How Do Legislators Adapt to New Electorates? Evidence from Redistricting in Congress and U.S. State Legislatures

Andrew C. W. Myers*

April 9, 2024

Abstract

A central question about democracy is whether elected officials adapt to their constituents' preferences. This paper leverages redistricting in Congress and ninety-eight American state legislatures for the years 1990 to 2024 to evaluate how legislators respond to changes in their electorate. Pairing a continuous-treatment difference-in-differences design with roll call- and interest group-based measures of ideology, I find that incumbents adapt their ideological representation to their reapportioned districts, but this effect is substantively small in magnitude. Instead, by matching legislators to the post-reapportionment districts they could conceivably represent, I find that incumbents respond to constituency changes through strategic retirement while their electorate systematically replaces remaining out-of-step incumbents. These findings imply that policy change in Congress and state legislatures is primarily facilitated by legislator replacement, rather than adaptation, matching the theoretical expectations of citizen-candidate models as opposed to models of Downsian convergence.

*Ph.D. Student, Department of Political Science, Stanford University. myersa@stanford.edu.

1 Introduction

A central question about democracy is whether elected officials adapt to their constituents' preferences. As an electorate's preferences change, canonical models of electoral competition alternatively predict that legislators will steadfastly maintain a fixed ideal point (Osborne and Slivinski, 1996; Besley and Coate, 1997; Alesina, 1988), adapt to the median voter (Downs, 1957; Hotelling, 1929; Black, 1958), or strategically exit office (Jacobson and Kernell, 1981). Despite widespread interest in legislator responsiveness, it is challenging to evaluate how legislators adapt to their electorate because shifts in constituent preferences are typically correlated with other district-level trends. In this paper, I exploit the decennial and court-initiated reapportionment of the U.S. House and ninety-eight state legislatures between the years 1990 and 2024, which altered the partisan composition of incumbents' districts, to evaluate how legislators respond to changes in constituency preferences. As I detail below, while a small number of foundational studies have employed redistricting-based designs in the U.S. House (Bertelli and Carson, 2011; Boatright, 2004; Glazer and Robbins, 1985; Leveaux-Sharpe, 2001; Stratmann, 2000), due to data limitations, they are unable to examine a key subset of legislators who may be most affected by redistricting: legislators who retire or are voted out of office.

To address this gap, I construct a dataset containing the home addresses of the near-universe of members of Congress and state legislators over the past 20 years. This data allows me to impute the partisan composition of the districts that exiting incumbents would plausibility have represented had they run for office. Second, to overcome concerns that changes in the underlying agenda of legislatures limit comparisons of roll call-based ideology scalings over time (Bateman, Clinton, and Lapinski, 2017; Handan-Nader, 2023; Tausanovitch and Warshaw, 2017), I provide new evidence on how returning incumbents adapt to their electorates using more than 70,000 interest group ratings, in addition to traditional measures of ideology. My analysis, which encompasses 501 sets of district maps across ninety-nine legislatures and three decades, provides the most comprehensive evidence to date on legislator

responsiveness to constituency change.

Pairing a continuous-treatment difference-in-differences design with roll call- and interest group-based measures of ideology, I find that incumbents adapt their ideological representation to their reapportioned districts, but this effect is substantively small in magnitude. For example, I estimate that a theoretical shift in copartisan presidential vote from 0% to 100% causes a shift in legislators' ideological representation that is equivalent to the common-space distance between Representatives Nancy Pelosi and Katie Porter or Dean Phillips. Instead, by matching legislators to the post-reapportionment districts they could conceivably represent, I find that incumbents respond to constituency changes through strategic retirement while their electorate systematically replaces remaining out-of-step incumbents. Specifically, for every 10 percentage points a state legislator's district becomes less friendly, their probability of winning reelection decreases by 10.9 points, their probability of running for office decreases by 7.9 points, and their probability of winning reelection conditional on running decreases by 5.2 points. In sum, previous research that focuses on within-legislator ideological adaptation misses the comparatively large effects of legislator replacement.

More broadly, my results run against the long-standing prediction that office-motivated legislators will adapt to match the preferences of the median voter (Black, 1958; Downs, 1957; Hotelling, 1929), but are consistent with models in which legislators maintain fixed ideological positions (Besley and Coate, 1997; Alesina, 1988; Osborne and Slivinski, 1996) and strategically exit office (Jacobson and Kernell, 1981). Moreover, my conclusions complement related work on incumbents' ideological positioning over time (Fouirnaies and Hall, 2022; Lee, Moretti, and Butler, 2004; Poole and Rosenthal, 2000). Hence, while electorates do not appear to force individual legislators to substantially adapt their ideological positions, elections achieve a degree of policy responsiveness by replacing out-of-step incumbents and the policies they represent.

2 Empirical Strategy

Evaluating how legislators respond to the changing preferences of their electorate is challenging because shifts in district composition are generally correlated with other district-level political and economic trends. I address this concern by leveraging a series of natural experiments induced by redistricting. By instantaneously altering the boundaries of districts, redistricting in the U.S. House and American state legislatures produces easily-measurable variation in the composition of incumbents' constituency.[1]

2.1 Measuring District Partisanship

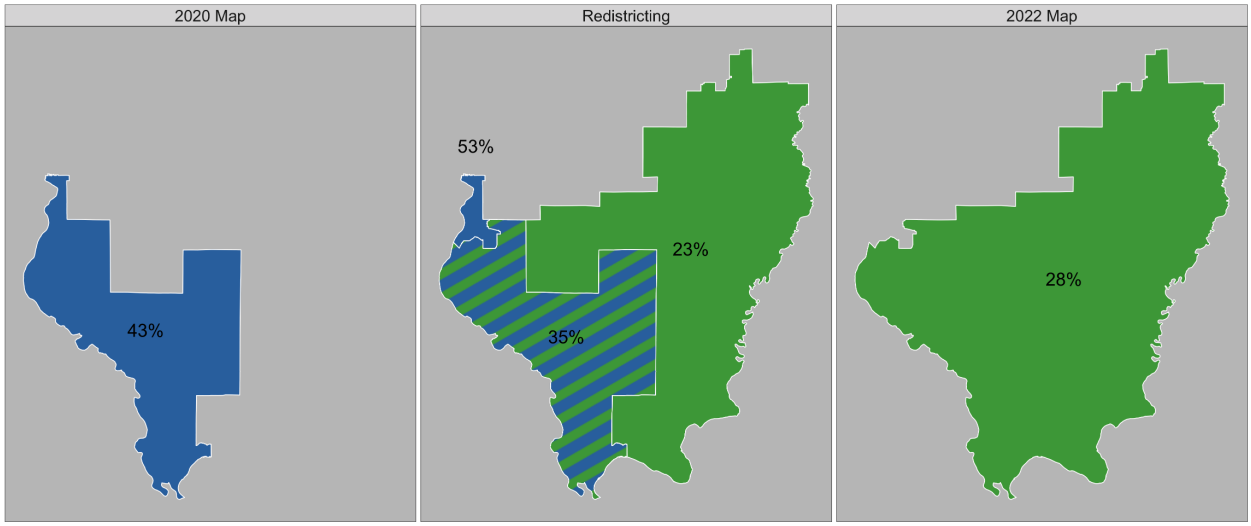
To exploit this design, I require a measure of the change in legislators' constituency induced by redistricting. While the aggregated preferences of districts may vary along numerous dimensions, I focus on the partisan composition of a district as measured by the two-party presidential vote share.[2] To isolate the instantaneous change in district partisanship induced by redistricting–and omit over-time and candidate-specific fluctuations in vote shares–I reallocate the two-party presidential vote from the most recent presidential election to both incumbents' pre- and post-reapportionment district boundaries.

