)$ is the cost function. Together $b_i(.)$ and $c_i(.)$ represent PAC i's propensity to contribute. Note that i's maximum contribution amount may be less than $clim$ depending on the functional forms of $b_i(.)$ and $c_i(.)$.

The baseline spatial model of giving described above assumes that PACs care only about ideology and thus offers an incomplete account of PAC contribution behavior. The extensive literature on PACs provides a wealth of evidence that nonspatial candidate characteristics are important determinants of contributions. Among these factors are incumbency status (Jacobson 1985; Stratmann 1991), electoral security (Ansolabehere and Snyder 2000; Welch 1980), competiveness of elections (Snyder 1989; Wand 2009), majority party status (Cox and Magar 1999; McCarty and Rothenberg 1996), PAC-candidate relationships forged through long-term repeat giving (Romer and

Snyder 1994; Snyder 1992), positions on powerful congressional committees (Grier and Munger 1991; Milyo 1997), reputational effects associated with area-specific expertise (Kroszner and Stratmann 1998), and promises to pressure bureaucracy (Gordon and Hafer 2005). I incorporate nonspatial candidate characteristics into the model as a vector of utility shocks. Each candidate is associated with a vector of candidate characteristics, X_j, to which each contributor assigns a vector of weights, β_i. Having incorporated these changes, the deterministic portion of the PAC's utility function takes the following form:

$$f(y|\delta, \theta_i, b_i(.), c_i(.), \beta_i, X) = \sum_j (b_i(y_j) - c_i(y_j) + y_j(\beta_i X_j - (\delta_j - \theta_i)^2)) \tag{2.2}$$

Equation (2.2) characterizes the demand-side of the market. I refrain from characterizing the supply-side by explicitly modeling the candidate's utility function. Both sides of the market are heterogeneous. PACs give to candidates based both on taste (ideology) and as investments. Candidates exert considerable effort fundraising, either by tailoring their issue platforms to appeal to donors or by offering various legislative services, but we do not observe what services, if any, exchange hands. This makes characterizing the market equilibrium extremely difficult without imposing a series of restrictive assumptions about the market behavior of contributors, candidates, or both. I instead specify the PAC's utility function with variables that others have shown to be important in describing equilibria and treat candidate ideal points as fixed parameters to be estimated.

A Statistical Model for PAC Contributions

A purely deterministic model of spatial giving assumes that the parameters over which the PAC optimizes are known and perfectly observed without error. In practice, the parameter values are unobserved or are "latent" quantities that must be inferred from the observed data. Latent variable models designed for this type of problem are common in the social sciences and form the basis of ideal point estimation. In this section, I develop an IRT count model to estimate these latent parameters.[1]

Interpreting the predictions made by the probabilistic model differs slightly from the deterministic model. Rather than predict the set of candidates that a PAC will support, it generates likelihood predictions about the amount each PAC gives to each candidate based on assumptions about the functional forms of the utility function and error distribution. I assume that PACs experience quadratic utility loss with respect to ideological distance and that errors are distributed via a right-censored negative-binomial distribution.[2]

Let y_{it_g} be a vector of length n that represents PAC i's contribution profile for period t_g, where t indexes the two-year election cycle and $g = 0$ for the primary election and $g = 1$ for the general election. The estimating equation takes the following form:

$$\lambda_{ijt_g} = e^{(\alpha_i + \gamma_j - (\delta_j - \theta_i)^2 + \beta_i X_{jt_g} + \pi_i \tau_{it})} \tag{3.1}$$

$$f(y_{ijt_g}|\lambda_{\mathrm{ijt}_g}, \sigma_{it_g}) = \begin{cases} NB(y_{ijt_g}|\lambda_{ijt_g}, \sigma_{it_g}) & \textit{if } y_{ijt_g} < 10 \\ \left(1 - \sum_{\mathrm{k}=0}^{9} NB(k|\lambda_{ijt_g}, \sigma_{it_g})\right) & \textit{if } y_{ijt_g} = 10 \end{cases} \tag{3.2}$$

where $NB(.)$ is the negative binomial distribution, and σ_{it_g} is a contributor-specific overdispersion parameter. The values for $b_i(.)$ and $c_i(.)$ are reparameterized as $\alpha_i = (b_i(.) - c_i(.))$, operating as PAC fixed effects, and γ_j are candidate fixed effects. I account for variation across election cycles in the resources available to each PAC with the parameter τ_{it}, which adjusts relative to the total amount of funds available to PAC i across election cycles. It is measured as a function of total receipts reported in the FEC filings divided by the number of active candidates for each two-period election cycle, such that $\tau_{it} = \log(\frac{\textit{total receipts}_{it}}{n_t})$. In order to account for the \$5,000 contribution limit for primary and general elections, the likelihood is right-censored at $y \geq 10$ (Cameron and Trivedi 1998). The period index separates candidate-contributor pairs into distinct observations, one for each primary or general election period during which they are

[1]Although contributions are measured as dollar amounts, PACs typically contribute in multiples of \$500 (Mebane and Wand 1999). Collapsing contribution amounts into count values by rounding up to \$500 intervals results in a negligible loss of information. The correlation between the original cardinal values and the transformed count values is r = .9999.

[2]In robustness checks of distributional assumptions, the negative-binomial model greatly outperforms the Poisson model in terms of model fit, but the recovered ideal points are nearly identical. I also ran tests using zero-inflated (Greene 1994; Lambert 1992) and hurdle models (Mullahy 1997), which are designed to account for the mass point at zero. Although zero-adjusted models have a number of desirable qualities, the large increase in the number of parameters associated with these models is unwarranted. The zero-adjusted models nearly double the number of parameters but only marginally affect the quantities of interest. The correlations of ideal points from the negative binomial and ZINB models are 0.996 for candidates and 0.991 for contributors. Consequently, the negative binomial model offers the best compromise between computational efficiency and model fit.

both active, which ensures that the maximum count value is uniform across observations. Of the parameters to be estimated, only σ is indexed by period.[3] The remaining parameters, including ideal points, are static across election cycles.

The list of nonspatial covariates included in the model draws on findings from the literature on why PACs contribute. It includes *challenger, open-seat candidate, seat competitiveness/electoral security,*[4] *committee leadership assignment (chair or ranking member), party leadership post, Senate candidate, presidential candidate, tenure, freshman, Appropriations Committee member, Ways and Means Committee member, Energy and Commerce Committee member, Financial Services Committee member, Member of committee relevant to the contributor,* and *Located in same state as contributor.*[5] A summary of the data sources can be found in the online supplemental appendix.

Let $d_{ijt_g} = 1$ if $y_{ijt_g} = 10$ and $d_{ijt_g} = 0$ if $y_{ijt_g} \leq 10$. Assuming independence across candidates and contributors, the log-likelihood to be maximized is,

$$LL(Y|\lambda, \sigma) = \sum_{i=1}^{n}\sum_{j=1}^{m}\sum_{t=1}^{T}\sum_{g=0}^{1}(1 - d_{ijt_g})\, ln\,(NB \times (y_{ijt_g}|\lambda_{ijt_g}, \sigma_{it_g})) + (d_{ijt_g}) \; ln\left(1 - \sum_{\mathrm{k}=0}^{9} NB(k|\lambda_{ijt_g}, \sigma_{it_g})\right) \qquad (3.3)$$

where Y is an $n \times m$ matrix of observed contribution counts with y_{ijt_g} being the contribution amount of PAC i to candidate j in period t_g.

Estimation

The model is estimated using joint maximum-likelihood estimation (JMLE), a two-stage iterative maximum-likelihood procedure also known as the Birnbaum Paradigm (Lord, Novick, and Birnbaum 1968). The first stage estimates the contributor parameters—α, θ, β, π, and σ—holding the candidate parameters fixed. The second stage estimates the candidate parameters—γ and δ—holding the contributor parameters fixed. This zig-zag estimation routine iterates until the percent increase in log-likelihood over the previous round falls below a prespecified threshold. Starting values for the ideal point parameters δ_j and θ_i are estimated via correspondence analysis (Benzécri 1992; Greenacre 1984), which is functionally equivalent to a reciprocal weighted-averaging technique in a one-dimensional setting. The starting value for a_i is the logged mean amount given by contributor i, and the starting value for γ_j is the logged mean contribution received by candidate j.

