Abstract

A vast literature has documented a growing ideological divide between the parties in the contemporary U.S. Congress. This research almost universally measures this polarization based on estimates from roll-call voting behavior. However, a recent, burgeoning literature has cast doubt on the over-time comparability of such roll-call based measures due to changes in the congressional agenda. We leverage data from candidate surveys that allow us to hold the policy agenda constant across the time period under study, 1996-2006. Our results suggest that polarization is not solely an artifact of an evolving agenda. In contrast to past results, we do not find evidence that members are adopting more extreme positions throughout their tenure in the House when we hold the agenda fixed. Instead, the increasing polarization within the fixed policy agenda is entirely due to replacement: the new members elected to the House during this time period are more extreme than those leaving the House during this period. Our findings suggest that the within-member movement to more extreme positions observed in roll-call voting behavior is the result of a changing agenda, increasing party pressure, or some combination of the two.
It is impossible to overstate the centrality of polarization in scholarship on contemporary American politics. As of April 2018, a Google Scholar search for the joint terms “polarization,” “Republicans,” and “Democrats” yielded 42,300 results. Contemporary understandings of elite polarization reflect the trends documented in Figure 1, which displays the differences between Republican and Democratic voting records in Congress using DW-NOMINATE scores developed by Keith Poole and Howard Rosenthal. Most strikingly, the scores document historic and ever-increasing levels of party polarization in recent decades, with Republican legislators increasingly conservative and Democratic legislators increasingly liberal. The patterns shown by DW-NOMINATE scores have led news coverage to declare that “the House and Senate are more divided than at any time since the end of World War I” and sent scholars scrambling to understand its implications for American democracy (e.g., Binder 2016; Cameron 2002; Jones 2001; Sinclair 2014). The ubiquity of DW-NOMINATE scores and their impact on contemporary research agendas and journalistic activity is explained in part by their status as “the only methodology that allows both for comparison of the dispersion of positions across time and for intertemporal change in the positions of individual legislators” (McCarty, Poole, and Rosenthal 2016, 21).

A closer examination of DW-NOMINATE scores reveals two especially important patterns related to polarization. First, the recent increase in polarization has been asymmetric, as Republicans have exhibited much greater movement in the conservative direction than Democrats have moved in the liberal direction. Republicans’ movement toward the ideological extremes thereby accounts for a disproportionate share of increased polarization. This is clear in Figure 2 below. Second, the recent increase in polarization is driven both by ideological adaptation among members of Congress and member replacement. Simple calculations based on DW-NOMINATE scores indicate that within-legislator movement by members of Congress — MCs whose voting records become more extreme over time — accounts for roughly half of the increase, and the other half is

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Figure 1: Increasing Polarization in Congress, DW-NOMINATE Scores. Each point indicates the differences between the parties’ mean DW-NOMINATE scores, with higher values along the vertical axis indicating greater party polarization. DW-NOMINATE scores for individual legislators range from -1 to 1.

The result of replacement — incoming members of Congress are more ideologically extreme than the legislators they succeeded.²

The trends documented in the above figures have also led scholars to search for theoretical explanations for ascendant polarization. Some researchers have pointed to secular trends in immigration and economic inequality as potential contributors to polarization (McCarty, Poole, and Rosenthal 2016). Other scholarship has instead considered the relationship between polarization and factors that are largely external to the legislative process, such as the recruitment of candidates, party primaries, districting procedures, campaign finance, and party activists.³ Perhaps the

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²Studies using other methods generally agree that adaptation and replacement both have been important drivers of congressional polarization, though they differ somewhat in their assessments of the relative contributions of each (Bonica 2014; Fleisher and Bond 2004; Roberts and Smith 2003; Theriault 2006, 2008).
³See, for example, Fleisher and Bond (2004), Masket and Shor (2015), McCarty, Poole, and Rosenthal (2009), McGhee et al. (2014), and Thomsen (2014).
Recent polarization as measured by DW-NOMINATE has been asymmetric, driven mainly by increasing extremism among Republicans. The strongest evidence to date concerns developments within Congress that may have contributed to polarization, including the increased power of party leaders to designate committee assignments, changes in the nature of the congressional agenda, and the more frequent use of restrictive rules and procedures.\footnote{For instance, see Cox and McCubbins (1993), Lee (2008), Roberts and Smith (2003), and Theriault (2006, 2008).}

In this paper, we revisit the empirical foundations of claims about ideological polarization in the contemporary United States Congress and its sources. Though DW-NOMINATE scores enable scholars to identify shifts among Republican and Democratic legislators in the conservative and liberal directions, respectively, scholars have recently identified several conceptual and methodological issues in interpreting roll call based estimates of legislative behavior, particularly those from DW-NOMINATE. Not only may the scores conflate ideological conflict with partisan conflict (Caughey and Schickler 2016; Lee 2016), but changes in the underlying legisla-

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure2}
\caption{Asymmetric Polarization, DW-NOMINATE Scores. Recent polarization as measured by DW-NOMINATE has been asymmetric, driven mainly by increasing extremism among Republicans.}
\end{figure}
tive agendas and issues can also complicate efforts to make comparisons across time (Bateman and Lapinski 2016; Bateman, Clinton, and Lapinski 2017; Clinton, Katzenelson, and Lapinski 2016; McCarty 2011).

