ROLL CALLS, PARTY LABELS 
AND ELECTIONS

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Abstract

We develop a model of legislative policy-making in which individual legislators are concerned with both policy and re-election. Legislators’ preferences are private information, and they have two means of communicating their preferences to voters. First, they each have a ‘party label’ which credibly identifies an interval within which their ideal points must lie. Second, their roll call votes may convey additional information about their preferences. Each legislator must therefore tailor her votes to her district in order to forestall a re-election challenge from the opposing party. In equilibrium, non-sincere voting records will occur mostly in moderate districts, where extreme incumbents are vulnerable to challenges from relatively centrist candidates. In those districts, the most extreme legislators may even choose to vote sincerely and retire rather than compile a moderate voting record. Thus, both roll call scores and candidate types will be responsive to district type. An empirical test of shifts in roll call scores of retiring House members in moderate districts confirms these findings.
1. Introduction

Members of the U.S. Congress evidently worry quite a bit about the electoral consequences of their roll call voting records (Mayhew, 1974; Kingdon, 1989). Although partisanship is probably the most important determinant of congressional election outcomes, other factors also matter. These include the strength of the opponent, incumbency per se, constituency service, and, possibly, the legislator’s ideological or policy “fit” with the district. Establishing a good roll call record is one way a member of Congress can show how well he or she represents the district. Conversely, members whose voting records do not adequately reflect the views of their constituencies are likely to find these records being used against them by their electoral opponents.

Empirically, partisanship and roll call voting records both appear to sort representatives across districts. It is difficult to make strong claims about the extent to which representatives mirror their districts, because it is difficult to measure the preference or ideology of the median (or mean) voter in each district, and virtually impossible to place these medians or means on the same scale as that defined by representatives’ roll call voting scores (e.g., Achen 1977, 1978). We are on surer footing, however, with the following claims:

(i) There is a strong, positive association between how liberal a representative’s roll call voting record is and how Democratic the district is, in terms of the share of the vote the district gives to the Democratic candidate in presidential elections.

(ii) There is a sizeable “gap” between the representatives from the two major parties, even when they represent similar districts. Democrats generally have substantially more liberal voting records than Republicans.

(iii) Within each party, there is a positive relationship between how liberal a representative’s roll call voting record is and how Democratic the district is.

(iv) There is little or no relationship between how liberal a non-incumbent candidate is and how Democratic the district is. This suggests that the relationship found among incumbents is due in large part to selection via elections.

(v) The Democrat and Republican running in a congressional race almost never adopt similar ideological positions. This holds for races between incumbents and challengers, as well as open-seat races.
(vi) Representatives with more extreme roll call voting records tend to receive a smaller share of the vote than representatives with moderate voting records, after controlling for how extreme (in terms of Democratic presidential vote share) their districts are.

Patterns (i)-(iii) and (vi) also hold, although a bit more roughly, for the Senate (there is not enough data to determine whether (iv) and (v) hold).

Figure 1 illustrates items (i)-(iii) by plotting roll call voting scores against the normalized Democratic share of the presidential vote for four different Congresses. The lines shown are estimated from eight bivariate regressions of roll call scores on district partisanship, one for each party in each Congress. The roll call scores are based on the linear probabilistic voting model described in Heckman and Snyder (1997). The normalized Democratic share of the presidential vote is an average across the several elections for which the presidential vote data are available at the congressional district level.¹

[Figure 1 here]

Figure 2 illustrates items (iv)-(v) by plotting the relationships among district type, party affiliation, incumbency, and an estimate of candidates’ revealed preferences. The positions are estimated using a survey administered by Project Vote Smart, called the National Political Awareness Test (NPAT).² Importantly, this survey provides a way to place incumbents and non-incumbents on the same scale, since it is sent to all general election candidates running for Congress. The survey covers about 200 questions on a variety of public policy issues, including taxation, spending priorities, health, education, welfare, defense, environment, unemployment, affirmative action, international trade, foreign policy, immigration, abortion, gun control, crime, drugs, and campaign finance. We use the 1996 and 1998 surveys, and scale the data using the linear factor model in Heckman and Snyder (1997).

[Figure 2 here]

Many papers in the literature find support for item (vi). Canes-Wrone, Brady, and Cogan (2002) summarize the literature, and also show that the relationship is robust over the post-war period.

²See Erikson and Wright (1997) and Ansolabehere, Snyder and Stewart (2001a, 2001b) for details.
There is a vast theoretical literature on voting and elections. However, this literature does not appear to contain any models that can account for all of the stylized facts above. The standard Hotelling/Downs model of spatial electoral competition—either in terms of two competing national “teams” of politicians, or district-by-district competition between two competing candidates—predicts either district-by-district convergence or national convergence, neither of which appears in the data.

Models in which parties or candidates have policy preferences, such as Wittman (1983), Calvert (1985), Londregan and Romer (1993), and Groseclose (1999), predict divergence and sometimes responsiveness to district preferences, but these models only consider a single election. These models provide no natural way to link elections across districts. We might imagine a set of elections, each held in its own district and with its own pair of policy-motivated candidates, and even imagine that each candidate was affiliated with a political party. But there is no reason to expect any particular relationship between the positions adopted by a party’s candidates in different districts. For that matter, there is no restriction on the number of parties—there might as well be as many parties as candidates.

The models by Robertson (1976), Austen-Smith (1984, 1986), Snyder (1994), and Snyder and Ting (2002) are one step closer to what is required. In these, parties compete across many districts simultaneously, running different candidates in each district. However, in these models voters vote only on the basis of a pair of “national” party platforms. Candidates never try to create a “personal” image that distinguishes them from their parties’ positions. Presumably, this is because they are either unable or unwilling to do so. Candidates might try to influence the platform chosen by their party’s caucus, but this activity is never seen by voters. These models might be reasonable for countries with “strong” parties, such as Canada, the U.K., and some European countries, but they make less sense in analyzing the U.S., where elections appear to be much more candidate-oriented.

In this paper we present and analyze a simple model that does account for the stylized facts above, at least qualitatively. The model is designed to explore the logic of electoral politics in an environment where communication between candidates and voters is costly. Voters want reliable, low-cost information about the candidates running for office. Political parties can play a role in doing this (e.g., as in Snyder and Ting, 2002). In addition, candidates may be able to provide their own, extra information, through visible actions such as their roll call voting records. Our model incorporates both types of information, and studies the relationship between them.\(^3\)

\(^3\)A variety of papers have analyzed models of elections and policy outcomes when there is moral hazard,
The model has four features that we find particularly desirable. First, voters and candidates are both strategic actors. Voters use information about candidates’ party affiliations and roll call records to decide how to vote. They do this because candidates have policy preferences that are private information, and the party and roll call choices help voters predict what actions the candidates are more likely to take in the future. Candidates are strategic in both their affiliation and voting decisions. Second, the model captures an important aspect of legislatures and legislative elections, namely that all legislators face a common roll call agenda. Individual legislators cannot choose their agendas. Most agendas are likely to force some, but not all, legislators to make hard choices in deciding how to vote. Third, the model also distinguishes meaningfully between candidates and parties. Party “brand names” constrain candidate behavior across districts, and individual members are limited in their ability to distinguish themselves from these brands. Finally, the model makes interesting predictions other than those mentioned above. One of these receives substantial empirical support, as shown in Section 5 below.

Naturally, these features are made possible in part by a number of simplifying assumptions. Three limitations are particularly noteworthy. First, the roll call agenda is extremely stylized. It is not obvious that a richer agenda would add much in the way of intuition, but further work is required to check this out. Second, the roll call agenda in the model is exogenous. These assumptions reduce the legislators’ strategy sets and focus attention on the incentives created by roll call votes and elections. In future work we hope to endogenize the agenda, and even explore it as a strategic variable, asking questions such as: when will parties mainly use any agenda-setting power they have to achieve policy aims, and when will they instead use agenda-setting power to try to damage the opposing party electorally? Third, and most importantly, key “party” decisions are treated as exogenous in the model. Making these decisions endogenous is one of the obvious next steps in the research. This will force us to adopt a model of party decision making, and we are leaning toward one with relatively “democratic” parties, as in Austen-Smith (1984) and Snyder (1994).

Our model is an infinitely repeated game in which a legislature chooses a policy by adverse selection, or both. These include Ferejohn (1986), Rogoff and Siebert (1988), Austen-Smith and Banks (1989), Alesina and Cukierman (1990), Banks (1990), Rogoff (1990), Hess (1991), Harrington (1992, 1993a, 1993b), Banks and Sundaram (1993), Reed (1994), Fearon (1999), Lohmann (1998), and Ashworth (1999). Most of these models are more about “valence politics” than “ideological politics”—politicians are trying to convince voters they are “high-quality” types, and voters are trying to choose high-quality types, induce politicians to undertake a large amount of “effort,” or both. A number of these models feature unknown candidate policy preferences, but all of them consider only a single office (although some incorporate repeat play).
majority rule from a simple random agenda in each period. The legislature represents a continuum of constituencies or districts. In each period, each district elects a single legislator by majority rule from a pair of candidates, each of whom is affiliated with a party.

