Abstract

Formal models of lawmaking imply that legislative productivity is a function of the distribution of legislators’ preferences, but disagreement about the role of parties leads to competing models that differ in terms of which legislators’ preference matter. We solve a difficult problem in discriminating between competing theories that arises from the unobservability of status quo policies by constructing a theoretical-statistical model. The model generates a probability distribution over observable outcomes that we fit and compare using maximum likelihood. Our analysis suggests that legislative productivity depends on both parties and supermajority pivots, but that party influence stems from agenda power rather than voting pressure and is exercised only on highly salient legislation.
“The parties are not therefore merely appendages of modern government; they are in the center of it and play a determinative and creative role in it.” (Schattschneider 1942, p. 1)

“The fact is that no theoretical treatment of the United States Congress that posits parties as analytic units will go very far.” (Mayhew 1974, p. 27)

Political parties appear to be central to American democracy, but their influence on contemporary lawmaking relative to legislators’ individual goals and the constraints imposed by institutions and rules remains a matter of substantial controversy. Are congressional parties not much more than collections of individual legislators who happen to have similar policy positions (Krehbiel 1993, Mayhew 1974)? Or are parties instead centralized organizations that confer significant power to their leaders (Aldrich and Rohde 2000, Cox and McCubbins 2005)? If the former, pivotal politics theories (Brady and Volden 2006, Krehbiel 1998) postulate that the key determinants of policy outcomes are legislators’ preferences and supermajoritarian institutions. If the latter, theories of party influence imply that lawmaking outcomes will reflect majority party preferences to a greater extent than would have been the case in their absence. Understanding the role that parties play in shaping policy outcomes is central to understanding fundamental issues concerning the distribution of power and its consequences.

Cleanly differentiating between competing partisan and pivot theories, however, has proven to be quite difficult. Theoretically, models corresponding to alternative theories should be straightforward to compare because they share a common set of assumptions (uni-dimensional policy space, Euclidean preferences, and strategic behavior) and differ only on a few key dimensions (which players possess proposal power and veto power), but under many conditions the theories turn out to be observationally equivalent, or nearly so. Empirically, the unobservability of key elements of the theories raises challenging inferential problems, and the need to make identifying or auxiliary assumptions further compounds the difficulty of discriminating between theories.
A particularly vexing problem is the fact that the locations of current policies—referred to in the literature as “status quo policies”—relative to legislators’ preferences are unknown and difficult to estimate (Poole and Rosenthal 1997). Researchers have taken several approaches to address this problem, with mixed results. One solution sidesteps the problem by deriving and testing predictions about roll-call cutpoints (the dividing lines between supporters and opponents of a bill), but the results are contradictory. Krehbiel, Meirowitz and Woon (2005) find weak support for the pivot theory over the alternatives; Clinton (2007) finds little empirical support for either theory; but Stiglitz and Weingast (2010) find greater support for a partisan model.

Another solution relies on auxiliary assumptions about the distribution of status quo policies. Assuming that status quo policies are normally distributed around the chamber median, Lawrence, Maltzman and Smith (2006) analyze roll call “win rates” and Cox and McCubbins (2005) analyze “roll rates.” Assuming that status quo policies are instead uniformly distributed, Covington and Bargen (2004) analyze roll call-based measures of bill content. These analyses generally appear to support partisan models. Chiou and Rothenberg (2003, 2006, 2009) analyze changes in gridlock instead of roll-call measures, also assuming that status quo policies are uniformly distributed, and find support for a combined pivots plus party unity model.

While the assumption of normally or uniformly distributed status quo policies may seem innocuous, akin to assuming a normally distributed error term in a regression model, the hypotheses generated from the theoretical models are sensitive to the exact form of the status quo distribution. Under more general assumptions, the hypothesized relationships turn out to be indeterminate. Moreover, a static status quo distribution is substantively problematic because it means that history is irrelevant. That is, in order for the distribution to be fixed, policy-making at time $t$ must be independent of policy-making at time $t + 1$. In contrast, both partisan and non-partisan theories of lawmaking recognize how previous outcomes shape current decisions. The inferences and conclusions of previous analyses that depend on a fixed status quo distribution are therefore quite suspect.
Richman (2011) avoids these problems by directly estimating status quo locations from survey measures of legislator preferences. His results support a pivots plus party unity model, but the time frame and set of issues are much more limited than in previous studies due to the reliance on survey data. Thus, although Richman’s analysis provides an important methodological and substantive contribution, indirect methods are necessary for analyzing patterns of lawmaking over a longer historical time period and for a broader set of issues.