Note that no bridging assumptions are needed to identify the scaling across candidates for the House, Senate, and presidency. This represents one of the method's main advantages. Techniques to recover ideal points that are comparable across institutions and types of actors are an integral part of the roll-call analysis literature (Bafumi and Herron 2010; Bailey 2007; Jessee 2009; Poole 1998). These techniques operate by finding bridging observations that provide the "glue" (Gerber and Lewis 2004; Poole and Rosenthal 2007) needed for a common-space scaling, typically in the form of legislators who graduate from one institution to another or bills with similar content that are assumed to have the same cut-point across voting bodies. PACs routinely give to candidates for different offices, thus solving the problem by virtue of the data.

The structure of the data should also help mitigate concerns about intertemporal comparisons. DW-NOMINATE uses legislators who continue from one period to the next as intertemporal bridges. Bailey (2007) augments this approach by constraining the cut-points of bills with similar content voted on across periods. Here both the contributors and candidates are active across multiple periods. This is analogous to having a largely consistent set of legislators vote on a largely consistent set of bills moving from each period to the next. Although the model described above assumes that ideal points for both sets of actors are fixed across time, the data structure should allow for increased flexibility when modeling preference change over time.

Data

The size and intricate structure of the federal campaign contribution dataset require decisions about the criteria for PACs and candidates to be included in the sample,

[3]Note that X_{jt_g} indexes the matrix of candidate characteristics but not the contributor coefficients. This reflects changes in candidate characteristics, such as tenure or committee assignments, that occur from one election cycle to the next.

[4]*Competitiveness/Likelihood of Winning* is grouped into categories based on margin of victory. The groups are *safe* candidates who receive at least 65% of the vote share, *likely win* (56–64%), *toss-up* (45–55%), and *likely loss* (35–44%). Remaining candidates are the control category.

[5]*Located in same state as contributor* and *Member of committee relevant to the contributor* are each indicator variables that code an interaction between a contributor and a candidate. *Located in same state as contributor* is activated if the candidate is from the same state as the contributor. *Member of committee relevant to the contributor* is activated when a PAC's industry coding aligns with a candidate's committee assignment. A table of industry-relevant committees is included in the online supplemental materials.

how to deal with corporate mergers and acquisitions, and whether a candidate is given a separate ideal point after switching parties or taking office for the first time. I restrict the sample to candidates who receive money from 30 or more unique contributors and contributors that give to 30 or more unique candidates over the course of the entire period under study. The threshold of 30 contribution records reflects the trade-off between including as many candidates and contributors as possible and ensuring that each actor has a reliable estimate. In order to maintain uniformity of contributor types, I exclude contributions from party committees, which are exempt from contribution limits, and leadership PACs. I additionally restrict the sample to direct contributions, thus excluding in-kind contributions and independent expenditures.

Changes in corporate ownership are common during the period under study. Upon observing a change in corporate ownership because of an acquisition, the target firm's PAC is typically phased out by the following election. However, in the rare case that the PAC continues to operate after a change in ownership, I assign a new ID after the acquisition. The coding scheme for corporate mergers is similar. When firms merge, the new corporate entity typically consolidates by selecting one of the merging firms' PACs to phase out. In these instances, I assign a new ID to distinguish the contributions before and after the merger. Candidates are also subject to structural changes. Any candidate who switches parties is assigned a new ID after the switch. In addition, I split the contribution records for any candidate who first appears as a challenger or an open-seat candidate before winning office. As a result, these candidates receive separate nonincumbent and incumbent estimates.

Model Fit

I rely on a battery of tests to assess model performance, starting with a test of the model's predictive accuracy. I test the model using results from a joint scaling of the 1980–2010 election cycles. The residual plot in Figure 1 provides a visual summary of model fit. It shows that the predicted values provide a good fit for the observed data, particularly at the extremes.[6] As an alternative to pseudo R-squared measures for generalized count models, Cameron and Windmeijer (1996) propose a deviance-residual summary statistic that calculates the marginal improvement in log-likelihood of the estimated parameters over the baseline of setting y at its mean.[7] The summary statistic reports an improvement of 52.1% over the baseline.

As a means of establishing external validity, I compare CFscores with other measures of ideology. Figure 2 plots CFscores against common-space DW-NOMINATE scores for incumbent, open-seat, and challenger candidates for the House and Senate.[8] The strong correlation supports the claim that CFscores recover the same liberal-conservative dimension recovered from roll-call data. As partisanship is highly collinear with DW-NOMINATE scores, the within-party correlations are particularly informative in distinguishing between ideological and partisan giving. The within-party correlations are strong for House incumbents ($r = 0.66$ for Democrats and 0.64 for Republicans) and increase in strength for Senate incumbents ($r = 0.73$ for Democrats and 0.71 for Republicans). The strongest overall correlations are observed for presidential candidates ($r = 0.94$ overall, 0.74 for Democrats, and 0.72 for Republicans).

The within-party correlations for nonincumbent candidates and their future DW-NOMINATE scores tend to be less robust. There are three possible explanations for this. First, PACs have yet to observe voting records for nonincumbents, leading them to make broad assessments based mostly on party membership. This is at best a partial explanation considering the relatively robust relationships for open-seat candidates and Senate challengers. Second, some PACs might condition their contributions primarily on the ideology of the incumbent candidate and place less weight on the challenger's ideology (i.e., many contributions are *against* the incumbent rather than *for* the challenger). If the challenger estimates are in fact overshadowed by the incumbent candidate, including information about each candidate's opponent in the utility function of contributors might improve the measures. The third explanation is that the data are too sparse for some challengers to be estimated reliably. Support for this claim is found in restricting the sample to candidates who receive contributions from 100 or more PACs, which increases the within-party correlation for Democratic House Challengers to 0.38.

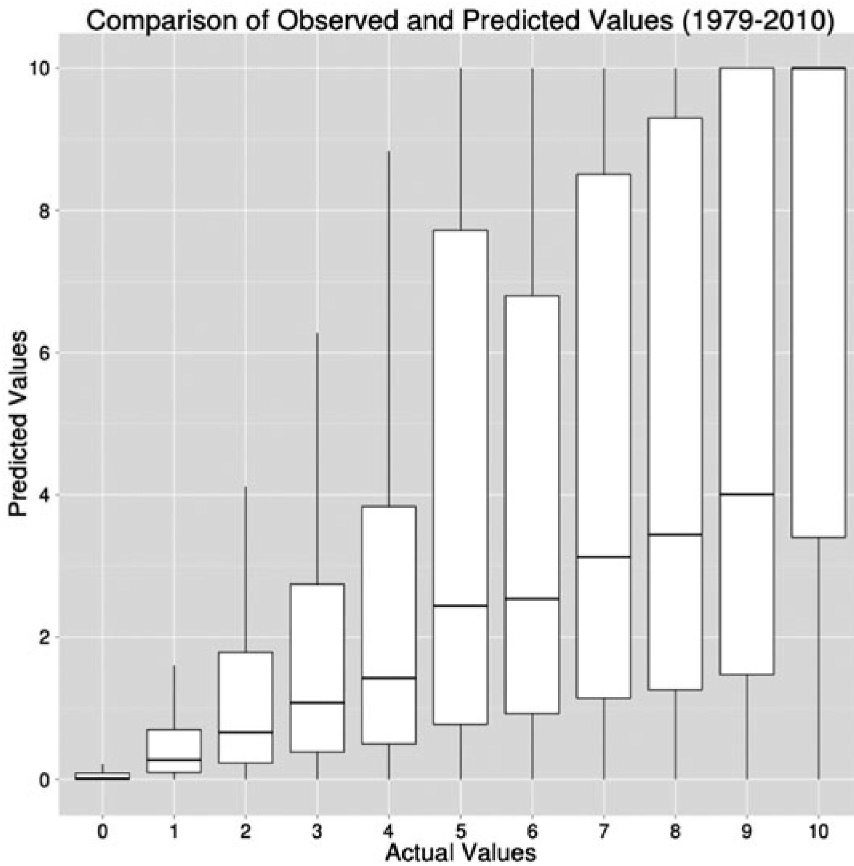
Although each of the above explanations helps place the nonincumbent results in context, roll-call estimates are imperfect measures of ideology, and treating them as though they are the "true values" can be misguided. A

[6]The negative binomial count model technically estimates a probability distribution over the set of possible outcomes for each observation, but it also estimates conditional means that can be interpreted as point estimates for predicted values.