Consider, for example, the calculation of presidential vote share for Illinois Representative Mike Bost depicted in Figure 1. The left facet of Figure 1 plots Bost's district before the 2022 decennial redistricting in blue, with the democratic candidate's (i.e., Joe Biden's) two-party vote share (43%) in 2020 reported in black. Again using the 2020 presidential election returns, the middle facet of Figure 1 shows that, following redistricting, Bost gained the Republican-heavy area plotted in solid green, maintained the area in striped green and blue, and lost the Democratic stronghold in solid blue. As the right facet of Figure 1 shows, following redistricting, the two-party democratic presidential vote share in Bost's district was 28%. The change in presidential vote share in Bost's district calculated *using the same*

[1] I exclude Nebraska's non-partisan state legislature from my analysis.

[2] Previous work notes that the presidential vote share can serve as a good measure of constituency preferences (Brady, Canes-Wrone, and Cogan, 2000; Jacobson, 2000).

Figure 1 – Example of Presidential Vote Share Composition Calculation. For each redistricting plan, presidential vote share is calculated by reallocating the precinct-level election returns from the same election to pre- and post-redistricting district boundaries. The figure below depicts this process for Illinois Representative Mike Bost during the 2022 decennial reapportionment. Democratic presidential vote shares in 2020 are reported in black, pre-redistricting boundaries are colored blue while post-redistricting boundaries are colored green.



2020 presidential election returns is thus 15 percentage points (43% - 28%).

For every set of district maps in my sample, I repeat the process described in Figure 1–reallocating the same presidential election returns to "old" and "new" district boundaries. Because the process of obtaining and standardizing the geo-located election results necessary for this calculation is quite time consuming, I focus on congressional redistricting between the years 1990 and 2024 and redistricting in state legislatures for the years 2000 to 2024. My sample includes decennial reapportionment (i.e., in 1992, 2002, 2012, and 2022) and court-initiated redistricting. Table 1 reports the presidential election used for each redistricting cycle. Data on the 1988 presidential vote comes from various editions of *Politics in America*, the 2000 presidential vote was provided by Bertelli and Carson (2011), geo-located data for the 2008 election is from the Harvard Election Data Archive, and geo-located data for the 2020 election is from the U.S. Elections Project and supplemented by the author from the

Table 1 – Presidential Vote Reference Years. This table reports the year of the presidential vote used to calculate district partisanship for each decennial redistricting cycle included in the analysis along with the data sources. I use the vote share from the most-recent prior presidential election in cases of court-initiated redistricting.

Redistricting Cycle	Presidential Vote Reference Year	Data Source(s)
1990	1988	*Politics in America 1990 & 1996.*
2000	2000	Bertelli & Carson (2011); Ansolabehere & Snyder (2011).
2010	2008	Harvard Election Data Archive.
2020	2020	U.S. Elections Project & various secretaries of states' websites.

various secretaries of states' websites.[3] In total, my analysis dataset includes 501 sets of district maps.[4]

As a robustness check, I also construct a measure of district partisanship for 2020 using a 100% sample of voter files from the commercial data vendor L2. Specifically, I geocode the address of every registered voter in the country as of August 2022 and allocate voters to pre- and post-reapportionment districts. Since party registration is imputed by L2 for the 31 states that do not report partisan affiliation, I prefer the presidential election vote measure of partisanship. However, my substantive results remain unchanged when using the voter file-based measure of partisanship for the most recent redistricting cycle.

2.2 Measuring Legislator Ideology

Second, my design requires a measure of legislators' ideological representation before and after they are assigned new districts. Matching previous work on redistricting and responsiveness, I begin by constructing measures of legislators' roll call voting. Specifically, I use roll call data from Vote View and Legiscan.com to scale incumbents' ideology using

[3]Geo-located data for a small number (11) of state legislatures were not available in 2010 and are excluded from my analysis.

[4]This number includes 182 congressional maps (4 decennial redistricting cycles × 43 states without at-large House districts plus 10 non-decennial maps) and 319 state legislative maps (3 decennial redistricting cycles × 98 legislative chambers plus 36 non-decennial maps minus 10 legislatures with missing data in 2010).

the W-NOMINATE algorithm (Carroll et al., 2009; Poole and Rosenthal, 1985).[5] While NOMINATE-based scalings are popular, they require a number of important technical assumptions. To relax these assumptions, I also calculate a measure of party unity voting as the share of all roll call votes that a legislator sides with the majority of their party.[6]

I am sensitive, however, to concerns that, in the absence of a common agenda, traditional roll call scaling methods may not be immediately comparable across legislative sessions (Bateman, Clinton, and Lapinski, 2017; Handan-Nader, 2023; Tausanovitch and Warshaw, 2017). To address these concerns, I collect more than 70,000 ratings by special interest groups from Project Vote Smart and supplemented by data from the various groups' websites. By selecting a subset of bills and scoring legislators based on their votes on these bills, special interest groups help bridge legislators' ideology across legislative sessions.[7] Previous research suggests that interest groups carefully select the bills they include in their ratings with an eye towards continuity over time (e.g., Fowler, 1982).