Candidates are driven by achieving office and, as legislators, by the desire to vote for their preferred policy options. Legislators may run for re-election once, and so might become future incumbent candidates. We assume that office-holding confers a fixed benefit on each winning candidate, and also a cost of affiliating with a particular party. These costs are increasing in the distance between the candidate’s ideal policy and the party platform. They might arise from two sources. First, they might reflect the power of a party’s “screening device.” As an example, a party might give candidates a test of “ideological correctness,” and only nominate those who pass the test. Second, membership costs may represent an (exogenous) explicit reward structure for collaborating with the party platform.

Voters “live” for a single period in the model, during which they wish to elect representatives whose preferences are closest to their own. Because candidates’ and legislators’ ideal points are private information, voters face an adverse selection problem. Candidates can neither communicate their preferences to voters directly, nor commit to a specific platform upon election. However, their affiliations and past voting records as legislators (if any) may convey some of this information. Voters might therefore draw different inferences from the same roll call record about a legislator’s likely future behavior, depending on the legislator’s party.

To win an election (or re-election), challengers and incumbents must therefore take into account the informational consequences of their party affiliations and roll call votes. Depending on the agenda, tensions may arise between voting to achieve re-election and voting one’s preferences. We find that in equilibrium, these tensions will be resolved differently depending on the district’s ideology. Thus, legislators with the same preferences but different constituencies will sometimes vote differently.

In ideologically extreme districts, legislators are generally free to vote their preferences. Because voters in those districts dislike the distribution of the non-incumbent’s party’s candidates, they will typically prefer an outlier in their own party to a random draw from the opposition. Knowing this, legislators are free to “separate,” or vote their preferences in

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4 This assumption allows us to avoid complicated contingent voting strategies. It is also plausible to think of this is a way of capturing voters’ limited memory, limited computational power, or limited ability to coordinate their vote choices.

5 While we do not give candidates the choice of which party to affiliate with in the model, it is also true that some types of candidates would want to affiliate with different parties in different districts.
equilibrium. In moderate districts, however, it is harder to be an ideological misfit. Centrist districts might well prefer a random draw from the opposition party to a known extremist. As a result, moderates can vote sincerely, but extremists must either “pool” with these moderates or vote sincerely and forego any chance at re-election. In equilibrium, the more moderate amongst these types pool, while the most extreme members vote their preferences and leave office. Thus, bad agenda realizations can unravel \textit{ex post} an \textit{ex ante} optimal decision to run for office.\footnote{In our model there are no primaries, but this result suggests a possible role for them. For example, parties may prefer a random draw from a distribution of candidates (\textit{i.e.}, new primary candidates) to a revealed extremist who might lose in a moderate district.}

We therefore identify two sources of intra-party variation in voting behavior. Because some extremists will pool with moderates in moderate districts, roll call scores will be responsive to district ideologies. And because extremists are electorally vulnerable in moderate districts, legislator types will also be responsive to district types in the long run. Importantly, since pools of challengers (both with incumbents and with an open seat) are less responsive than incumbents to district ideology, both forms of responsiveness are due more to actions in office (in the face of electoral pressures) and voter responses to them than to entry alone.

Our model suggests a number of empirical tests, and we report on one such test below. Since legislators always vote sincerely in the final period of their careers, we expect to observe changes in roll call scores just prior to retirement in districts where legislators felt pressured to vote strategically. Thus, according to our model, last-term roll call scores should become more extreme only in moderate districts. While the literature on legislative shirking has provided little evidence of systematic changes in last-term voting behavior (\textit{e.g.}, Lott and Bronars, 1993), we find significant effects by differentiating among district types.

We proceed as follows. Section 2 details the basic model. Section 3 characterizes the equilibrium and discusses the results. In Section 4 we develop some simple extensions to the model. Section 5 then presents some empirical evidence in support of our predictions. Finally, Section 6 discusses a few priorities for future work and concludes.

2. The Model

2.1. Environment and Players

Our model is an infinitely repeated game with three kinds of players: candidates, legislators, and voters. There is a continuum of constituencies or districts, each of which is
composed of a continuum of voters. In each period, each district elects a single legislator by majority rule from its set of candidates. The legislature then collectively chooses a policy from a random agenda.

Candidates in our model are either incumbent legislators seeking re-election, or challengers. We use the term “challenger” to refer to both opponents of incumbents as well as contestants in an open-seat race. All candidates must be affiliated with a political party.\textsuperscript{7} There are two parties, \( L \) and \( R \), which are both non-strategic actors. Each party \( i \) has a fixed platform \( x_i \in X \equiv [-1, 1] \), where \( x_L \leq 0 \) and \( x_L = -x_R \).\textsuperscript{8} Incumbents must repeat their previous affiliation, while challengers are generated from a set of potential challengers who choose their desired party affiliation(s).

Candidates in our model have multiple objectives, including policy and office-holding.\textsuperscript{9} They have ideal points in \( X \), and in each district, potential challengers’ ideal points are distributed uniformly on \( X \). These ideal points are private information. Election winners receive \( w > 0 \) for each victory, and zero otherwise. Each winner also receives some disutility from party membership. This cost increases with the distance between a candidate’s ideal point and the platform of her party. The cost might reflect a party’s ability to screen candidates for “ideological correctness,” or it may represent an (exogenous) explicit reward structure for collaborating with the party platform. Thus, for each victory, a party \( i \) candidate with ideal point \( z \) receives

\[
w - \alpha (x_i - z)^2
\]

upon winning office, where \( \alpha > 0 \). The parameter \( \alpha \) can be interpreted as a specification of each party’s ideological test, with higher values representing a greater ability to screen out candidates with preferences different from \( x_i \).

Upon election, candidates become legislators. In each period, each legislator is concerned with her vote in that session. For simplicity, we assume that the agenda is \( \{0, Q\} \) with probability \( \frac{1}{2} \) and \( \{0, -Q\} \) with probability \( \frac{1}{2} \), where \( Q \in (0, 1] \).\textsuperscript{10} Legislators receive pos-

\textsuperscript{7}Except in some trivial cases, the model would yield almost identical results if we also allowed candidates to run unaffiliated.

\textsuperscript{8}As will be clear below, restricting the platforms to the interval \([−1, 1]\) is not essential. The symmetric platforms assumption follows Snyder and Ting (2002), where candidates and voters have similar preferences and parties locate platforms to maximize seat share.

\textsuperscript{9}At least since Fenno (1973), congressional scholars and observers have identified a variety of different goals. See, e.g., Sinclair (1983), Deering and Smith (1997), and Bawn (1998).

\textsuperscript{10}We can view the agenda as the result of a shock to a pre-existing status quo, followed by an open amendment procedure leading to the floor median (which is 0 by the symmetry of the party platforms and equilibrium distribution of candidate types). We assume that shocks are equally likely in both directions, but this assumption is easily relaxed.
itive utility for casting sincere votes, and this utility increases in the distance between the agenda alternatives. Thus, a legislator receives positive utility if she votes against a “bad” alternative, and progressively higher utility as the “good” alternative approaches her ideal. More formally, given an ideal point $z$ and a pair of alternatives $q', q''$ where $|q' - z| \leq |q'' - z|$, that legislator receives

$$\begin{cases} 
-(q' - z)^2 + (q'' - z)^2 & \text{for voting } q' \\
(q' - z)^2 - (q'' - z)^2 & \text{for voting } q''.
\end{cases} \quad (1)$$

Following their first legislative session, legislators may retire, or become candidates of their party. We assume that legislators discount future utility by a common factor $\beta$. Legislators must retire after their second session. Retired legislators cannot become candidates in any future elections.

Voters “live” for only a single period, and wish to elect the candidate whose ideal point is closest to their own. Voter utility is quadratic, with an ideal point in $X$. Denote the median ideal point in a generic district by $y$. The distribution of district median voters has positive support on $X$, and a median at 0, so the distributions of district medians and candidate ideal points have the same median. This distribution remains constant over time. Voters also have beliefs about candidate preferences, which are updated in two ways. First, based on affiliations voters may reduce the range of possible types (ideal points) for a candidate. Let $\mu_i$ denote the posterior mean and $\sigma^2_i$ the posterior variance of the ideal points of potential candidates willing to join party $i$. The median voter’s expected utility from electing a non-incumbent from party $i$ is thus:

$$E[-(y - z)^2|i] = -(y - \mu_i)^2 - \sigma^2_i.$$ 

Second, a legislator’s voting record may reveal further information about her type. Section 3 derives the expected utilities of re-electing incumbents.