[7]The deviance measure is calculated as, $R^2_{DEV} = 1 - \frac{(LL(y) - LL(\lambda))}{(LL(y) - LL(\bar{y}))}$, where $LL(.)$ is the log-likelihood function.

[8]DW-NOMINATE estimates were downloaded from Poole and Rosenthal's voteview.com.

FIGURE 1 Box and Whisker Plot of the Estimated Conditional Means on the Observed Count Values (N = 26,449,991)



Note: The x-axis represents the distribution of predicted values from the model for each of actual count values. Predicted values are right-censored at 10.

point to consider is that there is a strong relationship between nonincumbent and incumbent CFscores. For those candidates who entered the dataset as nonincumbents before winning office, the correlation between their CFscores before and after entering office is 0.66 among Democrats and 0.54 among Republicans. This suggests that challenger estimates are not merely randomly positioning challengers with respect to their party.

Demonstrating that CFscores can successfully predict congressional voting outcomes is another means of establishing external validity. As the CFscores place all candidates along a single dimension, it is possible to calculate the correct classification rate using the same cutting-line procedure that Poole and Rosenthal apply to DW-NOMINATE scores. For each roll call, the cutting-line procedure draws a maximally classifying line through the ideological map that predicts that those voting "yea" are on one side of the line and those voting "nay" are on the other. The correct classification rate is simply the percentage of vote outcomes correctly predicted by the cutting lines. Table 1 reports the correct classification rates and aggregate proportional reduction in error (APRE)[9] across competing measures of legislator ideology.[10] I find that CFscores correctly classify votes at rates comparable to DW-NOMINATE scores and interest group ratings (Levitt, Groseclose, and Snyder 1999). DW-NOMINATE scores increase correct classification over CFscores by 2.4% in the House and 1.4% in the Senate. Turbo-ADA and Turbo-CCUS scores

[9]The APRE is the total sum of proportional reduction in error (PRE) over the total number of roll calls included in the scaling, where the PRE on roll-call j is: $PRE_j = \frac{(\text{votes in the minority}_j - \text{errors}_j)}{\text{votes in the minority}_j}$ and $APRE = \frac{\sum_j(\text{votes in the minority}_j - \text{errors}_j)}{\sum_j(\text{votes in the minority}_j)}$.

[10]The analysis includes all candidates with both CFscores and DW-NOMINATE scores. This excludes a small number of legislators who did not receive the requisite 30 contributions, usually because the legislator refused to accept contributions from PACs, self-funded, or was appointed to an empty seat and did not run for reelection.

FIGURE 2 Candidate CFscores Plotted against DW-NOMINATE Scores from a Scaling of the 1980–2010 Election Cycles

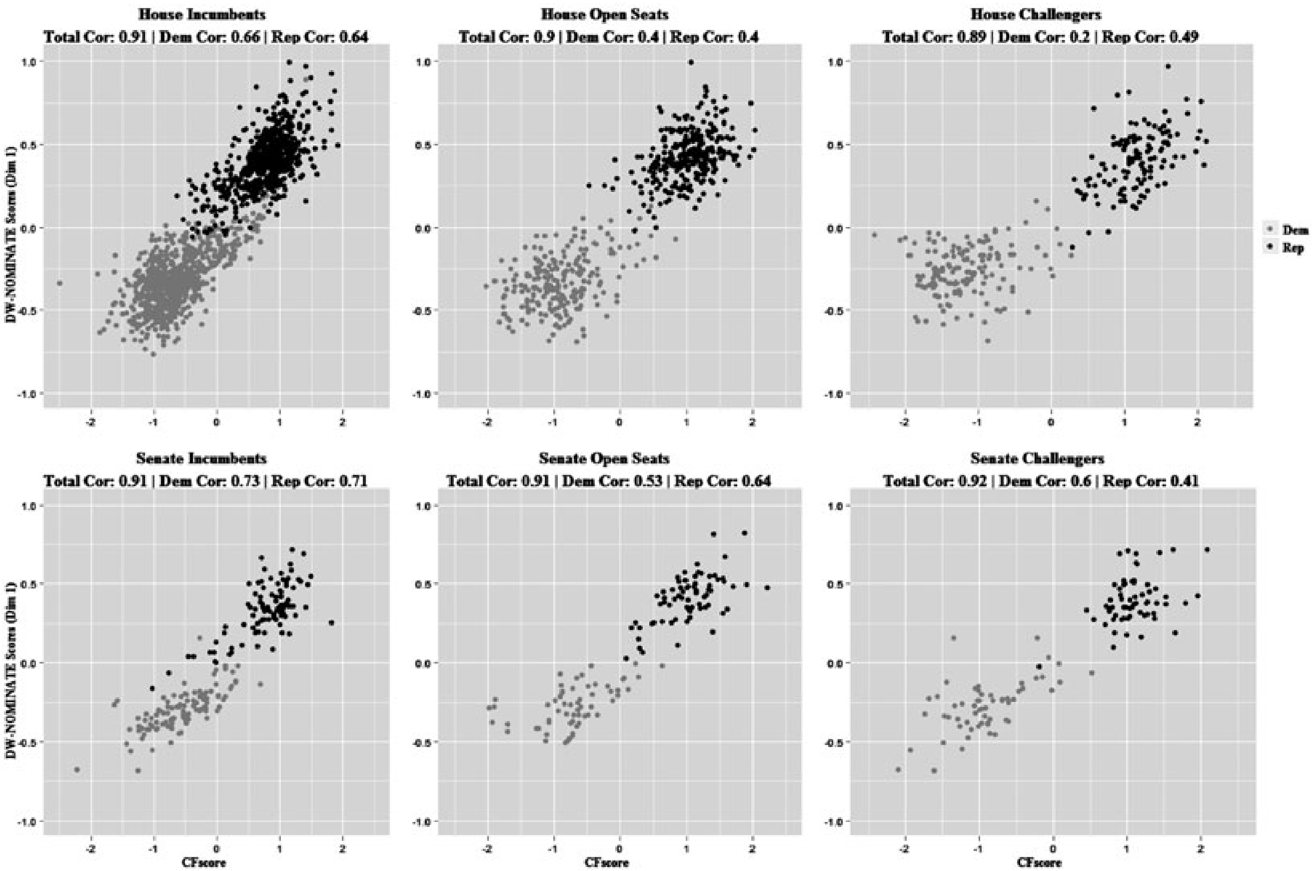


TABLE 1 Correct Classification Rates of Congressional Roll-Call Votes Associated with Competing Measures of Legislator Ideology

	Joint	House	Senate
CFscore	0.870	0.870	0.865
	(0.603)	(0.604)	(0.593)
DW-NOMINATE	0.892	0.894	0.879
	(0.671)	(0.676)	(0.634)
Turbo-ADA	0.880	0.882	0.867
	(0.696)	(.641)	(0.601)
Turbo-CCUS	0.875	0.877	0.866
	(0.619)	(0.623)	(0.595)