Mirroring my focus on changes in district partisanship, I restrict my analysis to interest groups that are classified by Project Vote Smart as primarily ideological in scope. Since the polarity of interest groups' ratings are set relative to their agenda, rather than according to partisanship (as is the case for W-NOMINATE and *Share Party-Line Votes*), movement along raw interest group ratings is inherently ideologically ambiguous. To fix the polarity of these ratings, I rely on Project Vote Smart's classification of every ideological interest group as "Liberal" or "Conservative." For every ideological interest group g and initial rating $RawRating_g$, I construct a polarity-adjusted rating using the rule

[5]Note that I do not study common-space NOMINATE or DW-NOMINATE scalings because the former are static over a legislator's career while the latter are constrained to evolve linearly (or according to some other smooth function) over a legislator's career. The Nokken-Poole period-specific NOMINATE scaling takes a hybrid approach, first estimating roll call locations via a constant ideal point model to estimate session-specific legislator ideal points. Unfortunately, Nokken-Poole period-specific NOMINATE scalings are not readily available for state legislatures. My results are, however, substantively identical when using Nokken-Poole period-specific NOMINATE scalings for Congress throughout this paper.

[6]This process mirrors the construction of the party unity scores published by *Congressional Quarterly*, with the minor difference that I exclude abstentions from the calculation.

[7]Interest group ratings have been previously used to measure state legislators' ideology in Fouirnaies and Hall (2022).

$$Interest\ Group\ Rating_g = \begin{cases} 100 - RawRating_g & \text{if } g \text{ is labeled Liberal} \\ RawRating_g & \text{if } g \text{ is labeled Conservative.} \end{cases}$$

Hence, $Interest\ Group\ Rating_g$ runs from 0 (most liberal) to 100 (most conservative) for all interest groups.[8]

Having outlined my empirical strategy, I now transition to evaluating whether legislators adjust their ideology to match shifts in their constituency.

3 Incumbents Adapt Their Representation to Their Constituency in Small Amounts

In this section, I use my data on district partisan composition and legislator ideology to evaluate whether incumbents adapt their representation to match their new electorate.

3.1 Roll Call Evidence

I begin by analyzing the roll call outcomes employed in previous studies. To estimate the effect of constituency change on legislator ideology, I adopt a within-legislator continuous-treatment difference-in-differences design, where "treatment" is defined by the change in district partisan composition induced by redistricting. Specifically, I estimate OLS regressions

[8]Despite carefully selecting the bills used to compile each session's ratings, interest groups' ratings may not be immediately comparable across time due to shifts and stretches in scales (Groseclose, Levitt, and Snyder, 1999). For example, a rating may shift by 25 points for all members in a given year, or the distance between ratings may stretch by a common factor. By including interest group-by-session fixed effects, my design differences out shifts in scales. Unfortunately, fixed effects will not address concerns about stretched scales, although changes of this nature should be small over the two-period comparisons I examine. As a robustness check, in Appendix A.3, I replicate my main analysis after applying the correction procedure outlined by Groseclose, Levitt, and Snyder (1999). My results are substantively identical. Because the Groseclose, Levitt, and Snyder correction constrains the way legislators' ratings change across time, I prefer the unadjusted ratings, matching Canes-Wrone, Brady, and Cogan (2002).

of the form

$$Ideology_{iwt} = \beta PresVoteShare_{iwt} + \alpha_{iw} + \delta + \varepsilon_{iwt}, \quad (1)$$

where $Ideology_{iwt}$ is a measure of ideology for legislator i in redistricting cycle $w \in \{2000, 2010, 2020\}$ (referred to as *Redistricting* in regression tables for brevity) in legislative session $t \in \{before, after\}$. $PresVoteShare_{iwt}$ is the presidential vote share (either for the Democratic presidential candidate or legislator i's copartisan presidential candidate) in the district legislator i represents in session t in redistricting cycle w. The term α_{iw} represents legislator-redistricting cycle fixed effects and δ is a redistricting cycle fixed effect of varying specification (results are robust to many fixed effects specifications).

In short, this design leverages within-legislator comparisons of ideology before and after redistricting. As a result, the first half of this paper focuses exclusively on legislators who are in office both before and after redistricting, matching the coverage of previous studies. In the second half of the paper I relax this restriction by examining whether legislators retire or are voted out of office following constituency change.

Before presenting the estimates, it is important to outline potential treats to my identification strategy. In many states, redistricting is a highly-strategic process, with the majority seeking to draw the most favorable maps possible for their party. Although these tendencies–or gerrymandering–are non-random, they do not generally threaten my estimates. By including legislator fixed effects, I difference out all static idiosyncratic factors specific to each legislator that affects their roll call voting. My design does, however, require that changes in legislators' electorates are independent of trends (existent or anticipated) in their voting records. For example, a scenario in which legislators whose voting records are trending in a conservative direction are targeted for redistricting would violate my identification assumption. Since legislators' ideology in the absence of constituency change is widely considered to be constant, this assumption is likely satisfied. Nevertheless, in Table 4 I test whether the effects I identify vary depending on whether partisan or non-partisan actors drew the new district maps. The results are highly similar.

Table 2 – Effect of Constituency Change on Roll Call Ideology. Legislators whose districts become more liberal (conservative) vote more liberally (conservatively) in the subsequent legislative session, but this effect is small in magnitude.

	Share Party-Line Votes		W-NOMINATE		W-NOMINATE Normalized Rank	
	Congress	State Leg.	Congress	State Leg.	Congress	State Leg.
Party Pres. Vote Share	0.07	0.05				
	(0.02)	(0.02)				
Dem. Pres. Vote Share			-0.24	-0.08	-0.20	-0.11
			(0.06)	(0.05)	(0.06)	(0.05)
N	1,970	10,140	1,968	9,552	1,968	9,552
Pre-Redistricting Outcome Mean	.91	.9	-	-	-	-
Legislator-Redistricting FEs	Y	Y	Y	Y	Y	Y
Chamber-Redistricting-Session FEs	Y	Y	Y	Y	Y	Y

Note: Robust standard errors are clustered by legislator in parentheses. *Share Party-Line Votes* runs from 0 (perfect voting with out-party) to 1 (voting in lock-step with the copartisan majority). *W-NOMINATE* runs from -1 (most liberal) to 1 (most conservative). *W-NOMINATE Normalized Rank* runs from near zero (most liberal legislator) to one (most conservative legislator).