\footnote{The assumption of such position-taking preferences is common in the literature on legislative decision making, especially models of interest group politics. See for example Snyder (1991), Groseclose and Snyder (1996), Diermeier and Myerson (1999), Groseclose and Milyo (2001), and Dal-Bo (2001). These position-taking preferences may be interpreted either as intrinsic, or induced by other players. An explicit policy-maximizing utility function might appear more reasonable, but since there is a continuum of legislators, no legislator is ever pivotal. Thus, policy utility would be immaterial to legislator strategies, and many counterintuitive voting strategies could be supported in equilibrium. However, the objective assumed here is equivalent to policy maximization in the limit via a trembling argument: if any legislator were to become pivotal, then this objective would achieve her most-preferred policy outcome.}

\footnote{Similar results obtain if we allow legislators to be infinitely-lived.}

\footnote{One interpretation of this assumption is that legislators might still provide particularistic benefits to their districts, even if they are unlikely ever to be pivotal in major roll calls.}

\footnote{Most symmetric, non-convex utility functions would not change the results, but would make deriving closed-form solutions difficult.}
Note that non-incumbents can do nothing to distinguish themselves from their parties. This assumption simplifies the analysis, but is of course extreme. It may not be too unreasonable, however, for two reasons. First, survey data show that voters know much more about U.S. House incumbents than non-incumbents.\textsuperscript{15} Erikson and Wright (1980, 1989) find that “House election outcomes are visibly influenced by the positions of incumbent candidates but not those of nonincumbent candidates” (Erikson and Wright, 1980, p. 87); they also find no effects of candidates’ positions in open-seat contests. Second, as a theoretical matter it is unclear how non-incumbents could credibly convey more information to voters. Since they cannot commit to particular actions in office, any campaign announcements would amount only to “cheap talk” in our game.

2.2. Sequence

In each period, the moves within each district are as follows.

1. \textit{Candidate Nomination Bids}. All potential challengers simultaneously choose which party label or labels ($R$, $L$) they would accept if offered a nomination. Voters do not observe these choices.

2. \textit{Candidate Selection}. For each party with no incumbent, Nature randomly draws a candidate from the set of those who would accept that party’s nomination (if the set is non-empty).\textsuperscript{16}

3. \textit{Election Voting}. Voters choose their representative by majority rule.

4. \textit{Legislative Agenda-Setting}. Nature selects an agenda \{0, $Q$\} or \{0, $-Q$\}, each with probability $\frac{1}{2}$.

5. \textit{Legislative Voting}. Legislators choose a policy $q$ from the agenda by majority rule.

6. \textit{Legislative Turnover}. Legislators who were in office for two periods retire. Legislators who were in office for one period choose either to retire or to run as incumbents in the

\textsuperscript{15}Mann and Wolfinger (1980) report that 93% of respondents in 1978 could recognize and rate their House incumbent, but only 44% could recognize and rate the challenger. Krasno (1994) reports that only 58% of respondents in 1988 could recognize the House challenger’s name, while 92% could recognize the incumbent. Examining the entire period 1978-2000, we find that respondents could place their House incumbents on the 7-point liberal/conservative scale more than twice as often as they could place the challenger.

\textsuperscript{16}The inability of parties to observe the ideal points of potential challengers makes the selection process equivalent to one of randomizing among the set of willing candidates. Under the assumptions made in the model, this set is always non-empty, and thus candidates are found with probability one. A variety of selection mechanisms produce the same results.
following period.

It will be convenient to refer to steps (1)-(3) as the election stage, and steps (4)-(6) as the legislative stage.

2.3. Solution Concept

We derive a perfect Bayesian equilibrium for this game, and use some minor refinements. This solution concept requires that all players choose optimally given their beliefs and other players’ strategies, and that beliefs be consistent with these choices. Multiple equilibria may exist, but when they do they are all qualitatively similar. We therefore focus on the simplest and perhaps most intuitive one, which we term maximally sincere. In this equilibrium, legislators vote sincerely to the maximum extent possible.\footnote{These equilibria are optimal for the set of legislators in any given period.}

Strategies in the game are then described by the following elements in each district over all periods \( t \). We conserve on notation by eliminating explicit references to districts (where possible) and time periods. Since only party affiliates can be relevant to the equilibrium, we also eliminate references to potential challengers who do not affiliate. Let \( H_{c,t} \) be the set of possible histories of affiliations, election outcomes, agendas, legislative votes, and retirements through period \( t - 1 \). In the election stage, each potential challenger submits a nomination bid \( d_t : H_{c,t} \to \{L, \emptyset\} \times \{R, \emptyset\} \) identifying the parties she is willing to join. (Incumbents run for re-election under their previous party label.) When voters vote they have the same information as potential candidates, plus the affiliation decisions made in period \( t \); thus, let \( H_{v,t} \) be the union of \( H_{c,t} \) with the set of feasible affiliations in \( t \). Voters use the affiliation choices and possibly roll call records, plus Bayes’ Rule, to form beliefs \( b_{L,t} : H_{v,t} \to B(X) \) and \( b_{R,t} : H_{v,t} \to B(X) \) about the intervals in which each candidate’s ideal point lies.\footnote{We denote voters’ beliefs simply with intervals (more generally, Borel \( \sigma \)-algebras on \( X \)) because the prior distributions of challengers are uniform. More complicated distributions yield more complicated beliefs, but typically qualitatively similar outcomes.} Voters then cast election votes, \( e_t : H_{v,t} \to \{L, R\} \) on the basis of their updated beliefs.

In the legislative stage, all legislators cast a legislative vote \( v_t : H_{l,t} \to \{-Q, 0, Q\} \) on the agenda selected by Nature, where \( H_{l,t} \) is the union of \( H_{v,t} \) with the set of possible period \( t \) election votes and agendas. Finally, first-term legislators make a retirement choice \( r_t : H_{r,t} \to \{retire, run\} \), where \( H_{r,t} \) is the union of \( H_{l,t} \) with the set of possible period \( t \) legislative votes.

We close the model by specifying out-of-equilibrium beliefs in the following two situations. First, if a legislator casts an out of equilibrium vote, then voters assess that the legislator is
drawn uniformly from the intersection of the set of types who would affiliate with the party and the set of types that would have cast that vote sincerely. If this intersection is empty, then she is simply assumed to be drawn uniformly from the set of types that would have cast that vote sincerely. For example, if a legislator votes for \(-Q\) over 0 out of equilibrium and the party does not have any members in \([-1, -\frac{Q}{2}]\), voters infer that her ideal point is distributed according to \(U[-1, -\frac{Q}{2}]\). Second, if a legislator runs for re-election out of equilibrium, then voters do not update their beliefs about her type. Such candidates would simply lose their re-election bids. This refinement captures the idea that voting and affiliation decisions err on the side of sincerity.

Finally, we make five tie-breaking assumptions to simplify the analysis, all of which are either standard or innocuous. First, as is typical in models with a continuum of voters, citizens vote as if they are pivotal. Second, incumbents who are indifferent between running in an upcoming election and retiring run only if they expect to win.\(^{19}\) Third, potential challengers who are indifferent between running and not running run only if they would receive non-negative utility from winning office. Fourth, ties between candidates are resolved in favor of party \(R\). Finally, ties between agenda alternatives are resolved in favor of 0.

3. Equilibrium

We discuss in turn the strategies of candidates, voters, and legislators. In addition to following the sequence of each period of play, this will allow us to focus the discussion initially on a single, generic period and a single, generic district with median voter located at \(y\).

3.1. Candidate Incentives

We begin by deriving the set of candidates who are willing to run for office under either party label in equilibrium. Using (1), a legislator with ideal point \(z\) receives the following policy utility for each possible agenda and vote:

\[
\begin{align*}
\left\{ \\
-Q^2 + 2Qz & \quad \text{for voting } Q \text{ over } 0 \\
Q^2 - 2Qz & \quad \text{for voting } 0 \text{ over } Q \\
-Q^2 - 2Qz & \quad \text{for voting } -Q \text{ over } 0 \\
Q^2 + 2Qz & \quad \text{for voting } 0 \text{ over } -Q
\end{align*}
\]

Suppose initially that legislators vote sincerely over whatever agenda appears. Clearly, there are three types of sincere voting records. Using (1), the expected utility from a single period

\(^{19}\)This assumption is also consistent with the presence of a primary system that is effective at defeating unelectable incumbents.
of sincere voting for each type is then:
\[ \pi(z) = \begin{cases} 
-2Qz & \text{if } z < -\frac{Q}{2} \\
Q^2 & \text{if } z \in \left[-\frac{Q}{2}, \frac{Q}{2}\right] \\
2Qz & \text{if } z > \frac{Q}{2} 
\end{cases} \]

Type (i) legislators always wish to vote “left” (i.e., $-Q$ over 0 and 0 over $Q$). Similarly, type (iii) legislators always wish to vote “right” (i.e., $Q$ over 0 and 0 over $-Q$). Finally, type (ii) legislators always wish to vote for the centrist alternative, 0. We will refer to these classes of candidate types as leftists, rightists, and moderates, respectively.

A candidate will then be willing to enter and vote sincerely for a single period if:
\[ w - \alpha(x_i - z)^2 + \pi(z) \geq 0. \] (2)

Thus potential candidates who are sufficiently close to a party’s platform will be willing to run under its label, even if doing so results in losing a re-election bid (or retirement). As a result, each party in each district will find a willing candidate with probability one.