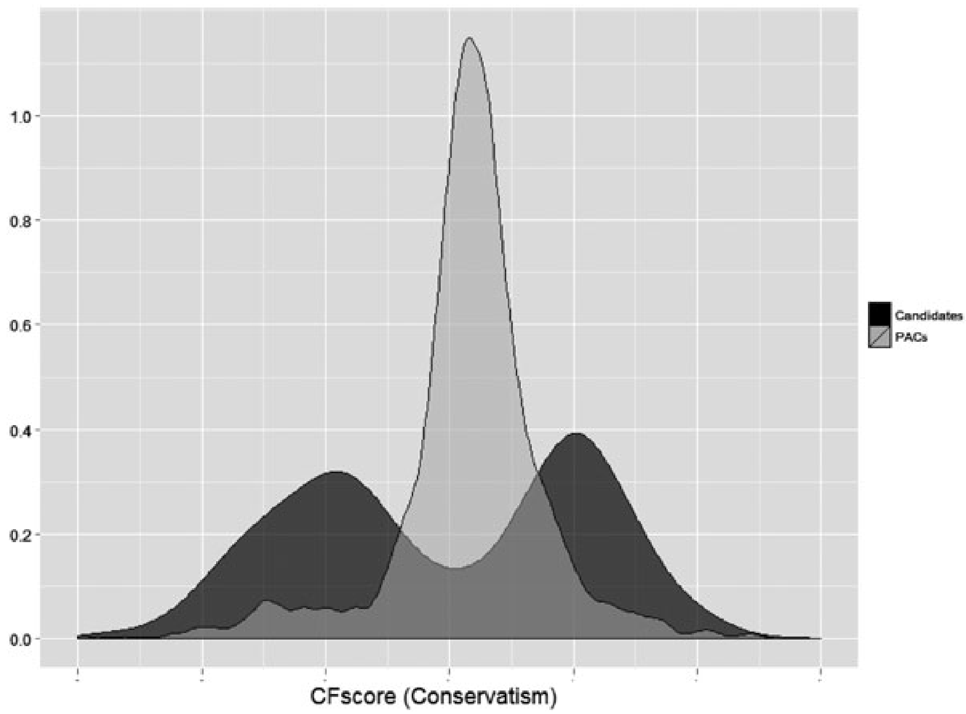
increase classification in the Senate as little as 0.02 and 0.01, respectively.

This is an impressive result. DW-NOMINATE and Turbo-ADA condition directly on roll-call data before classifying vote choices, whereas the CFscores do not. These predictions are not merely made out of sample; they are from an entirely separate dataset. Yet the CFscores predict roll-call voting outcomes nearly as well as roll-call measures. In a later section, I provide evidence that roll-call measures fail to measure accurately the ideological homogeneity of the parties and that much of the observed classification gains associated with DW-NOMINATE are due to overfitting the data.

Results from a Joint Scaling of the 1980–2010 Election Cycles

In this section, I summarize ideal point estimates for 4,196 PACs and 3,751 candidates active during the 1980–2010 election cycles. A useful quality of the model is that it places candidates and contributors on a common scale, which enables direct comparisons between actors. Figure 3 compares the distributions of PAC and candidate ideal points. Similar to ideal point distributions produced

FIGURE 3 Ideal Point Distributions of PACs and Candidates (1980–2010)



by roll-call data, the distribution of candidates is bimodal, dividing along party lines. However, the distributions differ in two important ways. The first is that Democratic candidates are more ideologically dispersed than are Republicans (sd = 0.69 for Democrats and 0.51 for Republicans). The gap remains even after excluding nonincumbent estimates (sd = 0.49 for Democrats and 0.43 for Republicans). The partisan difference in ideological cohesion contrasts with DW-NOMINATE scores, where the standard deviations for Democrats and Republicans are essentially equivalent.

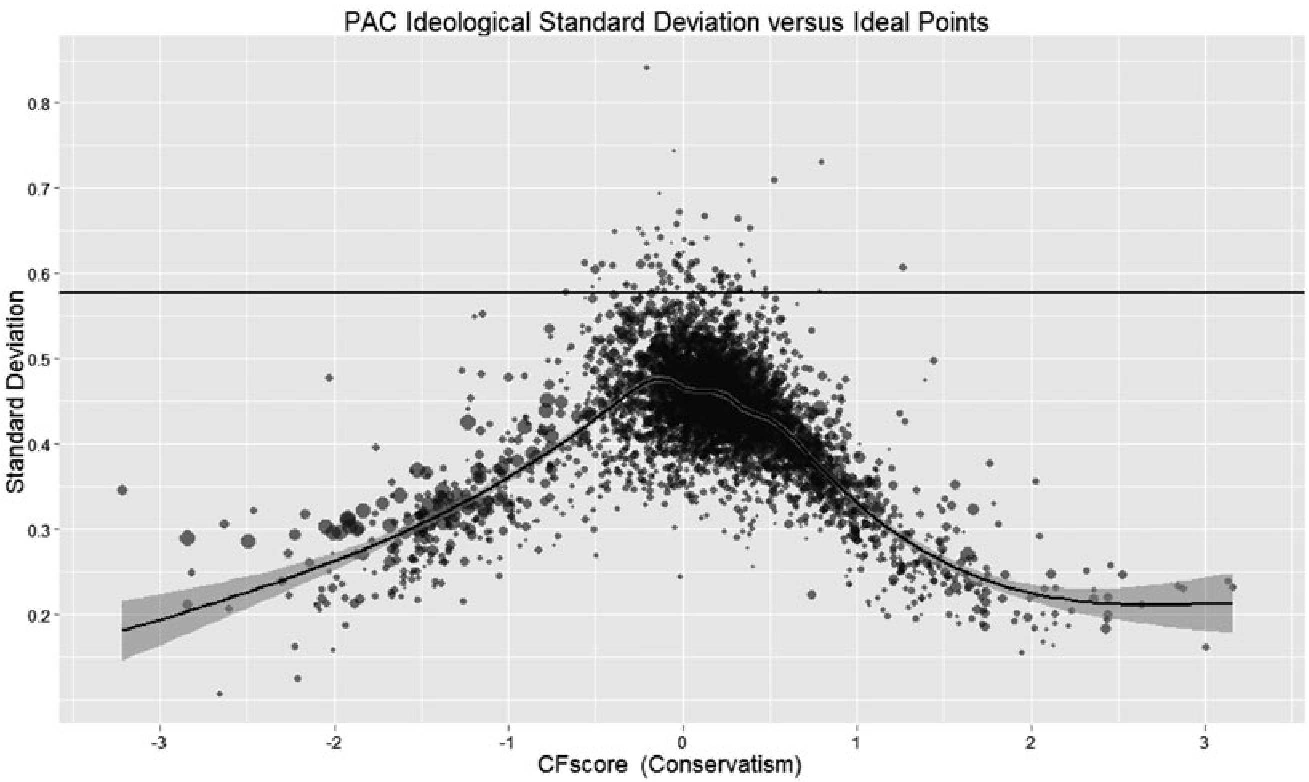
A third notable feature is the unimodal distribution of PAC ideal points located between the parties. Labor and single-issue PACs tend to locate toward the extremes, but the vast majority of PACs associated with corporations or membership and trade groups locate between the positions of the party means. This finding is in stark contrast with theoretical explanations for candidate divergence that hold that interest groups give in order to move legislators away from the median voter toward the extremes (Baron 1994; Coate 2004; Grossman and Helpman 1996; Peltzman 1976; Prat 2002).

Although this finding casts doubt on the depiction of corporations and trade organizations as polarizing agents, the claim that most interest groups are ideologically moderate requires further evidence. Two conflicting scenarios can lead the model to locate a PAC's ideal point near the center. The first is that the PAC is ideologically moderate and actively supports ideologically proximate centrist candidates. The second is that the PAC is nonideological and selects candidates to support irrespective of their ideology. In this case, the PAC gives all over the ideological spectrum, making it appear centrist on average.[11]

A measure of the ideological consistency of PAC contributions helps determine why so many PACs locate near the center. Not only does it inform how we should interpret ideal point estimates near the policy center by distinguishing between centrist and nonideological PACs; it

[11] A third explanation is that PAC giving is nonmonotonic with respect to ideology. The intuition behind this is that "rational contributors should not waste their money on either close friends or distant enemies but should focus their efforts on marginal enemies and uncertain friends" (Snyder 1992, 16). In this case, a PAC that has an ideal point on the extreme left will ignore its liberal friends and its conservative enemies and instead give to centrist candidates, thus causing the PAC to appear more centrist than it is. A PAC that has an ideal point near the center of the space will ignore fellow centrist candidates and will instead give to candidates who locate at some distance to its left and right, thus again causing the PAC to appear centrist on average. Although plausible, this account is easily dismissed. If a PAC's giving is nonmonotonic with respect to ideology, the ideal point distribution of its recipient candidates would be bimodal, centered about the PAC's ideal point. Yet, a bimodal distribution characterizes a tiny fraction of centrist PACs, whereas unimodal distributions are the norm.