Further, while concerns with binary-treatment two-way fixed effect (TWFE) models are well-documented, recent methodological work suggests that the traditional linear TWFE specification reported above can be difficult to interpret when treatment is continuous (Callaway, Goodman-Bacon, and Sant'Anna, 2024). Unlike binary-treatment TWFE specifications, continuous-treatment TWFE models may suffer from negative weighting problems even when there are only two time periods. To address this concern, in Appendix A.1 I show that my results are robust to a non-parametric estimate of these effects as well.

Table 2 presents my estimates of the effect of constituency change on incumbents' representation in office. The outcome in the first two columns of Table 2 is the share of votes each legislator cast with the majority of their party. This quantity runs from 0 (voting perfectly with the opposing party's majority) to 1 (voting in lock-step with the copartisan majority). The predictor in columns one and two is the two-party vote share received by the incumbent legislator's copartisan presidential candidate and is calculated as described in Section 2.1. I prefer *Share Party-Line Votes* because it aligns most closely with my measure of constituent preference change–as an electorate becomes, for example, more closely aligned with the incumbent's party, this measure evaluates whether the legislator votes more with that party. As columns one and two of Table 2 demonstrate, I find precise evidence that members of

Congress and state legislators adapt their representation in the theorized direction. This effect is, however, substantively small. For a theoretical shift from a copartisan presidential vote share of 0% to 100%, I estimate that members of Congress and state legislators vote with their party 7 and 5 percentage points more, respectively. Given pre-redistricting mean levels of party-line voting of 91% and 90%, for a 100% shift in district composition, these estimates translate into a roughly 8% and 6% increase in party-line voting for members of Congress and state legislatures, respectively.

To provide additional interpretation of these effects, I employ a simple process to estimate how much ideological movement we "should" expect from legislators if they adapted perfectly to their new constituency's preferences.[9] Using only the cross-section of data from before redistricting and pooling data across legislators, I estimate the relationship (ψ) between the Democratic candidate's presidential vote share in a district and that district's representation as measured by *Share Party-Line Votes*.[10] I then divide the coefficients estimated in Table 2 by ψ, yielding an observational estimate of the extent to which incumbents adapt to their electorate in comparison to the cross-sectional relationship between partisanship and ideological representation. For Congress this rate is 17%, while for state legislatures it is 19%.

While I prefer *Share Party-Line Votes* because it aligns closely with my measure of partisanship, this measure may not be sensitive enough to capture within-legislator changes in behavior. To begin to address these concerns, in columns three and four of Table 2, I

[9]This exercise is intended only to give a broad intuition for the magnitude of the coefficients reported in Table 2. Unlike the results in Table 2, these cross-sectional stimates do not represent causal effects of constituency change on legislator ideological positioning.

[10]Specifically, I estimate regressions of the form

$$ShareParty LineVotes_{iwt} = \psi PresVoteShare_{iwt} + dem_{iwt} + \delta_{cw} + \varepsilon_{iwt}, \quad (2)$$

separately for Congress and state legislatures. Since Democratic and Republican candidates represent the same district in drastically different fashions (Fowler and Hall, 2017), I include the dummy variable dem_{iwt} to indicate Democratic candidates. I add chamber-redistricting cycle fixed effects (δ_{cw}) to allow for different average scores across chamber-redistricting cycles. The key coefficient ψ approximates the cross-sectional (non-causal) relationship between a district's partisanship and its representation in Congress and state legislatures.

examine incumbents' W-NOMINATE scores. This scaling is set to run from -1 (most liberal) to 1 (most conservative) for each chamber. The predictor in columns three and four is the Democratic presidential candidate's two-party vote share. Hence, if legislators respond to a liberal (conservative) constituency shift by becoming more liberal (conservative), we should expect β in Equation 1 to be negative. I again find relatively precise evidence that legislators adapt their representation in the direction of their new electorate. To provide a reference point, the coefficient in column three of Table 2 suggests that a shift in democratic presidential vote share from 0% to 100% would cause a liberal shift in the incumbent's voting record that is equivalent to the common-space NOMINATE distance between Representative Nancy Pelosi and Katie Porter or Dean Phillips.

Finally, given concerns about the cardinality of W-NOMINATE scalings,[11] in columns five and six I reestimate the models reported in columns three and four using an ordinal W-NOMINATE measure (I label this measure *W-NOMINATE Normalized Rank*). To create this measure of ideology, for each chamber-session I rank candidates from most liberal (rank = 1) to most conservative (rank = number of legislators in chamber) using the first dimension of W-NOMINATE to determine ordering. Since the number of legislators varies across legislative chambers, I normalize this ranked scaling by the total number of legislators in the chamber. Hence, this variable runs from near-zero (most liberal) to one (most conservative). The results reported in columns five and six imply that a theoretical shift in Democratic district composition from 0% to 100% would cause the incumbent's ideological rank to move 20 and 11 percentage points in the liberal direction relative to their colleagues for Congress and state legislatures, respectively.

In sum, the roll call evidence presented above suggests that, while incumbents adapt their representation in the direction of their new electorate, these effects are substantively small and far from full convergence. However, since the technical assumptions required for bridging these measures of ideology over time may not hold, the next section reevaluates this

[11] For example, see Poole (2004) for a discussion about scale artifacts resulting from ideal point estimation.

relationship using a measure that helps hold the legislative agenda fixed.

3.2 Evidence from Interest Group Ratings

As noted above, due to changing agendas, raw roll call measures of legislator ideology may not be well-tooled to measure legislator ideology across legislative sessions. To address this concern, in this subsection I use interest group ratings to help obtain estimates of legislator ideology that are comparable across time. Previous research suggests that interest groups carefully select the bills they include in their ratings with an eye towards continuity over time (e.g., Fowler, 1982).

To evaluate incumbents' ideological positioning following redistricting, I reshape my data such that the unit of observation is an individual rating given by group g to legislator i serving in session t during redistricting cycle w. I then estimate OLS equations of the form

$$InterestGroupRating_{giwt} = \beta PresPartyVoteShare_{iwt} + \alpha_{giw} + \gamma_{gcwt} + \varepsilon_{giwt}, \qquad (3)$$

where $InterestGroupRating_{giwt}$ is the polarity-adjusted rating given by group g to incumbent i in redistricting cycle w and session t. $PresPartyVoteShare_{iwt}$ is the vote share for candidate i's copartisan presidential candidate in the election directly preceding redistricting in wave w and session t. The term α_{giw} is a fixed effect for each interest group-legislator-redistricting cycle and γ_{gcwt} is a fixed effect for each interest group-chamber-redistricting cycle-time. In short, this design makes within-interest group comparisons of an incumbent's ideology over time, after accounting for each interest group's average ratings of their peers in the same chamber.