Let $Z_i$ denote the set of types willing to affiliate with party $i$, with $\bar{z}_i$ and $\underline{z}_i$ representing its maximal and minimal elements, respectively. The following comment establishes basic properties of candidate types for each party.

**Comment 1.** Characterization of $Z_i$.

\[ \bar{z}_R = -\underline{z}_L = \begin{cases} 
\min\left\{x_R + \frac{Q}{\alpha} + \sqrt{\frac{Q^2}{\alpha^2} + \frac{w + 2Qx_R}{\alpha}}, 1\right\} & \text{if } x_R > \frac{Q}{2} \text{ or } w > \alpha(x_R - \frac{Q}{2})^2 - Q^2 \\
x_R + \sqrt{\frac{w + Q^2}{\alpha}} & \text{otherwise.}
\end{cases} \]
\[ \underline{z}_R = -\bar{z}_L = \begin{cases} 
x_R + \frac{Q}{\alpha} - \sqrt{\frac{Q^2}{\alpha^2} + \frac{w + 2Qx_R}{\alpha}} & \text{if } x_R > \frac{Q}{2} \text{ and } w < \alpha(x_R - \frac{Q}{2})^2 - Q^2 \\
\max\left\{x_R - \frac{Q}{\alpha} - \sqrt{\frac{Q^2}{\alpha^2} + \frac{w - 2Qx_R}{\alpha}}, -1\right\} & \text{if } w > \alpha(x_R + \frac{Q}{2})^2 - Q^2 \\
x_R - \sqrt{\frac{w + Q^2}{\alpha}} & \text{otherwise.}
\end{cases} \]

**Proof.** Proofs of all comments and propositions are in the Appendix.

This result usefully shows that even in a repeated setting, the set of candidates willing to affiliate with each party is identical to the set of candidates willing to join that party, achieve office, vote sincerely, and retire in a single period. Clearly, the willingness to join for only a single period is sufficient for ensuring that a candidate will join a party. It is necessary as well because voting sincerely maximizes a legislator’s payoff in a given period. The location
of these sets depends on \( w \) and \( x_R \). For example, if \( x_R > \frac{Q}{2} \) or \( w \) is sufficiently large, then \( \bar{z}_R \) is high, which means that party \( R \) will attract rightists. Sufficiently large values of \( w \) will also attract moderates, and perhaps even leftists.

To simplify matters, we rule out the case in which \( \bar{z}_R \leq -\frac{Q}{2} \) (equivalently, \( w \leq \alpha(x_R + \frac{Q}{2})^2 - Q^2 \)). Party \( R \) will not include any leftists, and party \( L \) will not have rightists. This is a sensible restriction because it allows party memberships to be at least minimally responsive to their platform positions, while leaving open the possibility that the parties may include types that have incentives to vote differently. This assumption is easily relaxed, and doing so produces more complex but qualitatively similar equilibrium behavior.

### 3.2. Voter Incentives

Now consider the competition between two candidates in the election stage. While no citizen can be pivotal, each votes as if she were pivotal and votes for the nearest candidate in expectation.\(^{20}\) There are two cases. In the first, there are no incumbents, and hence no voting records. Voters’ beliefs about candidate positions are formed exclusively through affiliation choices. Because the ideal points of potential challengers are distributed uniformly, voters assess that party \( i \)'s candidates have mean \( \mu_i = \frac{\bar{z}_i + \bar{z}_R}{2} \) and variance \( \sigma_i^2 = \frac{(\bar{z}_i - \bar{z}_R)^2}{12} \). A district’s median voter then prefers the party \( R \) candidate if:

\[
-(y - \mu_L)^2 - \sigma_L^2 \leq -(y - \mu_R)^2 - \sigma_R^2. \tag{3}
\]

Exploiting the symmetry of the party platforms, it is then straightforward to derive the standard result that in the absence of superior information about candidate preferences, districts will vote for the “closer” party.

**Comment 2.** In an open-seat election, the party \( R \) candidates wins if and only if \( y \geq 0 \). \( \blacksquare \)

Comment 2 also implies that after the first election (where all races are open-seat), party \( R \) legislators will occupy districts where \( y \geq 0 \), and party \( L \) legislators will occupy districts where \( y < 0 \). Within each party \( i \), the ideal points of legislators will be undifferentiated across districts, drawn uniformly from \( Z_i \).

In the second case, the district is occupied by an incumbent. For convenience, denote by \( v_i \) a generic voting record by a party \( i \) candidate (this record will be empty for non-incumbents). Let \( \mu_i(v_i) = E[z|v_i] \) and \( \sigma_i^2(v_i) = Var[z|v_i] \) be the posterior mean and variance of a party \( i \) incumbent’s ideal point (based on \( v_i \)), respectively. Without loss of generality, let the

\(^{20}\)This is the only strategy that can be supported in a Strong Nash equilibrium.
incumbent belong to party $R$. When $\mu_R(v_R) > \mu_L$ (as is typically the case), the incumbent defeats a party $L$ challenger if:

$$y \geq \frac{1}{2} \left[ \mu_L + \mu_R(v_R) + \frac{\sigma^2_L - \sigma^2_R(v_R)}{\mu_L - \mu_R(v_R)} \right].$$

(4)

A voting record can have two effects. It may reduce voter uncertainty by reducing the posterior variance of an incumbent’s ideal policy. If $\sigma^2_R(v_R) < \sigma^2_L = \sigma^2_R$, then the last term of (4) is negative, and the set of voters who would prefer her to a party $L$ challenger expands. It may also shift the posterior mean of the incumbent’s ideal policy. Legislators may then have incentives to “tailor” their voting records to their district types, balancing their desire to vote sincerely with the need to remain an acceptable candidate for re-election.

In particular, we are interested in determining the set of districts that would re-elect rightist incumbents who vote sincerely for $Q$ over 0, given that non-rightists vote for 0 over $Q$. In this case voters assess that the incumbent’s ideal point must lie in the interval $(\max\{\frac{Q}{2}, \tilde{z}_R\}, \tilde{z}_R)$. Substituting into (4), it is straightforward to obtain the following cutline $\tilde{y}$, at which a voter is indifferent between the rightist incumbent and a random draw from party $L$’s candidate pool:

$$\tilde{y} = \begin{cases} 
\frac{(Q + \tilde{z}_R)^2 - (2\tilde{z}_R + \tilde{z}_R)^2}{6(4\tilde{z}_R + 2\tilde{z}_R + Q)} & \text{if } \tilde{z}_R < \frac{Q}{2} \\
0 & \text{if } \tilde{z}_R \geq \frac{Q}{2}.
\end{cases}$$

(5)

Thus, a district will re-elect a rightist who votes sincerely on the $\{0, Q\}$ agenda if and only if $y \geq \tilde{y}$. Note that $\tilde{y} > 0$ when $\tilde{z}_R < \frac{Q}{2}$, so centrist districts will prefer party $L$ candidates to rightists because the variance reduction offered by rightists does not offset the loss from the rightward shift in the candidate’s mean. If $\tilde{z}_R \geq \frac{Q}{2}$, then there are no moderates in either party. In this case, sincere votes by rightists do not convey information, and Comment 2 applies.

3.3. Legislator Incentives

With this information, we may characterize optimal legislator strategies and complete the equilibrium. Legislators’ voting incentives depend on whether they are eligible for re-election in the next period. In their second session, legislators clearly will vote sincerely over whatever agenda arises. In their first session, however, they must consider the electoral consequences of the information conveyed by their vote. For this reason, $\tilde{y}$ plays an important role. In any district where $y < \tilde{y}$, rightist legislators cannot win re-election by voting sincerely (i.e.,

\footnote{If $\mu_R(v_R) < \mu_L$, then the party $R$ incumbent wins if $y \leq \frac{1}{2} \left[ \mu_L + \mu_R(v_R) + \frac{\sigma^2_L - \sigma^2_R(v_R)}{\mu_L - \mu_R(v_R)} \right]$.

15
These legislators may vote $Q$, receive a payoff of $2Qz - Q^2$ and retire, or they may vote 0 and thereby “pool” with the moderates. The latter gives a rightist legislator a negative payoff in the current period, but also the prospect of re-election and the ability to vote sincerely in her final session. If pooling results in re-election with certainty, then a rightist legislator will do so if:

$$2Qz - Q^2 \leq Q^2 - 2Qz + \beta[2Qz + w - \alpha(x_R - z)^2].$$

(6)

From this expression it is easy to derive two properties of the set of pooling legislators. First, there is a cutline $\tilde{z} \in [\frac{Q}{2}, z_R)$ such that all rightists for whom $z > \tilde{z}$ will vote sincerely and retire, rather than pool and run for re-election. To see this, note that by Comment 1, $2Qz + w - \alpha(x_R - z)^2 \geq 0$ for all party $R$ rightists and $2Q\tilde{z}_R + w - \alpha(x_R - \tilde{z}_R)^2 = 0$. Thus for any $\beta$, (6) holds at $z = \frac{Q}{2}$ but not at $z = \tilde{z}_R$. Second, the set of non-pooling legislator types, which we call extreme rightists, is non-increasing in $\beta$. Note that if $\beta = 0$, then future payoffs don’t matter: $\tilde{z} = \frac{Q}{2}$ and all legislators simply vote sincerely. As $\beta$ increases, the expected utility from pooling strictly increases for all types, and thus $\tilde{z}$ cannot decrease.