We study the sources of congressional polarization from 1996 to 2008, a period in which polarization increased sharply (see Figure 1). Using data from candidate surveys to characterize legislators’ electorally induced preferences over a fixed agenda during this time period, we document the extent to which polarization within Congress is explained by adaptation, replacement, changing legislative agendas, and increasing party pressure. We present evidence that roughly half of the increase in roll call polarization is due to replacement, driven almost entirely by Republicans, with the other half attributable to changes in the legislative agenda and/or increased party pressure.\(^5\) We find no evidence, however, that legislators systematically change their ideological positions over time or that constituency considerations are important contributors to polarization. Our findings provide new evidence about the sources of polarization in the contemporary Congress and suggest that DW-NOMINATE scores, at least in the current era, may overstate the magnitude of and trends in preference disagreement within Congress.

**Congressional Polarization: Empirical and Conceptual Issues**

Documenting the rise of congressional polarization — and identifying its causes, or at least the factors which covary with it — ultimately depends on the quality of the measures used to characterize voting behavior in Congress. However, because the composition of Congress and the agenda on which it votes changes over time, producing estimates of congressional voting patterns that are comparable across different congressional terms requires additional assumptions. Common-space DW-NOMINATE scores allow researchers to directly compare voting patterns in the House and Senate and across time by assuming that legislative behavior is constant over time

\(^5\)To an important degree, the power of party leaders and a changing agenda are inextricably linked. Scholars have hypothesized that party leaders exert their power to influence the agenda (e.g., Cox and McCubbins 1993). Nevertheless, we endeavor to disentangle agenda-related explanations from party-related explanations.
such that each legislator has the same ideal point estimate throughout their congressional career whether they served two terms or 20. In contrast, the standard DW-NOMINATE scores (displayed in Figures 1 and 2) report separate estimates for the House and Senate (i.e., they are not directly comparable across chambers) but allow legislators’ ideal points to change over time following a linear trend. Any changes in a legislator’s behavior over the course of their career, therefore, are smoothed evenly across their terms in office.\textsuperscript{6} While this assumption may be reasonable in many contexts, the dramatic increase in polarization in recent decades raises questions about the timing and magnitude of potential changes in legislative voting behavior for which DW-NOMINATE scores may be ill-suited for answering. Due to these limitations, Caughey and Schickler (2016) implement a dynamic approach to estimating legislators’ ideologies from their roll call votes so that they can detect rapid and nonmonotonic ideological change among Southern Democrats during the New Deal era.

Beyond the methodological issues and technical assumptions required for estimating temporal changes in legislative voting behavior, interpreting roll call-based estimates across time requires assumptions about their substantive meaning. Scholars have recently raised two sets of questions about substantive interpretations of DW-NOMINATE scores over time. A first objection concerns the dimension of conflict characterized by DW-NOMINATE scores. By assumption, scores estimated along a single dimension are said to reflect the liberal-conservative continuum, such that more negative scores represent legislators with more liberal ideologies while more positive scores reflect legislators with more conservative preferences. In evaluating polarization between parties in Congress, therefore, greater distances between the parties’ members are commonly interpreted as evidence of increased ideological disagreement. Lee (2016, 126) takes issue with this interpretation and argues that “scholars should let go of the idea that the level of party conflict in congressional roll call voting is a reliable indicator of the ideological distance between

\textsuperscript{6}The exception to this is party switchers who are treated as separate legislators pre- and post-switch. Their within-party movement is, however, constrained by the linear trend.
the two parties’ positions on national issues.” As Bateman, Clinton, and Lapinski (2017) point out, it is difficult to identify whether increased levels of disagreement between members of Congress, as appears to characterize recent roll call voting patterns by Democrats and Republicans, can be interpreted as an increase in ideological polarization without accounting for the policy content of the votes held in Congress.

A second issue of interpretation concerns whether potential shifts in estimates of legislative ideology are attributable to changing preferences or the content of the legislative agenda. Roll-call based measures, including DW-NOMINATE, confront the challenge of identifying comparable estimates over time when agendas and political context change along with them (Clinton, Katznelson, and Lapinski 2016). For instance, as McCarty (2011, 79) points out, “Despite the fact that D-NOMINATE produces a scale on which Ted Kennedy can be compared to John Kennedy and Harry Truman, some caution is obviously warranted in making too much of these comparisons … Being liberal in 1939 meant something different than liberal in 1959 or in 2009. So one has to interpret NOMINATE scores in different eras relative to the policy agendas and debates of each.” In an ideal scenario, each Congress would cast votes on the same roll call agenda, thereby ensuring that any changes over time in legislative voting patterns could be attributable to divergent preferences rather than a more partisan and divisive agenda. But just as scholars have recognized the importance of interpreting interest group scores of legislators with caution due to the groups’ propensities to oversample key votes which divide legislators across parties (Snyder 1992), conflict between parties in Congress could result in fundamental changes in the composition of the legislative agenda, with votes intentionally chosen to separate the parties. As Clinton, Katznelson, and Lapinski (2016) show, however, changes in the composition of the agenda can produce patterns that appear to be polarization absent preference divergence. This is a particularly vexing problem given the likelihood that the same factors which may contribute to greater ideological disagreement between the parties may strengthen the incentives for majority parties to wield greater power over the agenda.
We seek to address this issue in context of the 105th through the 110th House. Specifically, though DW-NOMINATE scores indicate that partisan polarization increased dramatically during this time period, we aim to parse this growth in polarization by identifying the extent to which it is attributable to changing ideologies and legislator replacement while holding constant the content of the agenda on which legislators express preferences. Somewhat more tentatively, we also seek to explore how well existing accounts explain possible increases in polarization.