Table 3 reports my estimates of Equation 3 for Congress and state legislatures. Consistent with the roll call-based measures of ideology, I find that liberal shocks in a legislator's electorate causes a liberal shift in that legislator's aggregate rating by interest groups. Specifically, I estimate that House members' ratings by ideological interest groups would move

Table 3 – Effect of Constituency Change on Interest Group Ratings. Legislators whose districts become more liberal (conservative) vote receive more liberal (conservative) interest group ratings in the subsequent legislative session, but this effect is small in magnitude.

	Interest Group Rating (Adjusted Polarity, 0-100)	
	Congress	State Leg.
Dem. Pres. Vote Share	-8.33	-12.07
	(3.14)	(5.40)
N	25,082	9,726
Legislator-Group-Wave FEs	Y	Y
Chamber-Wave-Session-Group FEs	Y	Y

Note: Robust standard errors are clustered by legislator in parentheses. Direction of *Interest Group Rating* is adjusted such that lower (higher) values indicate more liberal (conservative) ratings.

approximately 8 points on a scale from 0 to 100 in the liberal direction if their constituency changed from 0% to 100% Democratic presidential vote share. For state legislatures, this effect is a slightly larger 12 points. Put in terms of the observational adaption rate introduced in Section 3.1, these estimates imply an adaption rate of 8% and 17% for Congress and state legislatures, respectively.

3.3 Variation in Ideological Responsiveness

So far, I have established that legislators adapt to changes in their constituency in small amounts. To learn more about this advantage, I examine where this adaptation is smaller and larger.

Table 4 presents heterogeneity analyses. In each column, I interact my measure of constituency partisanship with a moderator variable. For brevity, I focus on interest group ratings and combine data on Congress and state legislatures. The results using *Share Party-Line Votes* and W-NOMINATE are highly similar, as are the results for Congress and state legislatures separately.

Column one interacts *Dem. Pres. Vote Share* with *Seniority*, or the number of prior

terms a legislator served in office. The second row shows that this interaction is positive, indicating that more-senior legislators adapt less to their constituency than their more-junior counterparts[12] Dividing the first row of column one by the second row, we observe that legislators who have served ten terms (i.e., 18.55/1.93) are predicted to not adapt to their new constituency at all.[13]

Next, in column two of Table 4 I explore whether adaptation varies across the set of actors that drew the district maps. For every redistricting cycle in my sample, I code whether the final map was drawn by politicians (i.e., state legislature, governor, or a politician redistricting commission) or non-politicians (i.e., independent redistricting commissions or state or federal courts). The variable *Partisan Map* indicates whether a given map was drawn by politicians. The estimate in row three suggests that adaptation rates are identical between politician and non-politician-drawn maps.

Lastly, in column three I restrict my analysis to maps drawn by politicians, and examine whether legislators who are a member of the party that drew the map adapt more or less than legislators of the opposing (and presumably out-of-power) party. The point estimate reported in row four implies that legislators who are members of the party that drew the new district maps (i.e., *In Control*) adapt slightly less to their electorate, although this estimate is imprecisely estimated.

Legislators may also begin to adapt to their future electorate before the start of the next legislative session. For example, Boatright (2004) finds that members of Congress in North Carolina adapted to their new district before the beginning of the next legislative session. Because interest groups typically provide only one rating per legislative session, I cannot use interest group ratings to test this dynamic. Instead, in Appendix A.2, after collecting the dates all 501 sets of maps were adopted (i.e., signed into law), I generate a second set of roll call scalings where the pre and post periods are delineated by adoption dates. The results

[12]Recall that lower values of *Interest Group Rating* indicate more-liberal ratings, so an increase in *Dem. Pres. Vote Share* should decrease *Interest Group Rating* among responsive legislators.

[13]In my sample, 12% of legislators were in office for 10 or more terms at the time of redistricting.

Table 4 – Variation in Ideological Responsiveness. More senior legislators adapt less to new constituencies.

	Interest Group Rating (Adjusted Polarity, 0-100)		
	(1)	(2)	(3)
Dem. Pres. Vote Share	-18.55	-8.88	-10.96
	(3.90)	(4.91)	(4.60)
Dem. Pres. Vote Share · Seniority	1.93		
	(0.51)		
Dem. Pres. Vote Share · Partisan Map		0.21	
		(5.86)	
Dem. Pres. Vote Share · In Control			3.64
			(6.27)
N	30,466	33,002	23,006
Legislator-Group-Redistricting FEs	Y	Y	Y
Chamber-Redistricting-Session-Group FEs	Y	Y	Y

Note: Robust standard errors are clustered by legislator in parentheses. Direction of *Interest Group Rating* is adjusted such that lower (higher) values indicate more liberal (conservative) ratings.

using these new measures are slightly larger in magnitude than the results reported in Table 2 (where scalings are calculated using the start dates of each legislative session), but the difference is small in magnitude and not statistically distinguishable from zero.

Taken together, the evidence presented in this section suggests that, while legislators may respond to constituency changes by modifying their representation in small amounts, this effect is substantively small. However, by restricting the analysis to legislators who are returned to office after redistricting, the foregoing section is unable to examine legislator replacement. It possible that, instead of adapting their representation to their electorate, legislators strategically retire and electorates vote remaining out-of-step incumbents out of office. I turn to evaluating this possibility in the next section.

4 Strategic Retirement and Electoral Selection

Previous work on legislator responsiveness to constituency change largely focuses on ideological adaptation. This is for good reason: whether legislators vote in line with their constituents' preferences directly shapes policy. However, the replacement of incumbents with new representatives is also an important channel of policy change, and one that has received little attention in studies of reapportionment. In fact, replacement may be the primary avenue through which voters shape policy (Lee, Moretti, and Butler, 2004; Fowler and Hall, 2017). Drawing on a new dataset of legislators' home addresses, I consider legislative replacement in this section.

4.1 Observing the Counterfactual Using Legislators' Home Addresses

The key challenge for studying legislator replacement following reapportionment is that, for legislators who choose to retire or seek higher office, the counterfactual district in which they run is unobservable. For example, if a legislator who was in office before redistricting chooses not to run in the election following redistricting, with traditional data sources we are unable to identify the new district in which the legislator would have run.