Note however that for any $\beta$, there will always be extreme rightists, as $\tilde{z} < \tilde{z}_R$.

It is worth noting here the role played by the maximal sincerity criterion. Without it, there exist ranges of districts with ideal points $[\tilde{y}, \tilde{y}']$ and $[-\tilde{y}', -\tilde{y}]$ where either type of legislator behavior is sustainable in equilibrium. That is, rightists (and leftists) may vote sincerely under all circumstances, or pool with moderates and retire in the aforementioned manner. Such equilibria are not unique and are slightly more cumbersome analytically, but as will be clear in the subsequent discussion, they would not substantially alter our conclusions.

### 3.4. Equilibrium Characterization and Discussion

The preceding observations and comments, coupled with some minor results, characterize the maximally sincere equilibrium of the game. The following proposition formalizes this result. The full characterization of the equilibrium can be found in the Appendix.

**Proposition.** The maximally sincere equilibrium strategies of this game, in each period $t$ and in each district, are as follows.

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22 Recall, if all party $R$ members are rightists, then $\tilde{y} = 0$ and all rightists can vote sincerely.

23 The value $\tilde{z}$ satisfying the expression with equality defines the cutline. In closed form, $\tilde{z} = x_R + \frac{Q}{\alpha}(1 - \frac{\tilde{z}}{2}) + \sqrt{Q^2(2-\beta)^2 - \alpha\beta(2Qx_R - 2Q\tilde{z}_R + 2Q^2 + \beta w)}$.

24 The cutline $\tilde{y}'$ is defined by the district whose median voter is indifferent between extreme rightists and a random draw from party $L$. 

---
For a potential challenger with ideal point $z$:

$$d_i^* = \begin{cases} i & \text{if } z \in Z_i \\ \emptyset & \text{otherwise}. \end{cases}$$

For a voter with ideal point $y'$ facing candidates with voting records $v_L$ and $v_R$:

$$b_{R,t}^* = \begin{cases} Z_R & \text{if } v_R = \emptyset, y \geq \bar{y}, \text{or } y < \bar{y} \text{ and the } t-1 \text{ agenda was } \{0, -Q\} \\
[\bar{z}_R, \tilde{z}] & \text{if } y < \bar{y}, \text{ the } t-1 \text{ agenda was } \{0, Q\}, \text{ and } v_{t-1} = 0 \\
[\bar{z}, \tilde{z}_R] & \text{otherwise.} \end{cases}$$

$$b_{L,t}^* = \begin{cases} Z_L & \text{if } v_L = \emptyset, y \leq -\bar{y}, \text{ or } y > -\bar{y} \text{ and the } t-1 \text{ agenda was } \{0, Q\} \\
[-\bar{z}, \tilde{z}_L] & \text{if } y > -\bar{y}, \text{ the } t-1 \text{ agenda was } \{0, -Q\}, \text{ and } v_{t-1} = 0 \\
[\bar{z}_L, -\bar{z}] & \text{otherwise.} \end{cases}$$

$$e_t^* = \begin{cases} R & \text{if } 2y'(\mu_R(v_R) - \mu_L(v_L)) \geq \mu_R(v_R)^2 - \mu_L(v_L)^2 + \sigma_R^2(v_R) - \sigma_L^2(v_L) \\
L & \text{otherwise.} \end{cases}$$

For a first-term legislator with ideal point $z$ in a district with median voter located at $y$:

$$v_t^* = \begin{cases} Q & \text{if the agenda is } \{0, Q\}, \text{ and if } z > \frac{Q}{2} \text{ and } y \geq \bar{y}, \text{ or } z > \tilde{z} \text{ and } y < \bar{y} \\
-Q & \text{if the agenda is } \{0, -Q\}, \text{ and if } z < -\frac{Q}{2} \text{ and } y < -\bar{y}, \text{ or } z < -\tilde{z} \text{ and } y \geq -\bar{y} \\
0 & \text{otherwise.} \end{cases}$$

For a second-term legislator with ideal point $z$:

$$v_t^* = \begin{cases} Q & \text{if the agenda is } \{0, Q\} \text{ and } z > \frac{Q}{2} \\
-Q & \text{if the agenda is } \{0, -Q\} \text{ and } z < -\frac{Q}{2} \\
0 & \text{otherwise.} \end{cases}$$

For a first-term legislator with ideal point $z$ in a district with median voter located at $y$:

$$r_t^* = \begin{cases} \text{retire} & \text{if } |y| < \bar{y} \text{ and } |z| > \tilde{z} \\
\text{run} & \text{otherwise.} \end{cases}$$

As a result of this voting behavior, incumbents are never defeated, and open-seat races always go to the nearest party. Consequently, the configuration of parties over districts remains stable after period 1—party $R$ legislators represent districts where $y \geq 0$, and party $L$ legislators represent the rest. However, the voting behavior which sustains this configuration can vary considerably within each party. Depending on the party platforms and the benefits of office-holding, two types of legislator voting behaviors are possible. In the first, parties are homogeneous: $Z_R \subseteq [\frac{Q}{2}, 1]$ or $Z_R \subseteq [-\frac{Q}{2}, \frac{Q}{2}]$ (and, by symmetry, $Z_L \subseteq [-1, -\frac{Q}{2}]$ or
$Z_L \subseteq [-\frac{Q}{2}, \frac{Q}{2}]$. All legislators within each party thus wish to cast the same sincere votes. These sincere votes do not convey any information beyond party affiliation, and thus all legislators are safe from re-election challenges. Legislators thus all last for two terms, and Comment 2 describes every election.

In the second case, parties are heterogeneous: $\bar{z}_R > \frac{Q}{2}$ and $\bar{z}_R \in [-\frac{Q}{2}, \frac{Q}{2}]$. Here outcomes depend on the agenda. When the agenda is $\{0, -Q\}$, all party $R$ legislators wish to vote for 0. Thus, the vote reveals no information and first-time legislators can successfully run for re-election. When the agenda is $\{0, Q\}$, all legislators can vote sincerely and win re-election only in extreme districts ($y \geq \tilde{y}$). Here, rightists vote for $Q$, and reveal themselves to be particularly well-suited for their districts, while moderates voting for 0 still present a better alternative to the district than a random draw from party $L$’s distribution of candidates. In moderate districts, however, rightists who reveal themselves cannot win re-election. Extreme rightists will vote sincerely and retire, while more moderate rightists ($z \leq \bar{z}$) will instead pool with the moderates and vote for 0. The following figure illustrates the distributions of legislator types and voting records by district.

[Figure 3 about here.]

Thus, when party memberships are heterogeneous, legislator behavior will vary according to district type. Focusing again on districts where $y \geq 0$, we can quantify these variations in two ways. First, legislator types will be responsive to district ideology in the long run. While the set of party $R$ legislators elected at $t = 1$ is uniform over $Z_R$, in subsequent elections career incentives select against extreme rightists in moderate districts.

Comment 3. For $\beta > 0$ and $\bar{z}_R < \frac{Q}{2}$, the long-run probability that an extreme rightist represents a district where $y < \tilde{y}$ is less than the probability that such a candidate represents party $R$ in an open-seat election.

This result is a direct and intuitive consequence of the retirement of extremists. Since no extremist survives in office for two periods, while non-extremists all do, the latter will be disproportionately likely to represent moderate districts in the long run.

Second, roll call votes will also be responsive to district types, both in the aggregate and for particular legislator types. To see this, it will be convenient to define a simple “roll call score” for each agenda. We assign a score of 1 for a vote for the “right” agenda items (i.e., $Q$ over 0, or 0 over $-Q$), and 0 otherwise. Combining the expected probabilities of each
legislator type derived in the proof of Comment 3 with the legislators’ equilibrium voting strategies, the expected roll call score of party $R$ legislators is:

$$\begin{cases} 
\frac{2\tilde{z}_R - Q/2 + \tilde{z} - 2\tilde{z}_R}{2(\tilde{z}_R + \tilde{z} - 2\tilde{z}_R)} & \text{for } y < \tilde{y} \\
\frac{2\tilde{z}_R - Q/2 - \tilde{z}_R}{2(\tilde{z}_R - \tilde{z}_R)} & \text{for } y \geq \tilde{y}.
\end{cases}$$

Figure 4 plots this relationship across all districts.