**Potential Explanations for Rising Polarization**

Accounts of congressional behavior provide several potential explanations for rising levels of ideological polarization. First, Theriault (2006, 2008) argues that ideological adaptation — within-member changes in the ideologically extreme direction — accounts for approximately a third of recent increases in congressional polarization in both the House and Senate. Focusing on the Senate, Bonica (2014, 7) argues that ideological adaptation is the “primary driver” of polarization beginning with the 105th Congress. However, Poole (2007) argues that members of Congress are ideologically consistent throughout their careers, raising questions about the plausibility of ideological adaptation as a major contributor to developments in polarization. A second body of research points to the importance of member replacement for increased polarization, as legislators who have succeeded retiring incumbents or defeated sitting incumbents have tended to be more ideologically extreme than the legislators they replaced. Member replacement is responsible for about two-thirds of the increase in polarization, according to Theriault (2006, 2008), and accounts for almost all of the rise in polarization in the Senate since 1978 (Theriault and Rohde 2011).

Other explanations center on changes in legislative organization and agenda control. Since Republicans took control of Congress after the 1994 elections, party leadership has tended to exert greater control over the selection of committee chairs, for instance, and has invested increased efforts to induce legislators to hew to the party lines. Scholars have also identified ways in which
the agendas have changed, with some issues represented more than others (Jochim and Jones
2012) and presidential agenda items receiving greater numbers of votes, yet also dividing the
parties (Lee 2008, 2009). If some agenda items invite greater partisan conflict than others, and
those items comprise an increasing share of the congressional agenda, changes to the legislative
agenda could account for greater polarization even in the absence of changes in the distribution
of legislators’ preferences. According to Lee (2008, 199), changes in the Senate agenda from 1981
to 2004 account for more than a third of the increase in polarization in that chamber.

For the most part, however, scholarship that studies potential explanations for polarization
is limited by the empirical and conceptual issues outlined above that afflict DW-NOMINATE
scores. Without a clearer idea about whether the patterns shown in Figures 1 and 2 reflect genuine
ideological divergence, changes in the underlying agenda, or something else, it is difficult to know
what to make of explanations for the observed patterns.

**Data and Measures**

From our perspective as researchers attempting to decompose the sources of polarization, we
would force Congress to hold votes term after term on an identical set of issues that comprise a
comprehensive agenda for the period under study. This ideal scenario would allow us to assess
the extent to which the two parties are diverging on a fixed ideological agenda and, furthermore,
the degree to which any divergence is the result of within-member movement relative to replace-
ment. Of course, such a scenario is infeasible, yet our data source represents a reasonably close
approximation to this ideal scenario.

We use data from Project Vote Smart’s National Political Awareness Test (NPAT), renamed in
2008 as the National Political Courage Test. Project Vote Smart describes the NPAT as “a collabor-
orative effort between Vote Smart and over 200 political scientists, journalists, and leaders from
across the political spectrum. The issues included on the Test are the top concerns of the Ameri-
can people and are likely to come up in the next legislative session." The survey is administered to all state and federal candidates in even-numbered years. While its content changes somewhat over time (new questions are occasionally included and questions are sometimes discontinued), the core set of issues and the questions used to gauge candidate positions on these issues are remarkably consistent over the time period under study. Given the near universal focus of scholars on roll-call based measures of polarization despite the problems of such measures (e.g., an evolving agenda), leveraging an alternative data source not subject to such problems provides a new lens through which we can examine polarization. While the NPAT data allow us to hold the agenda fixed, the primary trade-off relative to using roll-call data is that survey participants comprise a non-representative, convenience sample of congressional legislators. Moreover, we demonstrate below that members who choose to fill out the NPAT are not obviously exceptional in terms of their roll call voting behavior. Despite the obvious drawback of a non-representative sample, our approach to studying congressional polarization presents clear advantages.

The NPAT agenda is comprehensive and consistently includes the following issues: abortion, spending on a range of foreign and domestic policy areas, taxes, balanced budget amendment, campaign finance, voting regulations, same-sex marriage, government ethics reform, death penalty, prison reforms, criminal sentencing policies, drug policies, education, employment, environmental and energy policy, gun policy, health care, immigration, international policy, trade, national security issues, social security reforms, technology and communication issues, welfare and poverty policies, and federalism.