To address this gap, I leverage the unique set of residency requirements in place for all ninety-eight state legislative chambers included in my sample. Unlike members of Congress who face no formal residency requirements, all fifty states require state legislative candidates to reside in the district they would potentially represent. While the length of these requirements vary widely, they all generally rule out the possibility of state legislators strategically selecting new districts to represent following redistricting.[14] Hence, in almost every case, a state legislator's home address determines the post-redistricting district they would represent. While the strict conditions that limit strategic district selection do not hold in

[14]The logic is as follows. By requiring legislative candidates to reside in the districts they would represent, state legislative candidates generally cannot move and establish residency in a new district in time for the next election. One potential exception is that incumbents may strategically retire early from their "old" district in order to establish residency in a "new" district. However, the length of the residency requirements rule out this possibility in all but small number of state legislatures.

Congress, I include members of the U.S. House in the following results for reference.

This design requires data on the home addresses of legislators. I implement a three-part strategy to identify the home addresses of state legislators and members of Congress.

First, my preferred source on legislator addresses are the official voter registration files for all fifty states.[15] Using the R package *reclin2*, I built a machine learning algorithm that probabilistically matches the candidates from my elections returns dataset[16] to the appropriate state's voter file. To minimize the possibility of false matches, I block on state, last name, and district (i.e., state house, state senate, or U.S. House district) and drop matches with less than a 95% match probability.

Second, for cases where I cannot confidently match a legislator to the voter file, I use the addresses collected by the commercial data vendor Know Who. Finally, for legislators who are not included in the Know Who data, I obtain legislators' addresses from the FEC (for members of Congress) and secretary of states' disclosure forms (for state legislators). I prefer the voter file addresses because in some cases (particularly for members of Congress) the Know Who data and state campaign finance data sources report addresses for legislators' campaign offices instead of homes.

Using this dataset of legislator addresses, I impute the districts in which retiring legislators would have run had they decided to pursue office again. The final step is to merge the appropriate presidential election returns into the imputed district.

In this section, I focus on two outcomes: whether a legislator ran for reelection and whether they won reelection following redistricting in their original chamber.

[15] Voter file data are from the commercial data vendor L2.

[16] When missing from official election returns, data on candidates' middle names were supplemented by their Wikipedia page wherever possible.

Table 5 – Effect of Constituency Change on Incumbents' Retirement and Win Probabilities. Legislators whose districts become less friendly are less likely to win reelection, run for office, and win conditional on running for office.

	$Pr(Win_{t+1})$		$Pr(Run_{t+1})$		$Pr(Win_{t+1}\|Run_{t+1})$	
	Congress	State Leg.	Congress	State Leg.	Congress	State Leg.
Δ Party Pres. Vote Share	0.75	1.09	0.48	0.79	0.39	0.52
	(0.26)	(0.15)	(0.23)	(0.15)	(0.19)	(0.11)
N	1,133	5,114	1,133	5,114	951	3,685
Chamber-Redistricting FEs	N	Y	N	Y	N	Y

Note: Robust standard errors are clustered by legislator in parentheses. Data are at the legislator-wave level. Δ *Party Pres. Vote Share* is the change in a candidate's copartisan presidential vote share induced by redistricting between election t and $t+1$. *Party Pres. Vote Share*$_{t+1}$ is imputed using legislators' home addresses for legislators who do not seek reelection in time $t+1$.

4.2 Formal Estimates of Strategic Retirement and Electoral Selection Following Redistricting

The specification I employ in this section is as follows

$$ElectionOutcome_{iw,t+1} = \beta[PresPartyVS_{iw,t+1} - PresPartyVS_{iw,t}] + \delta_s + \varepsilon_{iwt}, \qquad (4)$$

where $ElectionOutcome_{iw,t+1}$ is an indicator for whether legislator i either ran for office or won office in $t+1$ (i.e., the "after" period) during redistricting cycle w. The term $[PresPartyVS_{iw,t+1} - PresPartyVS_{iw,t}]$ measures the change in the two-party vote share that candidate i's copartisan presidential candidate received between the district maps in session t and $t+1$. Finally, δ_{cw} is a chamber-by-redistricting fixed effect. Intuitively, this design makes within-chamber-redistricting cycle comparisons of probabilities of running and winning following constituency change.

My estimates of Equation 4 are reported in Table 5. I begin in the first two columns by considering the probability that a legislator wins reelection in the election cycle directly following redistricting. In state legislatures (where the residency requirement is binding), I find large and relatively precise effects of constituency change on reelection rates. Specifically, if a state legislator's district becomes 10 percentage points less friendly, I estimate that their

probability of winning reelection in either legislative chamber declines by 10.9 points–that is, a more than one-for-one decline in reelection probability. For members of Congress, the effect is a slightly-smaller 7.5 point decline in win probability for every 10 percentage point decline in copartisan presidential vote share among their potential electorate.

The effects identified in columns one and two, however, mask two underlying mechanisms. First, facing a new and less-friendly constituency, legislators may choose to not run for office at all. Incumbents are commonly thought to be highly strategic when making their reelection decisions (e.g., Jacobson and Kernell, 1981), so this mechanism seems likely to be at play following redistricting. Second, conditional on running for office, legislators may fail to win reelection because they are voted out of office by their new constituency. Given the high rates of straight-ticket voting, this possibility also seems quite likely.

The third and fourth columns of Table 4 investigate the first possibility. For state legislators, I find a substantively large effect of constituency change on legislators' retirement decisions. For every 10 points a legislator's potential new district becomes less friendly, I estimate their probability of running for office declines by 7.9 points. For members of Congress, this effect is smaller, or about 4.8 points for every 10 percentage points change in district composition.[17]

Finally, in columns five and six of Table 4, I consider whether voters systematically evict remaining legislators who have lost electoral support. To do so, I restrict my dataset to legislators who choose to run for reelection following redistricting. My estimate for state legislators in column six indicates that, for every 10 percentage points an incumbent's district becomes less friendly, their probably of winning reelection conditional on running declines by 5.2 points. This effect is substantially smaller than the overall effect of constituency change on win probability, indicating that legislators retain an incumbency advantage, but are nevertheless removed from office by their new electorate it becomes less friendly.

Overall, the evidence presented in this section suggests that an important piece of the

[17]That the effect for Congress is comparatively small suggests that, facing a large shift in district composition, members of Congress search for new districts (i.e., districts in which they do not reside).

picture has been missing in previous analyses of redistricting and responsiveness. A key way legislators respond to a constituency change is by retiring, and voters often systematically evict remaining incumbents.