Except in the degenerate case where $\tilde{z} = \tilde{z}_R$ (which occurs when $\beta = 0$ or $\tilde{z}_R = \frac{Q}{2}$), extreme districts will produce strictly higher roll call scores than their more left-leaning counterparts. As Section 3.3 showed, however, this effect is due not simply to the selection of types due to retirements, but also to changes in voting behavior among legislators of the same type. Some types vote identically regardless of their district: all legislators for which $z \leq \frac{Q}{2}$ generate expected roll call scores of $\frac{1}{2}$, and all legislators for which $z > \tilde{z}$ generate scores of 1. But legislators for whom $z \in (\frac{Q}{2}, \tilde{z}]$ generate expected roll call scores of $\frac{1}{2}$ in districts where $y < \tilde{y}$, and 1 in more rightist districts. Thus identical types of legislators may vote differently depending on the kind of district they occupy. And identical roll calls will convey different information to voters, depending on the district type.

4. An Extension: Imperfect Revelation of Roll-Call Records

The model can be generalized easily to address variations in the probability that a legislator’s voting record is revealed. This is a natural extension, as it allows us to examine the impact of the salience of the legislative agenda (or, alternatively, the level of media coverage) across legislative sessions.

We now assume that Nature reveals legislators’ roll call records in each period with probability $p$. When incumbents’ votes are not revealed, voters effectively perceive the election to be an open-seat contest. Two facts simplify the analysis considerably. First, it is easily verified that $p$ does not affect Comment 1, and therefore $Z_L$ and $Z_R$ remain unchanged. Second, since we continue to focus on maximally sincere equilibria, the set of districts that would re-elect a revealed rightist (characterized by $\tilde{y}$) also remains unchanged. Consequently, as in Section 3.3, this analysis only applies if $\tilde{y} > 0$, or alternately, if party $R$ includes both moderates and rightists.
Variations in $p$ do matter, however, for voting behavior in moderate districts. First-term rightists facing a $\{0, Q\}$ agenda in districts where $y < \tilde{y}$ may now successfully vote sincerely and win re-election. Rewriting (6), rightists will now pool if:

$$2Qz - Q^2 + (1-p)\beta[2Qz+w-\alpha(x_R-z)^2] \leq Q^2 - 2Qz + \beta[2Qz+w-\alpha(x_R-z)^2].$$

(7)

Simplifying and carrying out the same analysis as that in Section 3.3, there is again a cutline $\tilde{z}(p)$ separating extreme rightists from poolers. Its properties are characterized by the following comment. As intuition suggests, they are virtually identical to those of $\tilde{z}$.

Comment 4. There exists a type $\tilde{z}(p) \in [\frac{Q}{2}, \tilde{z}_R)$ such that a first-term legislator with ideal point $z$ in a district where $y < \tilde{y}$ votes for $Q$ over 0 if and only if $z > \tilde{z}(p)$, and $\tilde{z}(p)$ is increasing in $p$ and $\beta$. ■

This result generalizes the equilibrium characterized in Section 3. As the probability that voting is revealed increases, the set of legislators who pool expands. Changes in the discount factor have an identical effect. In the extreme cases where $p = 0$ or $\beta = 0$, all legislator types vote sincerely over all agendas in equilibrium. For all values of $p$ and $\beta$, however, the set of sincere-voting legislators is non-empty.

We note finally that this extension may be modified trivially to capture within-session variations as well. That is, since $p$ only affects voting on a district-by-district basis, we would observe the same effects by allowing it to vary across districts. Thus legislators in districts with lower levels of media coverage might be expected to produce more extreme (sincere), and hence less responsive, voting records in expectation.

5. An Empirical Test: Last-Period Effects on Roll-Call Voting

The model above predicts that when parties are at least somewhat heterogeneous, certain types of legislators in certain types of districts will vote differently in their first and second terms. Specifically, legislators with relatively extreme preferences who end up representing moderate districts will sometimes vote insincerely in their first term, pooling with moderates, in order to generate roll call voting records that better reflect the preferences of their constituents. These legislators will vote sincerely in their second term, however, when they know they are going to retire. On the other hand, we expect little or no first-term insincere voting in ideologically extreme districts, either by extremist or moderate legislators, since
the incumbents that end up representing these districts in equilibrium never need to vote insincerely in order to win re-election.  

We can construct tests of these predictions using data from the U.S. House of Representatives. We divide the set of districts into four categories: Safe Democratic, Marginal Democratic, Safe Republican, and Marginal Republican. The predictions can then be restated as follows: (i) In Marginal Democratic districts, Democratic representatives will vote in a more liberal fashion in their last term than in earlier years. (ii) In Marginal Republican districts, Republican representatives will vote in a more conservative fashion in their last term than in earlier years. (iii) In Safe Democratic and Safe Republican districts, representatives will not vote differently in their last term than in earlier years.

There is a large literature on legislative “shirking” which similarly examines last-period effects on roll call voting (e.g., Lott 1987; Lott and Bronars, 1993; Poole and Romer, 1993; Rothenberg and Sanders, 2000). Without exception, these papers average across all districts. They do not look for different effects in different types of districts. Typically, these papers report very small effects that are often statistically indistinguishable from zero.

Our test compares the roll call voting score of representatives in their last year with their average score in previous years. We do this by running regressions for each party that include member-specific fixed-effects, year fixed-effects, and two dummy variables: Retiring, Marginal District, and Retiring, Safe District. Roll call voting scores for each party are re-oriented so that a higher score represents a more extremist position (i.e., more liberal for Democrats, more conservative for Republicans). We then expect the estimated coefficient for the Retiring, Marginal District dummy to be positive and significantly different from zero, and the estimated coefficient for the Retiring, Safe District dummy not to be significantly different from zero. Or, at least, we expect the coefficient on the Retiring, Marginal District dummy to be significantly larger than the coefficient on the Retiring, Safe District dummy.

To keep the sample as clean as possible, we examine last-term effects only for representa-

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25 As noted above, this abstracts from primary elections. In a world with primaries, it might be necessary for moderate legislators in extremist districts to vote insincerely in an extremist fashion, in order to deter a primary challenge.

26 Rothenberg and Sanders (2000) report statistically significant but very small effects.

27 Our specification is similar to those of the previous studies on last-term shirking cited above. We also tried including a measure of district partisanship, to capture changes due to redistricting. This variable was never significant and did not affect the other coefficients.

28 Another potential problem is that the decision to retire may be endogenous. Previous studies on shirking side-step this issue, and we do as well. Two possible instrumental variables are age and health. Age and health have large and direct effects on the probability of retirement, but might not have much of a direct effect on roll call voting liberalness. We leave this for future work.
tives who left the House by an “ordinary” retirement into private life. Representatives who lost in their re-election bids (primary or general), ran for higher office, accepted an appointed government post, resigned under pressure, or died in office, are omitted in their last year.\footnote{We do include these members in the congresses prior to their last term, in order to estimate more accurately the year fixed-effects. If we also include the observations for the last terms for these members, along with dummy variables for each of the different types of departure, the estimates for the retirement dummies are virtually unchanged.}

We study the 91st-105th Congresses (1969-1999). We begin in the 91st Congress for two reasons. First, we want to be relatively confident that the roll call voting scores we construct represent approximately the same liberal-conservative ideological/issue dimension over the whole period studied. The upheaval of the 1960s due to civil rights, Vietnam and other issues, while not constituting a full-scale realignment, might have tilted the main axes of partisan and ideological conflict. For example, Poole and Rosenthal find a noticeable “perturbation” of the estimated roll call space due to civil rights, which peaked in the 1960s (Poole and Rosenthal, 1997, page 114). The roll call scores we use also show a bit of a “break” during the 1960s. For example, the correlation between the scores of the 91st Congress (1969-1970) and those of the 88th Congress (1963-64) is only .82; this compares to a typical non-1960s correlation for the postwar period of around .95. Second, we do not want large changes in members’ career expectations to confound our results. The incumbency advantage in the vote increased sharply during the 1960s, and this growth might have been due in part to changing preferences about the advantages of House service. In any case it would have sharply changed many members’ expectations about the possibility of having a long career in the House. There was a steady increase in the mean tenure of members of the House over the 20th century, which stopped by around 1970 (possibly earlier). We end in the 105th Congress because we do not yet have the roll call data for the 106th Congress.

To define the retirement variable, we use ICPSR and McKibbin (1993), augmented with data from \textit{Congressional Quarterly Weekly Reports}. To define the district types, we use district-level presidential voting data. Marginal Democratic districts are those for which the average Democratic percentage of presidential vote was less than the median value, and Marginal Republican districts are those for which the average Democratic percentage of presidential vote was greater than the median value.\footnote{For the 1970’s districts, we average across the presidential elections of 1972, 1976 and 1980; for the 1980’s districts, we average across the elections of 1980, 1984 and 1988; and for the 1990’s districts, we average across the elections of 1992 and 1996.} To define the roll call scores for each congress, we apply the linear probabilistic voting model described in Heckman and Snyder.
We use all non-unanimous roll calls in each congress, and take the estimated first dimension (factor) scores. We normalize by setting the range of scores to [0, 1] in each congress. The roll call data are from ICPSR #00004 (ICPSR and Congressional Quarterly, 1998) and the Clerk of the House. Table 1 presents the results (we do not report the year dummies and member-specific dummies). The table has two sections, one for the entire sample and one for a more recent subsample that considers the “post-reform” era of heightened intra-party cohesion and inter-party conflict (Rohde 1991). Columns 1 and 3 do not distinguish between Marginal and Safe districts, but include only a single retirement dummy. We show these to compare our results with those of the previously-mentioned studies on shirking. As in those analyses, we find small (and sometimes insignificant) coefficients on the retirement dummy.