To make the NPAT survey data amenable to standard methods for analyzing roll call data, we follow Ansolabehere, James M. Snyder, and Stewart (2001) and Shor and Rogowski (2018) and transform the items into binary decisions. Many items are naturally binary — “indicate which

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7 The description continues. “[The issues] are determined by a rigorous examination of national and local polls, the majority, minority and third party platforms, State of the Union and Response speeches, State of the State and Response speeches, and legislative agendas. Every effort is made to ensure that the test is as unbiased as possible.” See https://votesmart.org/about/political-courage-test.
principles you support (if any) concerning X” – so we code candidates as supporting the policy if they indicate support, and we code them as not supporting the position otherwise. This is the most common format used for most issue areas. The items on taxes and spending follow a different format, asking whether the candidate wants to “greatly increase,” “slightly increase,” “maintain,” “slight decrease,” “greatly decrease,” or “eliminate entirely” the taxes or spending on X. We turn each of these items into six decisions, and each candidate is coded as supporting exactly one of the decisions and opposing all of the others. The last type asks, “do you support X” and allows three possible responses — “yes,” “no,” or “undecided.” We turn each of these items into three decisions, and each candidate is coded as supporting exactly one of the decisions and opposing all of the others.

We then estimate the W-NOMINATE model on the resulting decision matrix of zeros and ones (and missing values) to generate estimated positions for each candidate, for each year they responded to the survey. We call the resulting first dimension scores the NPAT W-NOMINATE scores or, more briefly, NPAT scores.

We also compute simpler scores by counting the fraction of times each candidate made the “conservative” choice across decisions. We determine whether one or zero is the conservative choice on each item by comparing the fraction of “one” responses among Republicans to the fraction of “one” responses among Democrats; when the former is larger we call one the conservative choice on the decision, and when the latter is larger we call zero the conservative choice. We refer to the resulting scores as the NPAT Fraction Conservative scores.

We also experimented with coding the items as follows: if candidate A responds “greatly increase” then he/she is coded as supporting both the “greatly increase” and the “slightly increase” decisions on X but opposing all others; if A responds “slightly increase” then he/she is coded as supporting only the “slightly increase” decision on X and opposing all others; if A responds “maintain” status quo then he/she is coded as supporting only the “maintain” decision on X and opposing all others; if A responds “slightly decrease” then he/she is coded as supporting only the “slightly decrease” decision on X and opposing all others; if A responds “greatly decrease” then he/she is coded as supporting both the “greatly decrease” and the “slightly decrease” decisions on X but opposing all others; and if A responds “eliminate” then he/she is coded as supporting the “eliminate,” the “greatly increase,” and the “slightly increase” decisions on X but opposing all others. The results are essentially unchanged with this coding scheme.

Additionally, we experimented with simply coding the undecided responses as missing and the results are again essentially unchanged.
Changing Positions

A key component of our analysis involves studying within-candidate changes in NPAT scores over time. Our claim is that candidate responses to NPAT reflect their personal or electorally-induced policy preferences, such that any temporal changes in their responses on the same items reflect a change in preferences. While legislators may generally exhibit ideological consistency over their careers in Congress (Poole 2007), politicians do, sometimes, change their positions on key policy issues, quite publicly. Media reports frequently call attention to instances in which legislators changed their minds on high-salience policy issues. During the period under study, for instance, the media reported on Senator John McCain’s change in position on President George W. Bush’s tax cuts, offshore oil drilling, and flying the Confederate flag. Similarly, Representative Glenn Poshard changed his position on the assault weapons ban while Representatives Richard Burr and Porter Goss both changed their positions on NAFTA. And, more recently, Senator Rob Portman changed his position on gay marriage. Given the public nature of the NPAT, it seems quite reasonable to suspect that changes in candidates’ responses to its questions indeed reflect changes in their policy preferences.

While we cannot dispositively prove that changes in a candidate’s responses to the same item on the NPAT at time $t$ and $t+1$ reflect genuine opinion change, we can examine whether the changes we observe in the responses to particular items appear sensible, in that they are at least in the direction we would expect following various “shocks” to policy or policy outcomes. Do many candidates stop supporting a policy after it appears to be failing or has become unpopular? Do many candidates stop wanting to decrease taxes after a large tax cut has been passed? More generally, do many candidates stop wanting more of policy $X$ after a law is passed providing a substantial amount of $X$?

Consider first the responses on the budget item on Defense Intelligence Operations. The number of candidates supporting an increase in spending on Defense Intelligence Operations jumped dramatically between 2000 and 2002, in the wake of the September 11, 2001 terrorist
attacks. In 1996, 1998, and 2000, only 21% of candidates supported the decision to slightly increase or greatly increase spending on this item, while in 2002, 2004, and 2006 over 70% of candidates supported an increase. Of course, some of this change is due to new candidates with different views. However, a high percentage of candidates also changed their responses. Between 2000 and 2002, 69 out of 139 candidates (44%) switched from not supporting to supporting the decision to increase spending (either slightly or greatly) on this item. Only three candidates switched in the opposite direction. No other year exhibits a change anywhere near this large. In addition, four years later, the changes in responses were not only much smaller but also roughly equal in direction — between 2004 and 2006, 14 out of 134 candidates (10%) switched from not supporting to supporting the decision to increase spending (either “slightly” or “greatly”) on this item, while 15 candidates (11%) switched in the opposite direction.