5 Discussion

That legislators represent the preferences of their constituency is a cornerstone of democracy. However, due to data and design limitations, how policy comes to represent constituents' preferences is unclear. Previous work suggests that, as an electorate's preferences change, legislators will maintain a fixed ideal point, adapt to the median voter, or strategically exit office. Combining the decennial reapportionment of incumbents' districts with data on legislators' roll call and interest group-based ideology and their home addresses, this paper systematically examines how incumbents adapt to their constituency in the 1990s, 2000s, 2010s, and 2020s.

My evidence suggests that, while legislators may moderately adjust their ideology in response to a change in constituency, this effect is quantitatively small and substantially far from full adaptation. Instead, my analysis suggests that a key part of the picture that has been missing from previous research is legislator replacement. When legislators' districts become less unfriendly, I find strong evidence that they respond by retiring from office and voters often replace remaining incumbents.

At a broader level, this paper also contributes to the long-standing debate over whether incumbent legislators are Downsian entrepreneurs (Downs, 1957; Hotelling, 1929; Black, 1958) or steadfast ideologues (Osborne and Slivinski, 1996; Besley and Coate, 1997; Alesina, 1988). While the Downsian paradigm marshals powerful insights in other electoral contexts, my paper suggests that–even when presented the opportunity to adapt–incumbents' ideology is best understood as static.

References

Alesina, Alberto. 1988. "Credibility and Policy Convergence in a Two-Party System with Rational Voters." *The American Economic Review* 78(4): 796–805.

Bateman, David A., Joshua D. Clinton, and John S. Lapinski. 2017. "A House Divided? Roll Calls, Polarization, and Policy Differences in the U.S. House, 1877–2011." *American Journal of Political Science* 61(3): 698–714.

Bertelli, Anthony M., and Jamie L. Carson. 2011. "Small changes, big results: Legislative voting behavior in the presence of new voters." *Electoral Studies* 30(March): 201–209.

Besley, T., and S. Coate. 1997. "An Economic Model of Representative Democracy." *The Quarterly Journal of Economics* 112(February): 85–114.

Black, Duncan. 1958. *The Theory of Committees and Elections.* Cambridge: Cambridge University Press.

Boatright, Robert G. 2004. "Static Ambition in a Changing World: Legislators' Preparations for, and Responses to, Redistricting." *State Politics & Policy Quarterly* 4(December): 436–454.

Brady, David, Brandice Canes-Wrone, and John F. Cogan. 2000. "Differences in legislative voting behavior between winning and losing house incumbents." In *Continuity and Change in House Elections*, ed. David W. Brady, John F. Cogan, and Morris P. Fiorina. Stanford: Stanford University Press.

Callaway, Brantly, Andrew Goodman-Bacon, and Pedro H. C. Sant'Anna. 2024. "Difference-in-Differences with a Continuous Treatment.".

Canes-Wrone, Brandice, David W. Brady, and John F. Cogan. 2002. "Out of Step, out of Office: Electoral Accountability and House Members' Voting." *The American Political Science Review* 96(1): 127–140.

Carroll, Royce, Jeffrey B. Lewis, James Lo, Keith T. Poole, and Howard Rosenthal. 2009. "Comparing NOMINATE and IDEAL: Points of Difference and Monte Carlo Tests." *Legislative Studies Quarterly* 34(4): 555–591.

Downs, Anthony. 1957. *An Economic Theory of Democracy.* Harper and Row.

Fouirnaies, Alexander, and Andrew B. Hall. 2022. "How Do Electoral Incentives Affect Legislator Behavior? Evidence from U.S. State Legislatures." *American Political Science Review* 116(May): 662–676.

Fowler, Anthony, and Andrew B. Hall. 2017. "Long-Term Consequences of Election Results." *British Journal of Political Science* 47(April): 351–372.

Fowler, Linda L. 1982. "How Interest Groups Select Issues for Rating Voting Records of Members of the U. S. Congress." *Legislative Studies Quarterly* 7(3): 401–413.

Glazer, Amihai, and Marc Robbins. 1985. "Congressional Responsiveness to Constituency Change." *American Journal of Political Science* 29(2): 259–273.

Groseclose, Tim, Steven D. Levitt, and James M. Snyder. 1999. "Comparing Interest Group Scores across Time and Chambers: Adjusted ADA Scores for the U.S. Congress." *The American Political Science Review* 93(1): 33–50.

Handan-Nader, Cassandra. 2023. "A Classification Approach to Measuring Partisan Polarization in Congress.".

Hotelling, Harold. 1929. "Stability in Competition." *Economic Journal* 39: 41–57.

Jacobson, Gary. 2000. "Party polarization in national politics: the electoral connection." In *Polarized Politics: Congress and the President in a Partisan Era*, ed. J.R. Bond, and R. Fleisher. Washington: CQ Press.

Jacobson, Gary, and Samuel Kernell. 1981. *Strategy and choice in congressional elections.* New Haven and London: Yale University Press.

Lee, D. S., E. Moretti, and M. J. Butler. 2004. "Do Voters Affect or Elect Policies? Evidence from the U. S. House." *The Quarterly Journal of Economics* 119(August): 807–859.

Leveaux-Sharpe, Christine. 2001. "Congressional Responsiveness to Redistricting Induced Constituency Change: An Extension to the 1990s." *Legislative Studies Quarterly* 26(2): 275–286.

Osborne, Martin J., and Al Slivinski. 1996. "A Model of Political Competition with Citizen-Candidates." *The Quarterly Journal of Economics* 111(1): 65–96.

Poole, Keith T. 2004. *Spatial Models of Parliamentary Voting.*

Poole, Keith T., and Howard Rosenthal. 1985. "A Spatial Model for Legislative Roll Call Analysis." *American Journal of Political Science* 29(2): 357–384.

Poole, Keith T., and Howard Rosenthal. 2000. *Congress: A Political Economic History of Roll Call Voting.* New York: Oxford University Press.

Stratmann, Thomas. 2000. "Congressional Voting over Legislative Careers: Shifting Positions and Changing Constraints." *The American Political Science Review* 94(3): 665–676.

Tausanovitch, Chris, and Christopher Warshaw. 2017. "Estimating Candidates' Political Orientation in a Polarized Congress." *Political Analysis* 25(April): 167–187.