FIGURE 4 PAC Ideological Standard Deviation versus CFscores



Note: Each point represents a PAC, and its size is weighted by the log-scale of the total amount of dollars contributed. The smoothing line is a LOESS curve that weights each PAC equally. The horizontal line indicates the theoretical limit for nonideological giving.

is also a necessary means of establishing that most PACs conform to the core assumptions underpinning ideological giving. McCarty, Poole, and Rosenthal (2006) propose a simple summary statistic for ideological giving. They first rank-order candidate ideal points and normalize them to the interval [−1, 1]. They then calculate the money-weighted standard deviation of a PAC's contribution profile. If a PAC contributes randomly with respect to candidate ideology, on expectation, its money-weighted standard deviation will equal 0.577.[12] This serves as a theoretical baseline for nonideological giving. Figure 4 plots the ideological standard deviation statistics against the estimated ideal points for each PAC. A horizontal line designates the theoretical limit for nonideological giving. The farther a PAC is below the line, the more confident we are that ideological proximity influences its contribution decisions. The LOESS curve provides a sense of how ideologically consistent PACs are with respect to ideological positions. The curve remains well below the theoretical limit for all values of CFscores, a finding consistent with the notion that the vast majority of PACs incorporate ideological proximity into their contribution decisions and that the majority of PACs locating in the center are better described as centrist than nonideological.

Although the exception to the rule, some PACs are nonideological. A small percentage of PACs have money-weighted standard deviations that exceed the theoretical limit for nonideological giving. The nonideological behavior of many of these PACs makes more sense when placed in context. About a third of these PACs are nonpartisan interest groups that focus on a single issue. The two most prominent PACs that fit this description are the Women's Campaign Fund PAC, a group with the stated goal of supporting women candidates regardless of party, and the US-Cuba Democracy PAC, an anti-Castro organization known for targeting new members of Congress in the hope of building bipartisan support. Of all industry groups, the casino and gaming industry is by far the least ideological, with 10 out of 19 PACs that have money-weighted standard deviations above 0.577.

[12]Let N represent candidates receiving contributions from a PAC, and let K represent the total number of candidates. When candidates are rank-ordered and normalized to the interval [−1,1], the standard deviation is calculated as $sd = N/(\sqrt{(1/3)} * K)$. As the number of candidates approaches infinity, the standard deviation of their rank-ordered values will approach $1/\sqrt{(1/3)} = .577$.

Example Application 1: The Party Influence Hypothesis

Several researchers have addressed the problems associated with using ideal points recovered from roll calls under the assumption of sincere voting to test theories of legislative behavior (Clinton and Meirowitz 2003; Krehbiel 2000; Smith 2007). One much discussed problem is the difficulty in distinguishing the influence of party from legislator preferences. The sincere voting assumption can bias results by failing to account for the influence of party (Clinton, Jackman, and Rivers 2004; Smith 2007; Snyder and Groseclose 2000, 2001). This has been shown to exaggerate partisan polarization by simultaneously overstating the ideological cohesiveness of parties and understating the overlap between the parties (Clinton, Jackman, and Rivers 2004).

Snyder and Groseclose (2000) were among the first to test for party effects using roll-call voting records. They reason that rational parties will focus their efforts on whipping its members on close votes and that lopsided votes (those decided by margins of greater than a 65–35 split) should be free of the influence of parties. They implement a two-stage procedure that first recovers ideal points for legislators using only lopsided votes and then regresses close votes on the recovered ideal points and a dummy variable for Democratic legislators.

Snyder and Groseclose's (2000) analysis rests largely on the claim that voting on lopsided roll calls captures pure ideological position taking and that ideal point estimates recovered from this subset of votes will be unbiased by party effects. McCarty, Poole, and Rosenthal (2001) critique this approach on the grounds that dropping close votes makes it difficult to properly differentiate the positions of moderate legislators, which they claim will lead to the overestimation of the party effects. They propose an alternative test of party influence that combines nonparametric Optimal Classification (Poole 2000) with a two-cut-point model. They assume that by applying pressure, a party shifts the location of its members' ideal points away from the opposing party's mean toward its own. If pressure is applied uniformly such that the initial rank-ordering of ideal points is preserved, then party effects can be captured by shifting the cut-points for each party, which is equivalent to estimating distinct cut-points for each party. They hypothesize that in the presence of party influence, a two-cut-point model will substantially increase classification of close votes but only slightly increase classification on lopsided votes. Their results support the hypothesis but also show party effects to be much weaker than what is reported by Snyder and Groseclose.

A key advantage of CFscores is that they are estimated independently of voting records. This presumably makes the measures less sensitive to bias from party effects. Evidence for this is found in the much higher rate of partisan overlap than is observed in roll-call measures, a feature shared with ideological measures recovered from candidate surveys (Ansolabehere, Snyder, and Stewart 2001a, 2001b).[13] In addition, when the percent increase in correct classification of DW-NOMINATE scores over CFscores is plotted against legislator CFscores as shown in Figure 5, a clear pattern emerges where the largest differences in classification are found among moderates with ideal points that overlap with members of the opposing party.

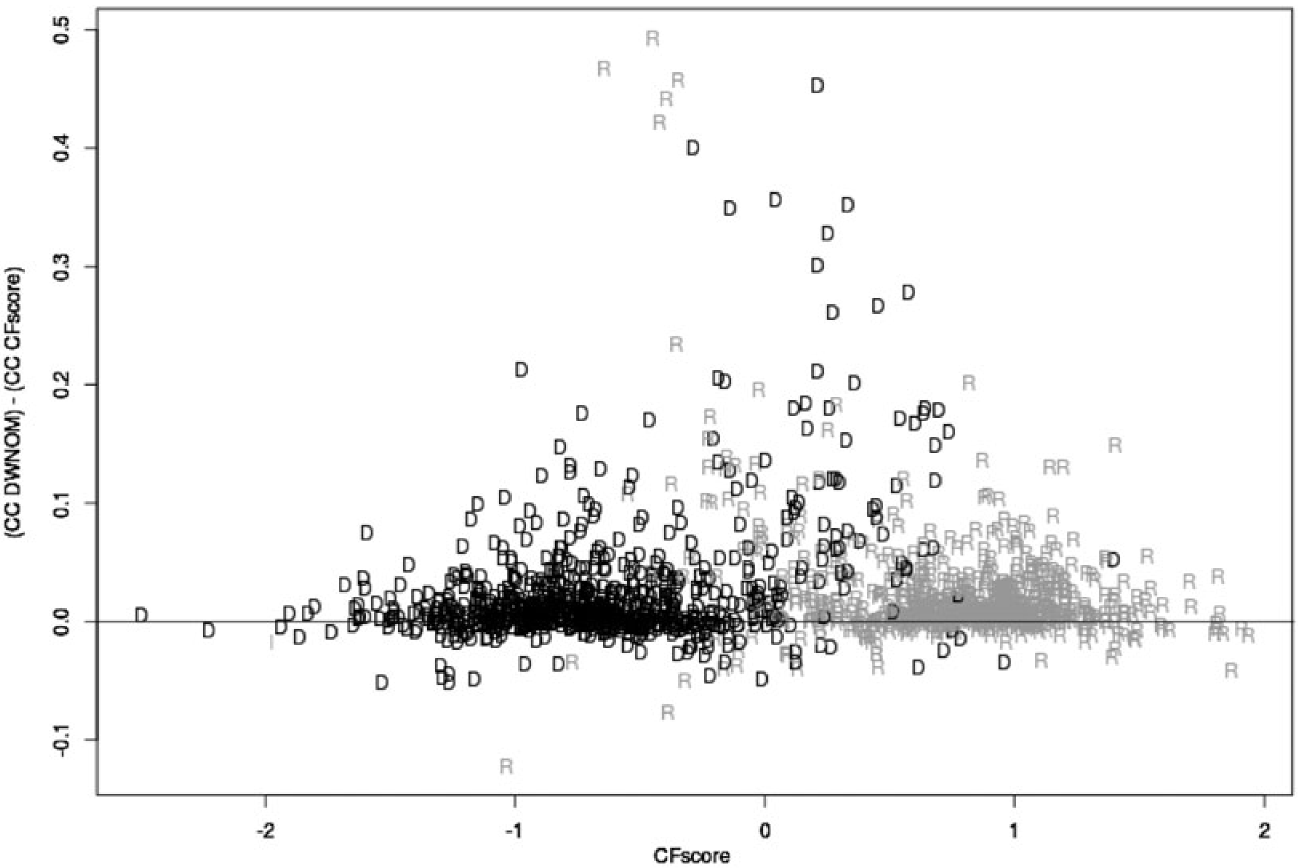
I apply McCarty, Poole, and Rosenthal's two-cut-point analysis to CFscores for members of the 96th – 111th Houses and find increased support of the party influence hypothesis. Table 2 shows that a two-cut-point model applied to CFscores of House members is associated with a 2.6% increase in classification on close votes compared to a 0.5% increase on lopsided votes. In contrast, a two-cut-point model applied to DW-NOMINATE scores increases classification by 0.7% on close votes and 0.3% on lopsided votes. To put this in perspective, the results for CFscores suggest that party pressure changes roughly 9.3 votes per roll call on close votes, up from the 1.7 votes per roll call suggested by results for DW-NOMINATE scores. In addition, adjusting for party effects appears to account for much of the difference in classification rate on close votes between CFscores and DW-NOMINATE.[14] A two-cut-point model reduces the classification differential from 2.4% for the one-cut-point model to just 0.7% for the two-cut-point model. That is, most of the advantage DW-NOMINATE has in predicting the most important votes vanishes after adjusting for party effects.