A second example involves the item: “Should the United States withdraw its troops from Iraq?” In 2004, only 31% of candidates responded “yes” to this item, but in 2006, after more than two years of occupation and casualties dealing with the insurgency, civil war, and sectarian violence, support for the administration’s policy had declined sharply and 59% of candidates responded “yes.” Again, some of this change is due to the emergence of new candidates with different policy views. But a significant number of candidates also changed their responses – 22% changed their response from “no” or “uncertain” in 2004 to “yes” in 2006, while only a single candidate switched in the opposite direction.

A third example involves responses on tax policy before and after the large tax cuts of 2001 (and 2003). Consider taxes on high-income households (i.e., those with incomes of $150,000 or more). After 2001, there was a sharp increase in support for increasing taxes (either “greatly” or “slightly”) on this group of households. Only 22% of candidates in 1996, 1998, and 2000 supported increased taxes for high income earners; however, after the 2001 tax cuts were passed, the number of candidates who expressed increasing taxes for high-income households increased to 41% among those running in 2002, 2004, and 2006. We find the same patterns within candidates.
Before 2001, 23 out of 264 candidates (9%) changed their responses between years in the direction of reducing or maintaining taxes on this group, while only 14 candidates (5%) switched in favor of increasing their taxes. The pattern is reversed after 2001. Between 2000 and 2002, 17 out of 128 candidates (13%) changed from opposing to supporting an increase in taxes on this group, while only 3 candidates (2%) changed in the opposite direction. Between 2002 and 2004, the corresponding figures are 16 out of 147 (11%) and 5 out of 147 (3%), respectively; and between 2004 and 2006, the corresponding figures are 11 out of 124 (9%) and 2 out of 124 (2%).

Overall, these patterns seem consistent with the conclusion that many candidates responded to the widespread perception that the Bush tax cuts benefited high-income households the most. They are also consistent with the hypothesis that after the large tax cuts were passed, some candidates saw less need for further cuts, particularly given that the tax cuts had resulted in large federal deficits. In the Appendix, we consider two other “shocks” to the policy environment: Medicare Part D and the minimum wage increase. In both cases, we document similarly sensible patterns of movement in candidate positions in response to these changes.

In sum, we have documented that, at least in these several specific instances, candidates systematically change their responses to the NPAT questionnaire in sensible ways as the status quo, or their perception of the status quo, also changes. These patterns provide strong face validity to the idea that candidates report different issue positions on the survey when their issue positions in fact change. Thus, the NPAT data should allow us to measure the extent to which members of Congress change their policy views to adopt more extreme, polarized positions on a fixed policy agenda.
Results

Within-Member Movement

We first analyze changes in individual candidates’ NPAT scores over time. We analyze all available pairs of years that are one or two elections apart, i.e., 1996-1998, 1998-2000, 2000-2002, 2002-2004, 2004-2006, 1996-2000, 1998-2002, 2000-2004, and 2002-2006.\textsuperscript{10} For each pair of years we consider all candidates who filled out the NPAT survey in both years. We then estimate NPAT W-NOMINATE scores for each pair of years separately, using only the survey items that appear in both years. By doing so, we hold the policy agenda on the survey fixed.

NPAT scores are reported in Figure 3 and Figure 4. Figure 3 shows all pairs of years pooled, while 4 shows each pair of years separately. In all plots, the diagonal line shown is the 45-degree line. The first important finding is that candidates’ NPAT W-NOMINATE scores rarely change substantially over time. Even more important, they do not exhibit \textit{systematic} changes that would contribute to polarization. That is, there is no tendency for conservatives to become even more conservative between years \(t\) and \(t+2\) or \(t+4\), and no tendency for liberals to become even more liberal. There is no mass of points above the 45-degree line to the right of the zero point (which we would observe if conservative candidates were systematically becoming more conservative over time), nor is there a mass of points below the the 45-degree line to the left of the zero point (which there would be if liberal candidates were becoming more liberal over time).

It is fairly clear from the figures that regressions of NPAT scores in year \(t+2\) or \(t+4\) on NPAT scores in year \(t\) should yield slope coefficients near 1 and intercepts near 0. The table below shows that this is in fact the case.

Next we show the predicted “path” of NPAT scores, based on stringing together the year-over-year changes for within-candidate moves. These are displayed in figures 5 and 6. The paths are constructed as follows. Let \(P^R_{1996}, P^R_{1998}, \ldots, P^R_{2006}\) be the two-year path for Republicans. The first

\textsuperscript{10}Below we discuss how we analyze changes from 2000 to 2002 given redistricting that followed the decennial Census.
two different four-year paths, one beginning in 1996 and one beginning in 1998.

Let \( P^R_{1996} \) be the average of the 1996 NPAT scores among all Republicans who had scores in that year. Let \( C^R_{1996,1998} \) be the average of the changes in NPAT scores between 1996 and 1998 among all Republicans who had scores both in 1996 and 1998 (with each year’s scores constructed using only the items asked in both years). The second point, \( P^R_{1998} \), is \( P^R_{1996} + C^R_{1996,1998} \). Defining \( C^R_{1998,2000} \) analogously, the third point is \( P^R_{2000} = P^R_{1998} + C^R_{1998,2000} \), and so on until we reach \( P^R_{2006} \). The path for Democrats is calculated in a similar fashion. The four-year paths are calculated analogously but the \( C \) terms involve NPAT surveys four years apart. Note also that we consider two different four-year paths, one beginning in 1996 and one beginning in 1998.