Columns 2 and 4 show how different the estimates are when we distinguish between Marginal and Safe districts. Retiring Democrats in Marginal districts move about .038-.048 points to the left in their last congress, and retiring Republicans in Marginal districts move about .048-.057 points to the right. In both parties, members retiring from Safe districts vote no differently in their last term than in previous congresses. For both parties, we can overwhelmingly reject the hypothesis that the last-term effects are the same in Marginal and Safe districts (see the last row in each half of the table).

The estimated retirement effects are not massive, but they are not trivial either. For Democrats, the standard deviation of roll call scores ranges from .11 to .26 in our sample, and the average standard deviation is about .17. A shift of .043 points therefore represents nearly one-fourth of a standard deviation. Another way to get a sense of the magnitude of the effect is to ask how many members a retiring Democrat passes in his or her last-period move to the left—that is, what happens to the member’s rank on the left-right voting scale. For the more recent (98th-105th) congresses, a member starting at the party mean and moving .043 points to the left would jump over roughly 10-14% of the Democratic delegation.

The roll call scores of Republicans are more homogeneous than Democrats, so the retirement shifts are even more significant. For Republicans, the standard deviation of roll call scores ranges from .06 to .17 in our sample, and the average standard deviation is about .14. The implied retirement shift of .049 points therefore represents a sizable move. In terms of rank changes, a member who begins at the party mean and moves .049 points to the right

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31 Using the Poole-Rosenthal NOMINATE scores produces similar results.

32 The year fixed-effects control for mean shifts in the roll call scale that occur across congresses (see Groseclose et al. 1999). We do not directly control for the “stretching” that can also occur across congresses, but that is typically less of a problem than shifting means.
will jump over about 15-25% of the Republicans.

6. Discussion and Conclusions

We have developed a model that links candidate and legislator strategies with voter information. In equilibrium, three critical features of legislative elections are captured. First, parties can play vital roles as informational shortcuts across districts. In many situations, the ability (or good fortune) to sort oneself into the correct party is all that a candidate needs to do to win an election. Second, incumbents are to some degree distinct from parties, and may refine their “message” by actions taken while in office. These strategies can take different forms as they attempt to tailor their records to their districts. Third, the very nature of collective decision-making implies that candidates will not be able to choose their messages optimally. Legislators who are ill-suited for their districts may find themselves trapped between voting one’s preferences and re-election concerns. Such conflicts may be resolved in both ways in equilibrium.

Our model can account for the inter- and intra-party variations observed in Figures 1 and 2 above, at least qualitatively. As our analysis of roll call voting and congressional retirements demonstrates, the model also provides a basis for generating additional hypotheses linking party labels, legislative agendas, voter information, district type, and roll call votes.

Some of the most immediate extensions of the model will expand on the stylized agenda structure assumed here. For instance, with more complex agendas, legislators could compile richer roll call records, and they could rely much more on these records to communicate their preferences to voters. More importantly, however, the agendas need to be endogenized. Because of the difficulty that candidates face in communicating with large electorates, information about Congressional behavior is critical to individual legislators. And since agendas are so central to the information received by voters, we should expect them to be chosen as strategically as the roll call votes themselves.

Ultimately, we believe that the most important extension to the model is to endogenize the party itself. Rather than being left exogenous, key features of the party should be subject to the collective choice of their members. One relatively simple way to do this is by making parameters such as $\alpha$ democratically selected. Party members might choose stricter “discipline” because doing so would increase the information conveyed by their label, or looser discipline to avoid being confined to safe but small segments of the electorate. Second, parties might be able to engage in some internal resource allocation, perhaps by rewarding those who vote with the majority of the party. In this case it may be possible to maintain
the informational properties of parties and roll call votes exclusively through self-selection into voting blocs, and without explicit platforms.
Proof of Comment 1. Consider a moderate potential challenger (i.e., $z \in [-Q_2, Q_2]$). If she is elected and votes sincerely in the legislative stage, she will receive $w - \alpha (x_i - z)^2 + Q^2$ in her first legislative session. Suppose $w - \alpha (x_i - z)^2 + Q^2 \geq 0$. Solving for $z$, if $z \in [x_i - \sqrt{w + Q^2 \over \alpha}, x_i + \sqrt{w + Q^2 \over \alpha}] \cap [-Q_2, Q_2]$, the candidate receives non-negative utility by voting sincerely and retiring, and is therefore willing to enter. Now suppose that $w - \alpha (x_i - z)^2 + Q^2 < 0$. Since $w - \alpha (x_i - z)^2 + Q^2$ is the maximum that a legislator may receive in a term of office, no voting strategy can give such a legislator non-negative utility in office, and the potential challenger will not enter. Thus the single-term participation constraint (2) is necessary and sufficient for characterizing the set of moderates willing to affiliate with party $R$. 

An identical analysis holds for non-moderate potential challengers; therefore, $Z_R = \{z \mid (2) \text{ holds}\}$. Thus, rightists affiliate with party $R$ if $w - \alpha (x_i - z)^2 + 2Qz \geq 0$, or equivalently $z \in [x_R + {Q_2 \over \alpha} - Q^2 + 2Qx_R + w \over \alpha, x_R + Q^2 + 2Qx_R + w \over \alpha] \cap (-Q_2, 1]$. Similarly, leftists affiliate if $w - \alpha (x_i - z)^2 - 2Qz > 0$, or equivalently $z \in [x_R - {Q_2 \over \alpha} - Q^2 + 2Qx_R + w \over \alpha, x_R - Q^2 + 2Qx_R + w \over \alpha] \cap [-1, -Q_2]$. By symmetry, $\bar{z}_L = -\bar{z}_R$ and $\bar{z}_R = -\bar{z}_L$. Combining these expressions,

$$\bar{z}_R = -\bar{z}_L = \begin{cases} \min\{x_R + {Q_2 \over \alpha} + \sqrt{Q^2 + w + 2Qx_R \over \alpha}, 1\} & \text{if } x_R > Q_2 \text{ or } w > \alpha (x_R - Q_2)^2 - Q^2 \\ x_R + \sqrt{w + Q^2 \over \alpha} & \text{otherwise.} \end{cases}$$

$$\bar{z}_L = -\bar{z}_R = \begin{cases} x_R + {Q_2 \over \alpha} - \sqrt{Q^2 + 2Qx_R \over \alpha} & \text{if } x_R > Q_2 \text{ and } w < \alpha (x_R - Q_2)^2 - Q^2 \\ \max\{x_R - {Q_2 \over \alpha} - \sqrt{Q^2 + w - 2Qx_R \over \alpha}, -1\} & \text{if } w > \alpha (x_R + Q_2)^2 - Q^2 \\ x_R - \sqrt{w + Q^2 \over \alpha} & \text{otherwise.} \end{cases}$$

Thus establishing the result. ■

Proof of Comment 2. This follows directly from the symmetry of parties $L$ and $R$. Since $\bar{z}_L = -\bar{z}_R$ and $\bar{z}_L = -\bar{z}_R$, $\mu_L = -\mu_R$ and $\sigma_L^2 = \sigma_R^2$. The condition for party $R$ to win, $-(y - \mu_R)^2 - \sigma_R^2 \leq -(y - \mu_L)^2 - \sigma_L^2$, then reduces to: $y \geq 0$. ■

Proof of Proposition. We address the strategies of each player type in a generic district during period $t$ in turn.

Potential Challengers. A potential challenger located at $z$ is willing to affiliate with party $i$ if, conditional upon winning the election, she receives non-negative utility. The necessary and sufficient conditions for this are guaranteed by Comment 1. Thus, $d^*_t = i$ if $z \in Z_i$, and $d^*_t = \emptyset$ otherwise.
Voters. Consider a generic voter with ideal point at \( y' \). Since the voter lives for one period, she votes for the party \( R \) candidate if 
\[-E[(y'-z_i)^2|v_{R,t}] \geq -E[(y'-z_L)^2|v_{L,t}],\]
where \( z_i \) is the ideal point and \( v_t \) the voting record of the party \( i \) candidate. Evaluating, we have 
\[-(y-\mu_L(v_L))^2-\sigma^2_L(v_L) \leq -(y-\mu_R(v_R))^2-\sigma^2_R(v_R),\]
where \( \mu_i(v_i) \) and \( \sigma^2_i(v_i) \) are the posterior mean and variance of \( z_i \), respectively, as determined by Bayes’ Rule. Simplifying, we obtain the result.