These results highlight the potential for CFscores to address theoretically interesting claims about legislative behavior. It has been noted that it is generally "inappropriate to use ideal points estimated under one set of assumptions (such as sincere voting over a one-dimensional policy space) to test a different behavioral model (such as log-rolling)" (Clinton, Jackman, and Rivers 2004, 1). While some progress in resolving this problem of inference has been made through methodological

[13] Snyder and Groseclose utilize the candidate-survey-based NPAT scores, which they claim to be relatively unbiased by party effects by virtue of independence from roll-call data, as a robustness check on their initial analysis (Ansolabehere, Snyder, and Stewart 2001b; Snyder and Groseclose 2001).

[14] Note that there was no party overlap in DW-NOMINATE scores during the 108th–109th Congresses. Excluding those congresses yields an increase in classification from the two-cut-point model of 0.8% on close votes and 0.3 for lopsided votes.

FIGURE 5 Increase in Correct Classification of DW-NOMINATE over CFscores



Note: The y-axis plots for each legislator the percentage of votes correctly classified by DW-NOMINATE scores less the percentage of votes correctly classified by CFscores.

TABLE 2 Correct Classification Rates of House Roll-Call Votes with One-Cut-Point and Two-Cut-Point Models

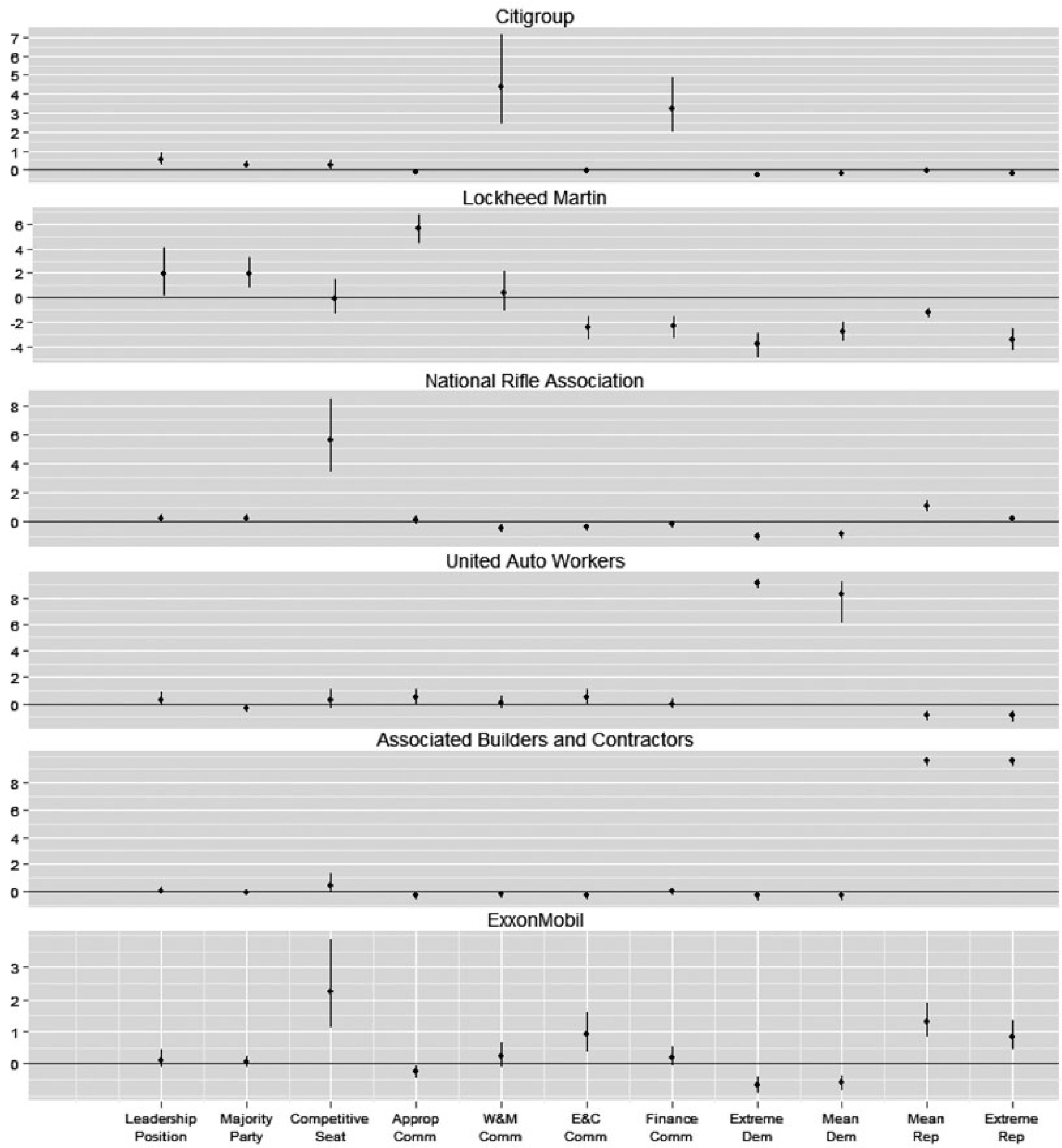
	Two Cut-Point	One Cut-Point	Difference
Close Votes			
DW-NOMINATE	0.909	0.902	0.007
CFscore	0.902	0.876	0.026
Lopsided Votes			
DW-NOMINATE	0.886	0.883	0.003
CFscore	0.867	0.862	0.005

innovations in scaling roll calls, a satisfying solution seems to call for ideal point measures derived from an independent data source. This is precisely what the CFscores provide, thus positioning them as a useful new tool for testing theories of legislative voting behavior.

Example Application 2: The Determinants of PAC Giving

There are extensive theoretical and empirical literatures on the contribution behavior of PACs. The theoretical literature tends to emphasize the role of quid pro quo transactions between legislators and interest groups in organizing the market. This traces back to the seminal work of Denzau and Munger (1986), who develop a theoretical explanation for PAC contributions as a market for legislative services or access. A common setup of theoretical models has candidates sell legislative services in exchange for campaign contributions, which they in turn spend on political advertising to provide information or signals about their ideology or quality to uninformed voters (Ashworth 2006; Baron 1994). The alternative theory holds that PAC contributions are primarily motivated by ideology (Austen-Smith 1987; McCarty and Poole 1998; Poole, Romer, and Rosenthal 1987). In this account,

FIGURE 6 Effects of Candidate Characteristics on PAC Contributions



interest groups seek to influence the ideological composition of Congress by bolstering the election efforts of ideologically proximate candidates without necessarily expecting favors in return.