The bottom line from this analysis is simple: the predicted paths are all basically flat, showing that the within-candidate changes in NPAT scores are not suggestive of any increase in polariza-
is no indication of an upward trend. That is, we observe no evidence that the within-member
provides additional evidence that members themselves are not changing their policy preferences
in the systematically extreme direction.

We translate these party paths into a predicted path of polarization in the chamber (i.e., the
difference between the average predicted positions of Republicans and the average predicted
positions of Democrats) in Figure 6. This figure shows the difference between $P^R_t$ and $P^D_t$. There
is no indication of an upward trend. That is, we observe no evidence that the within-member
changes in NPAT scores have led to an increase in polarization in these scores.

Figure 4: NPAT W-NOMINATE Scores for Candidates with 2+ Scores, by Each Pair of
Years.
Table 1: Regressions of Score in Year 2 on Score in Year 1

<table>
<thead>
<tr>
<th>Years</th>
<th>Coeff (Std Err)</th>
<th>Coeff (Std Err)</th>
<th>R²</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996–1998</td>
<td>0.015 (0.012)</td>
<td>0.970 (0.023)</td>
<td>0.93</td>
<td>139</td>
</tr>
<tr>
<td>1998–2000</td>
<td>-0.036 (0.012)</td>
<td>0.917 (0.024)</td>
<td>0.93</td>
<td>118</td>
</tr>
<tr>
<td>2000–2002</td>
<td>-0.016 (0.011)</td>
<td>0.966 (0.020)</td>
<td>0.96</td>
<td>111</td>
</tr>
<tr>
<td>2002–2004</td>
<td>-0.032 (0.013)</td>
<td>0.996 (0.024)</td>
<td>0.94</td>
<td>118</td>
</tr>
<tr>
<td>2004–2006</td>
<td>-0.022 (0.009)</td>
<td>0.994 (0.016)</td>
<td>0.97</td>
<td>113</td>
</tr>
<tr>
<td>1996–2000</td>
<td>0.003 (0.015)</td>
<td>0.953 (0.029)</td>
<td>0.93</td>
<td>84</td>
</tr>
<tr>
<td>1998–2002</td>
<td>-0.061 (0.014)</td>
<td>0.937 (0.025)</td>
<td>0.95</td>
<td>81</td>
</tr>
<tr>
<td>2000–2004</td>
<td>-0.028 (0.012)</td>
<td>0.978 (0.021)</td>
<td>0.97</td>
<td>81</td>
</tr>
<tr>
<td>2002–2006</td>
<td>-0.054 (0.013)</td>
<td>1.040 (0.023)</td>
<td>0.97</td>
<td>68</td>
</tr>
<tr>
<td>1996–2002</td>
<td>0.000 (0.024)</td>
<td>0.896 (0.042)</td>
<td>0.88</td>
<td>61</td>
</tr>
<tr>
<td>1998–2004</td>
<td>-0.080 (0.022)</td>
<td>0.938 (0.039)</td>
<td>0.91</td>
<td>58</td>
</tr>
<tr>
<td>2000–2006</td>
<td>-0.041 (0.020)</td>
<td>0.933 (0.035)</td>
<td>0.93</td>
<td>54</td>
</tr>
</tbody>
</table>

Next, we assess whether the legislators who complete the NPAT, especially those who have done so multiple times, are anomalous with respect to their roll-call voting behavior. Figure 7 shows the growth in polarization in roll-call voting based DW-NOMINATE scores, again stringing together the year-to-year changes from each adjacent pair of years. There are three trends in the figure, one for all House members (light gray), one for those members with one or more NPAT scores (medium gray), and one for those members with two or more NPAT scores (black). This last subset is the group used to construct Figures 5 and 6 above.

All three trends exhibit a clear increase in polarization of a similar magnitude (about 0.15 points). Importantly, the increase in polarization for the sample of members with two or more NPAT scores is almost identical to the growth in polarization among all members. Thus, even though it is purely a convenience sample, it is evidently not a particularly strange sample. These legislators are slightly more polarized than average both at the beginning and at the end of our period of study, but they exhibit the same increase as the average.
Figure 5: Predicted Path of NPAT W-NOMINATE Scores, Stringing Together Year-over-Year Changes.

Replacement vs. Within-Member Movement

In Table 2, we examine how two different factors, replacement and within-member movement, contributed to polarization over the period 1996-2006. The table has two halves, one for each party, and each party has three panels. The top panels show the changes in DW-NOMINATE scores overall; the middle panel shows the changes in DW-NOMINATE scores for representatives with two or more NPAT scores; and the bottom panel shows the changes in NPAT W-NOMINATE scores. Note that in each row of the middle panel the sample of legislators is the same as that in the corresponding row of the bottom panel—the number of observations, shown in the last column, is therefore always equal for these rows.