We propose a novel method for comparing alternative theories that incorporates an explicit, yet flexible, model of history-dependent status quo policies into a statistical model of legislative productivity, thus solving the theoretical indeterminacy problem that undermines the validity of inferences made in previous work. Like Chiou and Rothenberg (2003, 2006, 2009), we focus on legislative productivity—in our case, the number of laws enacted—rather than roll call votes because the former are better measures of outcomes of the entire lawmaking process while latter reflect behavior that is specific to a single chamber. Building on the analytical approach proposed by Krehbiel (1998, 2006a, 2006b), we assume that status quo policies are partly endogenous: they are inherited from policy-making in previous periods but subject to exogenous stochastic shocks. By positing a stochastic model of exogenous “shocks” to the status quo and combining it with various assumptions about the role of parties in generating policy outcomes (positive agenda power, negative agenda power, direct pressure on roll call voting), we generate a series of statistical models of the complete data generating process. Furthermore, the variety of party influence that we consider in our set of models is more thorough than in previous work. Notably, we add a hybrid pivots-plus-party gatekeeping model. For each model, we then use Monte Carlo methods and Common Space ideal point estimates (Carroll et al. 2010) to generate likelihood distributions for counts of legislative productivity. We then fit the models to Binder’s (2003) and Mayhew’s (1991) data on salient legislative enactments in the 80th-110th Congresses using maximum likelihood, which allows us to estimate parameters and to compare models.
Our analysis yields two key findings. First, hybrid pivots-plus-party agenda control models provide the best fit to the data for highly salient legislation. While our results are consistent with previous work in that we find evidence of party influence (Chiou and Rothenberg 2003, Richman 2011), our results also differ in that the type of party influence we find operates through agenda control rather than through pressure on roll call voting, which is consistent with the Cox and McCubbins’s (2005) party cartel theory. Most of the data are consistent with a model of parties exercising positive agenda control, but we also find some evidence of negative agenda control. Second, we find that the non-partisan pivot model provides the best fit to the data for the least salient legislation. Taken together, our findings suggest that the “parties versus pivots” debate is misguided: the role of parties is not an “either-or” proposition. Parties and pivots both matter. Parties exercise agenda power, but they must do so within the constraints dictated by their members’ preferences and by institutional voting rules. Furthermore, their power is not unlimited and because they must choose when to exercise agenda power, they do so only on the most salient issues of the day.

**Competing Models of Party Influence on Lawmaking**

Spatial models of lawmaking yield precise predictions about legislative outcomes and the frequency of policy change. We consider a series of models that vary in their assumptions about the nature of party influence, comparing a non-partisan pivotal politics baseline against a set of hybrid pivot-plus-party models. Each hybrid model involves a distinct form of party influence, as we distinguish direct pressure on roll-call voting from agenda control, and further distinguish positive from negative agenda control. Formally, each model is a sequential game that represents a single-period of lawmaking for a single issue and assumes a uni-dimensional policy space where legislators’ preferences over policy outcomes are single-
peaked and symmetric, assigns key players agenda power or veto power, and posits the existence of a status quo policy.\footnote{Our approach follows Chiou and Rothenberg (2003) and Richman (2011) in considering combined pivots-plus-parties models. For ease of exposition, we assume a unicameral legislature in this section. In our statistical model and empirical analysis, we follow the implementation of Chiou and Rothenberg (2003), which allows for bicameralism. The differences between the unicameral and bicameral versions of the models are mainly technical and not substantively interesting.}

The baseline model in our analysis is \textit{non-partisan pivotal politics} (NP), following the theory advanced by Brady and Volden (2006) and Krehbiel (1998). Parties have no explicit role in the model, which instead emphasizes that supermajoritarian voting rules constrain policy change. In the theory, any legislator may make a proposal (so that proposal rights are diffuse) and in order to pass, proposals must have enough support to overcome both a Senate filibuster (requiring a 3/5 Senate vote) and a presidential override (requiring 2/3 of each chamber). Outcomes implied by these assumptions are equivalent to those in a model in which the \textit{median legislator} makes proposals subject to the approval of the \textit{filibuster pivot} and the \textit{veto pivot}.\footnote{We emphasize that the “median as proposer” assumption does not mean the median is actually a monopoly agenda setter. A model with a monopoly agenda setter is isomorphic to a model with an open rule without time constraints or delay costs, so the assumption should instead be viewed as an equivalent analytic simplification rather than as anything that is substantively meaningful.} Specifically, status quo policies outside of the gridlock interval will be brought inside the interval as close to the median legislator’s preferred policy as the pivots will allow.