The empirical literature has mainly focused on two overarching lines of inquiry. The first line of inquiry asks what PACs are actually buying with their contributions. The earliest research in this area looked to adjudicate

TABLE 3 Estimated Effects of Candidate Characteristics on Total PAC Contributions by Sector

	Leadership Position	Majority Party	Toss-Up Election	Appro-priations	W&M	E&C	Financial Services	Extreme Dem	Mean Dem	Mean Rep	Extreme Rep	N
Agribusiness	5,030	4,740	2,516	9,060	12,164	−793	−4,812	−16,509	−10,467	−1,587	−13,733	80
Comm./Tech.	7,185	4,215	6,168	−8,439	4,823	29,098	−3,812	−19,904	−10,849	−4,462	−14,386	66
Construction	6,433	6,101	4,393	5,026	11,452	−2,704	167	−12,125	−9,672	6,631	100	38
Defense	4,008	2,861	1,268	15,990	559	−3,014	−2,719	−4,832	−3,532	−1,091	−3,992	18
Energy/Nat. Rsrc.	7,834	2,436	9,595	2,456	15,389	23,442	−2,195	−10,675	−8,748	7,967	1,872	82
Finance	8,837	2,988	15,907	−5,194	37,539	3,861	72,068	−18,592	−10,850	−381	−9,975	59
Foreign Policy	1,780	578	12,079	−375	−932	−4,843	−2,879	−6,502	−2,275	−2,682	−7,221	19
Health	7,412	17,406	22,388	6,989	157,040	108,044	−3,814	−36,917	−24,744	−12,436	−33,817	114
Ideology/Issue	64	1,289	21,359	6,357	8,559	1,313	8,983	13,790	9,770	−2,578	705	43
Insurance	4,526	952	2,799	−1,384	35,482	6,193	32,652	−5,859	−4,344	−917	−4,559	45
Labor	12,065	6,593	39,658	−1,249	−908	−15,856	−15,939	67,847	65,617	−60,045	−66,061	65
Law/Lobbying	6,796	2,246	6,739	3,426	12,333	3,626	−1,100	−2,705	−556	−3,777	−7,157	65
Misc. Business	19,114	14,197	25,902	−4,225	46,847	4,564	1,106	−27,552	−19,704	8,330	−5,413	120
Other	4,002	2,126	5,336	−2,562	−736	−2,123	4,146	−3,930	−2,419	−2,263	−4,369	14
Real Estate	4,511	777	13,576	−246	14,557	1,242	20,921	−1,914	−1,344	−580	−1,674	16
Transportation	5,885	3,905	5,971	5,077	10,516	1,675	−1,449	−15,228	−11,761	546	−5,802	49
Total	105,483	73,411	195,655	30,708	364,683	153,726	101,324	−101,606	−45,877	−69,325	−175,480	893

Note: Each cell represents the mean predicted increase over a baseline candidate, summing over all PACs from a given sector.

between the competing position-induced (i.e., ideological) and service-induced (i.e., quid pro quo) accounts of PAC contributions. Among other things, these studies revealed that contribution strategies tended to be heterogeneous across categories of PACs, with labor and membership PACs spending to influence election outcomes, whereas corporate and trade PACs typically invest in influencing the legislative process by buying votes, legislative services, and access (Snyder 1992).

The second line of inquiry seeks to explain the determinants of PAC contributions. What do PACs look for in candidates to support, and what makes a PAC more likely to give to one candidate over another? This area of research focuses on the effects of candidate characteristics on PAC contributions. Committee assignments have attracted considerable attention. Several studies provide evidence that PACs are more likely to support members of powerful committees (Grier, Munger, and Roberts 1994; Milyo 1997; Romer and Snyder 1994). Others find that PACs concentrate funds on committees with jurisdiction over policy relevant to their respective industries or members with industry-relevant policy expertise (Esterling 2007; Kroszner and Stratmann 1998).

I leverage the IRT count model to weigh in on the debate on the importance of ideology in explaining PAC contributions. In constructing a model that integrates ideological and nonideological motives for giving, I forego the starting assumption that PACs pursue one or the other strategy and instead allow the data to speak to the question at hand. I restrict the candidate sample for this analysis to House candidates active during the 2006–2008 election cycles. Restricting the sample allows me to measure electoral competitiveness using Congressional Quarterly House election forecasts.[15] Although the CQ measures strongly correlate with two-party vote share, they sidestep the potential endogeneity problem that could arise if PAC contributions influence election outcomes. I selected this period because of the switch in majority party control subsequent to the 2006 elections. I subset the sample of PACs to those active both before and after the switch in party control and include an indicator variable for whether candidates are members of the majority party. This leaves a total sample of 893 PACs and 652 candidates.

I estimate simulated first differences to examine the determinants of PAC giving (King, Tomz, and Wittenberg 2000). The baseline candidate in the analysis is a House incumbent of the minority party running for reelection in a safe seat. For each set of first differences, I adjust the value for a single candidate characteristic, holding the remaining characteristics fixed at the baseline values. One can interpret the results as the predicted increase/decrease in contributions associated with a change in majority party status, committee membership, party leadership status, or electoral competitiveness.

[15] I thank Jonathan Wand for sharing these data. The measures range from 1 to 7, where 7 indicates a safe seat.

FIGURE 7 Candidate Ideology and Aggregated Effects of Changes in Candidate Characteristics

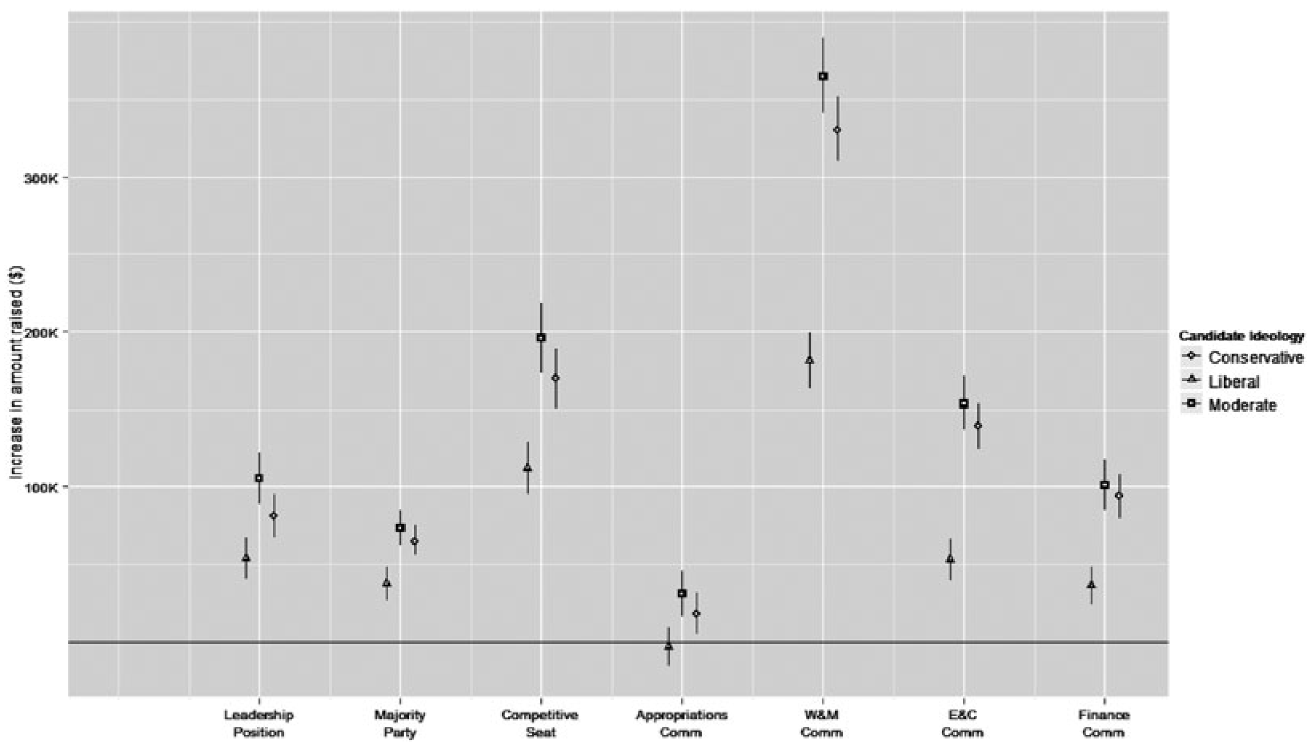


Figure 6 displays the mean values and 95% credible intervals of the simulated first differences for selected PACs that highlight the diversity of strategies within and across categories. Consistent with service-induced giving, several PACs focus on committees most capable of providing legislative services. Citigroup targets members of the Ways and Means and Financial Services committees, as is typical of PACs from the banking and insurance sectors, whereas the defense contractor Lockheed Martin concentrates its contributions on members of the Appropriations Committee. In selecting which candidates to support, the PACs representing the National Rifle Association, the United Auto Workers, and the Associated Builders and Contractors condition primarily on ideology. ExxonMobil provides an example of a corporate PAC that mixes ideological and service-induced strategies. It exhibits a strong preference for conservative candidates, giving significantly more to candidates in competitive races. At the same time, it targets the Energy and Commerce Committee, but its preference for conservative candidates outweighs the incentives to give to liberal committee members. This highlights that even if legislators are in a position to provide legislative services, they must also be willing to do so.