Appendix

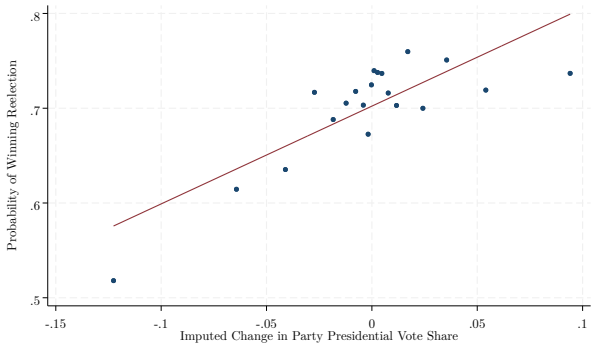
Contents

A.1 Non-Parametric Estimates of Strategic Retirement and Electoral Selection

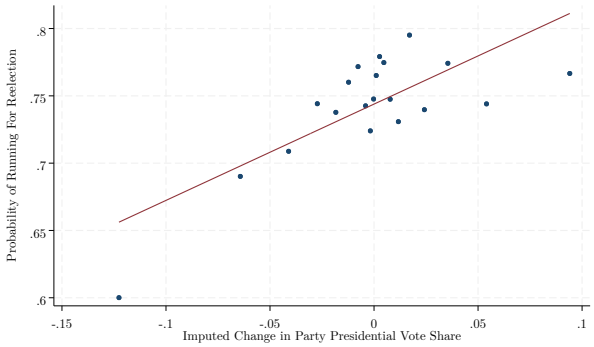
Callaway, Goodman-Bacon, and Sant'Anna (2024) demonstrate that, unlike binary-treatment TWFE specifications, continuous-treatment TWFE models may suffer from negative weighting problems even when there are only two time periods. To address this concern, Figure A.1 plots a non-parametric binscatter of my estimates. The results provide strong evidence to reject concerns about negative weighting.

Figure A.1 – Residualized Binscatter of Strategic Retirement and Electoral Selection. Figures plot the average outcomes for equal-sample-sized bins of Change in Party Presidential Vote Share. Data is residualized by chamber-redistricting cycle before plotting.

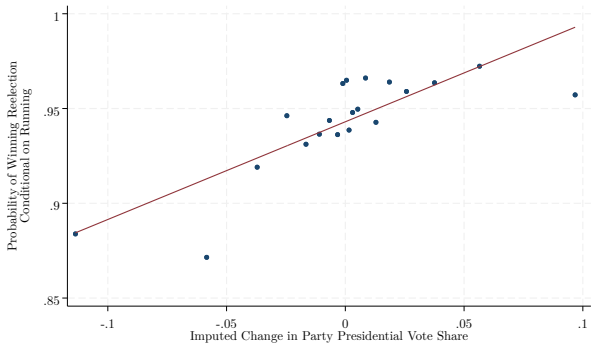
(a) Probability of Winning Reelection



(b) Probability of Running for Reelection



(c) Probability of Winning Conditional On Running for Reelection



A.2 Estimates Using Date District Maps Were Adopted

Boatright (2004) finds that members of Congress in North Carolina adapted to their new district before the beginning of the next legislative session. In this section, I generate a second set of roll call measures, where the pre- and post-periods are delineated by the date new district maps were adopted (i.e., signed into law). The results using these new measures are slightly larger in magnitude than the results reported in Table 2 (where ideology is calculated using the start dates of the new legislative session). However, the difference is small in magnitude and not statistically different.

Table A.1 – Effect of Constituency Change on Roll Call Ideology. In this table, ideological scalings are calculated using the dates redistricting plans were adopted. Legislators whose districts become more liberal (conservative) vote receive more liberal (conservative) interest group ratings in the subsequent legislative session, but this effect is small in magnitude. The effects are substantively identical to 3.

	Share Party-Line Votes		W-NOMINATE		W-NOMINATE Normalized Rank	
	Congress	State Leg.	Congress	State Leg.	Congress	State Leg.
Party Pres. Vote Share	0.09	0.07				
	(0.03)	(0.02)				
Dem. Pres. Vote Share			-0.16	-0.12	-0.20	-0.19
			(0.09)	(0.08)	(0.08)	(0.07)
N	1,960	7,846	1,958	6,922	1,958	6,922
Pre-Redistricting Outcome Mean	.93	.9	-	-	-	-
Legislator-Redistricting FEs	Y	Y	Y	Y	Y	Y
Chamber-Redistricting-Session FEs	Y	Y	Y	Y	Y	Y

Note: Robust standard errors are clustered by legislator in parentheses. *Share Party-Line Votes* runs from 0 (perfect voting with out-party) to 1 (voting in lock-step with the copartisan majority). *W-NOMINATE* runs from -1 (most liberal) to 1 (most conservative). *W-NOMINATE Normalized Rank* runs from near zero (most liberal legislator) to one (most conservative legislator).

A.3 Estimates Using Adjusted Interest Group Ratings

Despite carefully selecting the bills used to compile each session's ratings, interest groups' ratings may not be immediately comparable across time due to shifts and stretches in scales (Groseclose, Levitt, and Snyder, 1999). To address these concerns, for every interest group, I apply the correction procedure outlined by Groseclose, Levitt, and Snyder. Table A.2 presents the results. The results using adjusted ratings are substantively identical to the results when using nominal ratings as reported in Table 3.

Because the Groseclose, Levitt, and Snyder correction constrains the way legislators' ratings change across time,[18] I prefer the unadjusted ratings, matching Canes-Wrone, Brady, and Cogan (2002)

Table A.2 – Effect of Constituency Change on Interest Group Ratings. In this table, interest group ratings are adjusted following the correction outlined by Groseclose, Levitt, and Snyder (1999). Legislators whose districts become more liberal (conservative) vote receive more liberal (conservative) interest group ratings in the subsequent legislative session, but this effect is small in magnitude.

	Interest Group Rating (Adjusted Polarity, 0-100)	
	Congress	State Leg.
Dem. Pres. Vote Share	-7.36	-15.32
	(3.63)	(5.87)
N	25,082	9,726
Legislator-Group-Wave FEs	Y	Y
Chamber-Wave-Session-Group FEs	Y	Y

Note: Robust standard errors are clustered by legislator in parentheses. Direction of *Interest Group Rating* is adjusted such that lower (higher) values indicate more liberal (conservative) ratings.

[18] Specifically, Groseclose, Levitt, and Snyder fix each legislator's mean preference parameter across time, but allow for idiosyncratic deviations in ratings that are not correlated with time or chamber switches.