Overall, Republicans became considerably more conservative over the period 1996-2006 in
their DW-NOMINATE scores, and within-member movement and replacement contributed approximately equally to the change. On average, the DW-NOMINATE scores of continuing Republican members increased by 0.090. New Republican members (i.e., those who were first elected sometime during the period) had DW-NOMINATE scores that were on average 0.104 points higher than the scores of those Republican members who left Congress during the period. The patterns are roughly similar for the subset of legislators with two or more NPAT scores; if anything, for these members, the figures suggest that more of the increase in DW-NOMINATE scores was due to within-member movement rather than replacement. For this subset of legislators, the DW-NOMINATE scores of continuing members increased by 0.091, while the DW-NOMINATE scores of new members were on average 0.051 points higher than the those of departing members. The difference between the full Republican delegation and the sub-sample is not too surprising given the relatively small sample sizes.

The third Republican panel shows the changes in NPAT scores. For simplicity, and since the
Figure 7: Trends in Polarization in DW-NOMINATE Scores by whether Members Completed the NPAT. This figure displays the difference in the party means in DW-NOMINATE scores for all House members, only House members who completed the NPAT survey at least once, and only House members who completed the NPAT survey multiple times.

The analysis above for Figures 3-6 shows no systematic changes in NPAT scores within-candidate over time, we compute the average NPAT score for representatives with two or more scores. Thus, by definition, the scores of the continuing members are constant over time and the change is 0.000. The interesting pattern is that new Republican members had NPAT scores that were on average 0.082 points higher than those of departing Republican members. Thus, the new Republican members were considerably more conservative than retiring members even on the same set of policy questions.

While the increase of 0.104 or 0.051 in estimated extremism based on roll call voting might be primarily the result of changes in the roll call agenda, the 0.082 increase in estimated extremism based on NPAT cannot be the result of an evolving agenda. Thus, we assert with more confidence that a large fraction—probably at least half—of the increased conservatism among Republican members is due to replacement.
Among Democrats, there is almost no systematic within-member movement and also little or no difference between new and departing members (either with respect to DW-NOMINATE scores or NPAT scores). In particular, new Democratic members had NPAT scores that were on average just 0.006 points higher than those of departing Democratic members. Among this subset of MCs, there was a slight increase of 0.026 in DW-NOMINATE scores—i.e., the new Democrats were slightly more conservative in their roll call voting than the departing Democrats. Overall, however, the changes among Democrats were tiny, and we now have greater confidence that this is not an artifact of a changing agenda.

Overall, we can conclude with a fair degree of confidence that the partisan asymmetry in polarization in roll calls found in the DW-NOMINATE scores (recall Figure 2 above)—or at least the asymmetry resulting from replacement—is not an artifact of a changing agenda.

**Constituency Sources of Preference Change**

We measure district partisanship using the presidential vote to examine whether changes in district partisanship (due to redistricting) are related to within-candidate changes in NPAT scores. We find little evidence of a relationship between changes in district partisanship and changes within-candidate NPAT score, which echoes the findings of previous work using roll-call based measures of legislator ideology. The left panel of Figure 8 shows this relationship for all candidates, while the right panel restricts to only Republican candidates. Results are similar if we restrict attention to winning candidates.

The overall relationship between NPAT scores and district partisanship is much stronger, however. This can be seen in Figure 9. The left panel displays the scatterplot for winning candidates, and the right panel displays the scatterplot for losing candidates. In each plot, there are two curves, which show the predicted values of 3rd-order polynomial regressions for each party separately. For winning candidates in the relatively competitive 40% to 60% range of presidential vote, there is a steep relationship between NPAT scores and district partisanship: the more Re-
Table 2: Changes in Extremism of Roll Call and NPAT Scores, 1994 to 2006

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<td>0.095</td>
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<td>Continuing MCs</td>
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<td>-0.396</td>
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<td>New MCs</td>
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Figure 8: Changes in NPAT Scores vs. Changes in District Partisanship

The more Republican the district is, the more conservative the NPAT score of the winning candidate is. This suggests that it is possible for gerrymandering to contribute to polarization at least in the long run (although McCarty, Poole, and Rosenthal (2009) show that there is no clear causal effect of gerrymandering in the short term).

Figure 9: NPAT Scores vs. District Partisanship for Winning and Losing Candidates

NPAT Fraction Conservative Scores

The patterns described above regarding the NPAT W-NOMINATE scores all hold for the NPAT Fraction Conservative scores. These can be seen in Figure A.1, Figure A.2, Figure A.3, and Table
A.1 in the Appendix. That these patterns are present in the extremely simple and transparent fraction conservative scores suggest that our results are not contingent on a particular scaling method. Summary statistics of the NPAT Fraction Conservative scores also provide evidence that none of the patterns previously identified are the result of “boundary” problems. The average score of Republican candidates is 0.56, far from the mathematical limits of 0.00 and 1.00. The minimum score across all Republican candidates is 0.38 and the maximum is 0.83. Similarly, the average score for Democratic candidates 0.46, the minimum score is 0.32, and the maximum is 0.72. Again, none of these indicate that hitting the extremes is an issue in the data. Thus, for example, we can be fairly confident that Democratic NPAT scores were not constant over time because they were constrained by the zero lower bound. Moreover, the consistent patterns using the NPAT Fraction Conservative scores weigh against the concern that W-NOMINATE NPAT scores reflect the particular composition of the sample which sought office and responded to the NPAT survey. A legislator’s W-NOMINATE score, for instance, depends upon not only how that legislator responded to the survey but also how all the other respondents answered the survey. Therefore, a shift to the ideological left could be observationally equivalent to the entry of many new conservative candidates. Because we find identical patterns using our simpler measure of legislator ideology, however, we have greater confidence that our conclusions are not a statistical artifact of the ideological profile of the legislators who completed the NPAT.