Table 3 summarizes the simulated first-difference results across categories of PACs. It reports the mean predicted increase in contributions over a baseline candidate in the general election. The baseline candidate is specified with an ideal point at the mean of all candidates. The bottom row reports the total expected change in contributions, summing over all PACs. The effects of leadership and majority party status are positive for most categories of PACs and essentially neutral for the remainder, increasing the total amounts raised by $105,483 and $73,411, respectively.

Securing a position on a powerful committee also increases PAC contributions. The largest gains are associated with the Ways and Means and Energy and Commerce committees.[16] The finance, insurance, real estate, and health sectors account for most of the $364,683 value of a seat on Ways and Means, whereas increased giving from the telecommunications, technology, and health sectors is largely responsible for the $153,726 value of a seat on Energy and Commerce. Members of the Appropriations Committee see substantial gains from the defense industry ($888 on average per PAC) sectors but raise less than the baseline candidate from several other sectors. Finance, insurance, and real estate PACs single-handedly account for the increase in funds for members of the Financial Services Committee, a combined

[16]These results are consistent with Romer and Snyder (1994).

amount of $101,324. In fact, members of the committee raise an additional $125,641 from finance, insurance, and real estate PACs but raise $24,317 less from other sectors.

The results support the hypothesis that special interest groups reward specialization but also suggest that specialization can cut both ways. Specializing increases contributions from interest groups closely connected to the policy area but often decreases contributions from groups that are not. Evidence for this claim is found in the estimated effects of membership on the Finance Committee, which are significant and positive (i.e., the lower bounds on the credible intervals that are above zero) for 55 out of 57 finance PACs, 37 out of 45 insurance PACs, and 13 out of 16 real estate PACs. Yet the same is true for only 38 out of 773 PACs from other sectors compared with 164 PACs for which the effect is significant and negative. Specialization, it seems, is not always the most lucrative strategy. Moreover, the results suggest that in taking a position on a specialized committee, a representative with policy preferences hostile to the industry not only faces the prospect of weakened support from PACs from related sectors but also the prospect of reduced funding from other sectors.

Table 3 also reports changes in expected contribution amounts as a candidate deviates from the policy center to the positions of the mean Democrat, the mean Republican, and the extreme wings of each party (specified as the positions of the 10^{th} percentile among Democrats and the 90^{th} percentile among Republicans). The effect of a candidate's ideology on fundraising is commensurate in size to the effects of nonspatial characteristics. The amount raised from PACs is greatest for centrist candidates and decreases as candidates move away from the center toward the ideological extremes. A centrist candidate can expect to raise $45,877 more than an identical candidate at the mean of the Democratic Party and $69,325 more than a candidate at the mean of the Republican Party. Candidates positioned at the ideological extremes raise even less. However, the falloff is less severe for candidates on the extreme left than for candidates on the extreme right. This is because most liberal candidates benefit from labor PACs, but the most conservative candidates do not receive commensurate support from business PACs.

The final set of results shows the asymmetric effects of leadership and committee assignments with respect to candidate ideology. In order to assess how the effects vary with ideology, I simulate three sets of first differences with the baseline candidate's ideal point set to the mean candidate, to the mean Democrat, and then to the mean Republican. Figure 7 shows the aggregate-simulated first differences with 95% confidence intervals for baseline candidates with liberal, moderate, and conservative ideal points. The fundraising value of leadership or majority party status is significantly greater for moderates (and to a lesser extent, conservatives) than it is for liberals. The value of committee assignments also varies with ideology. The differences are greatest for the Ways and Means, Energy and Commerce, and Financial Services committees, where a liberal can expect a fraction of the fundraising benefit received by a similarly situated moderate or conservative. This suggests that, all else being equal, legislators' strategies for how best to allocate effort among tasks should differ based on ideology.

Conclusion

The primary contribution presented here is a new method to recover accurate and reliable ideological measures from contribution data. The model presents a powerful tool for deconstructing the elements of the contributor's decision function and is capable of separating out the competing effects of ideological and nonideological motives. Much of the value added is that we can recover ideological positions for a more comprehensive set of political actors. However, the method also shows great potential as a platform for testing hypotheses about contribution behavior, just as NOMINATE has done for the study of legislative behavior.

Replacing roll-call measures with CFscores results in a negligible reduction in predictive power of legislative voting behavior, and in exchange, we gain a more rounded measure of candidate ideology that incorporates a more comprehensive set of information about a candidate's beliefs and actions. Contribution decisions reflect the many ways in which candidates express their ideology beyond how they vote. In assessing a candidate's ideology, contributors are free to consider the candidate's public speaking record, the issues he champions, his campaign promises and stated policy goals, the legislation he authors and cosponsors, the compromises he brokers, or even his religious and cultural values. Insofar as roll-call measures capture the above information, they do so indirectly, if at all. Yet this is the stuff of campaigns. It is what the media reports, what campaign advertisements highlight, and what seems to interest voters.

We stand to learn much from such an extension. For one, empirical tests of spatial models of electoral politics require data on candidate positioning, including those who never serve in Congress. The proposed methods can recover estimates for most of these unsuccessful candidates. In addition, PAC ideal points are quantities of interest in their own right and have the potential to cast light on a wide range of political phenomena. Among other things, such measures make it possible to examine whether PACs from a given industry have adopted similar ideologies, suggesting a coherent lobbying platform, or have more diffuse policy preferences, suggesting diverging or opposed lobbying platforms.

The pervasiveness of money in politics and the increased range of applicability is perhaps the main advantage in using contribution records to measure ideology. Campaign finance is an expansive arena of competing interests that brings together the masses, elites, special interest groups, and politicians. Roll-call votes are confined to legislatures, but the vast, interconnected flows of political money pervade nearly every level of American politics. This makes contributors who give to candidates from different institutions ideal bridge actors needed to construct a common-space scaling. Scaling federal contribution records automatically places contributors and House, Senate, and presidential candidates on a common scale. In recent years, states have made their campaign finance databases available to the public. As such, the methodology readily extends to candidates for state legislative, judicial, and gubernatorial office as well as ballot measure campaigns. The natural next stage of the project is the inclusion of individual contributors, which will open up a multitude of interesting avenues of research into the contribution behavior of individuals.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

- Data Sources
  - o Contribution Records
  - o Candidate Characteristics
  - o Roll Call Data and Measures
  - o Industry Codes and Corporate Ownership
- **Table A1:** Industries and related committees
- **Table A2:** Correct classification rates of Senate roll call votes with one-cutpoint and two-cutpoint models
- **Figure 1A:** Frequencies of contribution amounts (1980 to 2010)
- **Figure A2:** DW-NOMINATE versus CFscores for Presidential Candidates
- **Figure A3:** Candidate CFscores plotted against DW-NOMINATE scores (1980–2010). Only candidates that receive contributions from 100 or more PACs are included.
- **Figure A4:** Candidate CFscores plotted against Turbo-ADA scores (1980–2010)
- **Figure 5A:** Ideological Distributions of PACs by Sector