First-Term Legislators (Voting). We focus first on party \( R \) legislators in districts where \( y \geq 0 \). If the agenda is \( \{0, -Q\} \), then a legislator voting for 0 over \(-Q\) generates a posterior \( b_{R,t} = Z_{R,t} \). If the legislator runs for re-election, then by Comment 2 she wins in any district such that \( y \geq 0 \). Since 0 is a sincere vote for all party \( R \) legislators, voting 0 must therefore be optimal.

If the agenda is \( \{0, Q\} \), there are four cases. First, if \( y \geq \bar{y} \), then any legislator voting for \( Q \) in equilibrium generates a posterior \( b_{R,t} = [\max\{\bar{z}_R, \tilde{z}_R\}, \tilde{z}_R] \) if \( \bar{z}_R > \frac{Q}{2} \). By definition of \( \bar{y} \), voting for \( Q \) results in re-election, and thus \( v_t = Q \) must be optimal for all types such that it is sincere; \( i.e., z > \frac{Q}{2} \). Similarly, voting for 0 generates a posterior \( b_{R,t} = [\tilde{z}_R, \min\{\frac{Q}{2}, \tilde{z}_R\}] \) if \( \tilde{z}_R \leq \frac{Q}{2} \). In this case, \( \mu_R(v_R) \leq |\mu_L| \) and \( \sigma^2_R(v_R) \leq \sigma^2_L \); hence, the legislator would defeat a party \( L \) challenger in any district where \( y \geq 0 \). Thus, \( v_t = 0 \) must be optimal for all types such that it is sincere; \( i.e., z \in [-\frac{Q}{2}, \frac{Q}{2}] \). Second, if a legislator votes for \( Q \) when \( \bar{z}_R \leq \frac{Q}{2} \), then she generates the out of equilibrium belief \( b_{R,t} = [\frac{Q}{2}, 1] \). Regardless of the anticipated election outcome, this type of legislator would receive strictly higher utility by voting sincerely for 0. The third case, where a vote for 0 is observed when \( \bar{z}_R > \frac{Q}{2} \), is symmetric to the second.

Fourth, if \( y < \bar{y} \), then by the definition of \( \bar{y} \) legislators cannot win by voting for \( Q \), given that moderates vote for 0. Voting for \( Q \) generates a posterior \( b_{R,t} = (\bar{z}, \bar{z}_R) \). By the definition of \( \bar{z} \), \( v_t = Q \) is thus optimal if \( z > \bar{z} \). Voting for 0 generates a posterior \( b_{R,t} = [\bar{z}_R, \min\{\bar{z}_R, \tilde{z}\}] \). In this case, \( \mu_R(v_R) \leq |\mu_L| \) and \( \sigma^2_R(v_R) \leq \sigma^2_L \); hence, the legislator would defeat a party \( L \) challenger in any district where \( y \geq 0 \). Thus, \( v_t = 0 \) must be optimal for all types in \( [\bar{z}_R, \tilde{z}] \).

First-Term Legislators (Turnover). Given that legislators with ideal points \( z > \bar{z} \) anticipate losing the following election, given their optimal voting strategies, they choose to retire. Given that all other legislators anticipate winning the election and voting sincerely in the final period, they choose to run for re-election.

Second-Term Legislators. Such legislators maximize \( (1) \), and thereby cast sincere votes.

To complete the equilibrium, we establish voting strategies for all districts and all parties. Party \( L \) legislators’ voting strategies in districts where \( y < 0 \) follow by symmetry. Comment
2 implies that after the election in period 1, all districts where \( y < 0 \) are occupied by a party \( L \) legislator, and all districts where \( y \geq 0 \) are occupied by a party \( R \) legislator. Given the voting strategies identified above, party \( L \) candidates never win in districts where \( y \geq 0 \) and party \( R \) candidates never win in districts where \( y < 0 \). Thus, these voting strategies are the sequentially rational choices of all possible legislators. 

**Proof of Comment 3.** We define a three-state Markov Chain \( P \) describing the equilibrium transitions of party \( R \) types in a district where \( y < \bar{y} \). Let state 0 represent a first-term non-extreme rightist, state 1 a second-term non-extreme rightist, and state 2 an extreme rightist. Then,

\[
P = \begin{pmatrix}
0 & 1 & 0 \\
\frac{\bar{z} - z_R}{z_R - \bar{z}} & 0 & \frac{\bar{z} - z_R}{z_R - \bar{z}} \\
\frac{\bar{z} - z_R}{z_R - \bar{z}} & \frac{\bar{z} - z_R}{z_R - \bar{z}} & 0
\end{pmatrix}.
\]

Let \( \pi_k \) represent the long-run probability of being in state \( k \). We then solve for the following system:

\[
\begin{align*}
\pi_0 &= \frac{\bar{z} - z_R}{z_R - \bar{z}} \pi_1 + \frac{\bar{z} - z_R}{z_R - \bar{z}} \pi_2, \\
\pi_1 &= \pi_0, \\
\pi_2 &= \frac{\bar{z} - \bar{z}}{z_R - \bar{z}} \pi_1 + \frac{\bar{z} - \bar{z}}{z_R - \bar{z}} \pi_2, \\
\sum_k \pi_k &= 1.
\end{align*}
\]

Solving, we obtain \( \pi_0 = \pi_1 = \frac{\bar{z} - z_R}{z_R + \bar{z} - 2\bar{z} R} \), and \( \pi_2 = \frac{\bar{z} - \bar{z}}{z_R + \bar{z} - 2\bar{z} R} \).

Now note that \( \frac{\bar{z} - z_R}{z_R + \bar{z} - 2\bar{z} R} \) is the probability of drawing an extreme rightist in an open-seat race. Since \( \pi_2 < \frac{\bar{z} - z_R}{z_R + \bar{z} - 2\bar{z} R} \) if \( \bar{z} > z_R \), and \( \bar{z} > z_R \) if \( \beta > 0 \) and \( \bar{z} < \frac{Q}{2} \), extreme rightists will, on average, be in office less than other types of party \( R \) members if \( \beta > 0 \).

**Proof of Comment 4.** Simplifying (7), we obtain:

\[
2Qz - Q^2 \leq Q^2 - 2Qz + p\beta[2Qz + w - \alpha(x_R - z)^2].
\]

(8)

Since this expression is quadratic in \( z \), there are two roots satisfying it with equality. By Comment 1, \( 2Qz + w - \alpha(x_R - z)^2 \geq 0 \) for all party \( R \) legislators and \( 2Q\bar{z}_R + w - \alpha(x_R - \bar{z}_R)^2 = 0 \). Further, by assumption \( \bar{z}_R \leq \frac{Q}{2} \). Thus for any \( p \) and \( \beta \), (8) holds at \( z = \frac{Q}{2} \) and cannot hold at \( z = \bar{z}_R \), and only the upper root, \( \bar{z}(p) \), lies in \( [\frac{Q}{2}, \bar{z}_R) \). In closed form,

\[
\bar{z}(p) = x_R + \frac{Q}{\alpha}(1 - \frac{2}{p\beta}) + \frac{\sqrt{Q^2(2 - p\beta)^2 - \alpha p\beta(2p\beta Qx_R - 4Qx_R + 2Q^2 + p\beta w)}}{\alpha p\beta}.
\]
Since (8) holds for $z < \tilde{z}(p)$, all first-term legislators for whom $z \leq \tilde{z}(p)$ vote 0 on the \{0, Q\} agenda in districts where $y < \tilde{y}$. Likewise, (8) does not hold for $z > \tilde{z}(p)$, so first-term legislators for whom $z > \tilde{z}(p)$ vote Q in those districts.

To show that the set of non-pooling legislator types is non-increasing in $\beta$, note first that if $\beta = 0$, then $\tilde{z} = \frac{Q}{2}$. The expected utility from pooling (the right-hand side of (7) and (8)) is strictly increasing in $\beta$ for all $z$. Thus any type that prefers pooling on the \{0, Q\} agenda for some discount factor $\beta'$ must also prefer pooling when $\beta \geq \beta'$. We conclude that the set of pooling rightists cannot decrease in $\beta$, and thus $\tilde{z}$ is non-decreasing.

An identical analysis holds for $p$. $\blacksquare$
REFERENCES


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Table 1
Last-Term Effects on Congressional Roll Call Voting
Dependent Variable: Roll Call Voting Score

<table>
<thead>
<tr>
<th>All Retirements, 91st-105th Congresses</th>
<th>Democrats</th>
<th>Republicans</th>
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<tr>
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<td>.015**</td>
</tr>
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<td></td>
<td>(.005)</td>
<td>(.005)</td>
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<tr>
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Figure 1: Roll-Call Score by District Type
Figure 2: Candidate and Incumbent Ideology by District Type
Figure 3: Voting Strategies on \{0, Q\} Agenda, by District
Party R only; \( y \geq 0 \)

Figure 4: Roll-Call Score by District Type