**State Legislatures**

We computed NPAT Fraction Conservative Scores for all state legislative candidates in 1996 and 1998 analogous to those above for the U.S. Congress, again using only the questions common in both years. In Figure 10, we plot the 1998 scores against the 1996 scores, for those legislators with scores in both years. This is analogous to the first plot in Figure A.2. Again, the points lie clustered tightly around the 45 degree line, and there is no signs of systematic movement toward polarization—i.e., no clustering of points above the 45 degree line among the candidate
with relatively conservative scores in 1996, and no clustering of points below the 45 degree line among the candidates with relatively liberal scores in 1996. We suspect, then, that “parsing” the polarization in state legislatures will produce patterns similar to those we found above for Congress.

![Figure 10: 1998 vs. 1996 NPAT Fraction Conservative Scores for State Legislators.](image)

**Conclusion**

The broadest finding from our analysis is that the growing polarization observed in roll-call voting is not simply an artifact of a changing agenda. When we hold the agenda fixed, we still document patterns of a growing gap between the two parties. Furthermore, we find evidence
of asymmetric polarization: the gap between the two parties results from the average Republican becoming substantially more conservative not the average Democrat becoming substantially more conservative. However, some of the patterns we observe are inconsistent with past analyses from roll-call based measures. In particular, we do not find evidence that members are systematically moving to more extreme positions throughout their tenure. Much of the literature finds that this within-member movement explains about half of the increase in polarization. This inconsistency suggests that roll-call based measures, such as DW-NOMINATE, may overstate the degree to which the parties are polarized in terms of ideological preferences. Instead, at least some of the growth in roll-call polarization is likely due to the changing agenda, increasing party pressure, or both.
References


A Appendix

Changing Positions

Medicare Part D

The prescription drug benefit for Medicare recipients (Medicare part D), passed in 2003, is another interesting case. The relevant item in the NPAT survey asks candidates whether they “support expanding prescription drug coverage under Medicare.” Between 2000 and 2002, 13 out of 124 candidates (10.5%) switched from not supporting to supporting expansion, while only 4 candidates (3%) switched in the opposite direction. After 2003 the pattern is reversed. Between 2002 and 2004, 24 out of 149 candidates (16%) switched from supporting to not supporting expansion, while only 4 candidates (3%) switched in the opposite direction. Between 2004 and 2006, 18 out of 145 candidates (12%) switched from supporting to not supporting expansion, while only 7 candidates (5%) switched in the opposite direction.

The Minimum Wage

A final case is the minimum wage. The federal minimum wage increased by 21% between 1996 and 1998, from $4.25 to $5.15. It remained unchanged until 2008. Between 1996 and 1998, 23 candidates out of 173 (13%) switched from supporting to not supporting an increase in the minimum wage, while only 2 candidates (1%) switched in the opposite direction. This is the only pair of years in which an imbalance of this sort occurs. In all other cases where a large number of candidates change positions on this issue, they increase their support for the minimum wage. Between 1998 and 2000, 28 candidates out of 164 (17%) switched from not supporting to supporting an increase in the minimum wage, while only 3 candidates (2%) switched in the opposite direction. Similarly, between 2004 and 2006, 18 candidates out of 149 (12%) switched from not supporting to supporting an increase in the minimum wage, while only 1 candidate (1%) switched in the opposite direction. Both of these pairs occurred during periods in which the minimum wage was fixed in nominal terms and therefore decreasing in real terms.
Fraction Conservative Scores

Figure A.1: Year 2 vs. Year 1 NPAT Fraction Conservative Scores for Candidates with 2+ Scores, All Pairs Pooled
Figure A.2: Year 2 vs. Year 1 NPAT Fraction Conservative Scores for Candidates with 2+ Scores, By Year Pair
Table A.1: Regressions of Score in Year 2 on Score in Year 1

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<th>Years</th>
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<th>Std Err</th>
<th>Slope Coeff</th>
<th>Std Err</th>
<th>R²</th>
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<td>1996–1998</td>
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<td>(0.011)</td>
<td>0.950</td>
<td>(0.025)</td>
<td>0.91</td>
<td>143</td>
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<td>1998–2000</td>
<td>0.040</td>
<td>(0.012)</td>
<td>0.909</td>
<td>(0.024)</td>
<td>0.92</td>
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<td>2000–2002</td>
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<td>(0.012)</td>
<td>0.957</td>
<td>(0.025)</td>
<td>0.93</td>
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<td>2002–2004</td>
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<td>0.985</td>
<td>(0.022)</td>
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<td>2004–2006</td>
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<td>0.967</td>
<td>(0.017)</td>
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Figure A.3: Predicted Path of Average NPAT Fraction Conservative Scores, Stringing Together Year-on-Year Changes