The \textit{party unity} (PU) model is a hybrid pivot-plus-party model with a strongest form of party influence. The model retains the pivotal politics assumption that lawmaking requires supermajority votes to overcome filibusters and stave off presidential vetoes but adds the idea that parties exert direct pressure on member behavior, such as roll-call voting (Cox and Poole 2002, Snyder and Groseclose 2000).\footnote{For critiques of this literature see Krehbiel (1993, 2003) and Smith (2007).} Such strong influence might be possible to the extent that parties can discipline their members through rewards and punishments including committee assignments, leadership positions, campaign funds, support for legislative proposals, or district-level spending. In the PU model, we assume that members of each party act identically to its median member in all aspects of the legislative process so that
the only relevant preferences are those of the majority and minority party medians. The spatial locations of the proposer and pivots will depend on the size of the majority and the locations of these two partisan players rather than on the entire distribution of preferences. Because the floor median behaves identically to the majority party median, it necessarily follows that the proposer in the PU model is the majority party median. In most cases, the veto pivot is the median of the president’s party while the filibuster pivot is the median of the non-presidential party. However, the majority party median will control both pivots if either the party has a veto-proof majority (regardless of the president’s party affiliation) or if the president’s party has a filibuster-proof majority. In these latter two cases, the PU model predicts a complete absence of gridlock, but in general, the PU model involves majority party proposal power and minority party blocking power and predicts that status quo policies will be brought as close as possible to the majority party median’s ideal point so long as the minority party median prefers it to the status quo.

The degree of party influence that the PU model posits is extraordinarily strong, especially because it involves influence on roll call voting—one of the most visible manifestations of legislative behavior. Interest groups analyze and publicize voting behavior, and votes at odds with constituents’ wishes are often highlighted by challengers, meaning that voting with the party will be electorally costly for many members (Canes-Wrone, Brady and Cogan 2002) and party unity will be very costly to achieve. Indeed, there is little to no evidence in the roll-call voting literature that party influence is as strong as what the PU model entails (e.g., McCarty, Poole and Rosenthal 2001). Acknowledging the difficulty of achieving instances of party discipline, some theorists have proposed that parties exert a weaker—though still consequential—form of party influence through control of the legislative agenda (Cox and McCubbins 2005). Such control is possible to the extent that voters and constituents pay less attention to policy proposals than they do to voting behavior. In our analysis, we distinguish between two distinct forms of agenda control.
In the *party agenda setter* model (AS), the majority party has positive agenda power but cannot influence its members’ voting behavior. That is, it has a monopoly on proposal power (e.g., as if it operates under a closed rule), so like the PU model, the proposer in the AS model is the majority party median. But like the NP model, heterogeneity in legislators’ preferences, both within and between parties, is consequential. There are two critical differences between the AS and PU models. First, the minority party is less influential. It cannot block policies opposed by its median member but supported by the veto or filibuster pivots (one of whom will be a member of the minority party). Second, the majority party cannot force the floor median to accept outcomes preferred by the majority party median that it would otherwise oppose. As a consequence, the AS model predicts gridlock to the extent that there is heterogeneity within the majority party, even when the majority is veto-proof or filibuster-proof.

The *party gatekeeping* model (GK) involves the weakest form of party influence in our analysis, and we follow Cox and McCubbins (2005) in assuming that parties’ primary means of influence is through negative agenda power (otherwise known as gatekeeping, e.g., Denzau and Mackay 1983). Specifically, we assume that the majority party can use its scheduling power to keep issues off of the legislative agenda, but once it puts an issue on the agenda it cannot prevent the floor median from making proposals (i.e., operates under an open rule) nor can it pressure members to vote with the party. Formally, the GK model adds a prior stage to the NP model in which the majority party median acts as a gatekeeper, first deciding whether to retain the status quo or to play the baseline pivotal politics game.\(^4\) The resulting hybrid pivots-cartel model predicts a greater frequency of gridlock, but when policies pass in the GK model they are the same as what would pass in the NP model.

Figure 1 illustrates the differences between the four models’ basic predictions regarding outcomes as a function of the status quo, holding the ideal points of key players constant. The key players are the majority party median \(P_M\), the minority party median \(P_N\), the veto

\(^4\)Because the House is widely believed to be the more partisan chamber, we assume in our empirical analysis that the gatekeeper is the House majority party median.
pivot \( V \), the filibuster pivot \( F \) and the floor median \( M \).\(^5\) The figure shows the obvious differences between the models’ predictions about the width of gridlock intervals. It also illustrates where the observational equivalence problem holds. For instance, all four models predict gridlock if the status quo lies between \( V \) and \( F \) while the AS, GK, and NP models predict the same outcomes for status quo points lying between \( 2V - M \) and \( V \). Furthermore, the figure also highlights the fact that the models make different predictions about what will happen to policies when the status quo lies outside the gridlock interval. For example, the PU and AS models predict that extreme status quo policies lead to outcomes at the majority party median, while the GK and NP models imply that such outcomes will instead lie at the floor median. These differences provide additional leverage that our method uses to discriminate between the models, unlike the gridlock interval described in the next section.

\(^5\)The figure corresponds to unified Republican government. Similar figures can be made for other cases.
We emphasize that our analysis involves a more comprehensive range of party influence than previous comparisons of spatial lawmaking models. Numerous papers compare only the non-partisan pivotal politics model (our baseline NP) with a “pure” version of the cartel agenda (gatekeeping) model that denies the role of supermajoritarian voting institutions (Clinton 2007, Krehbiel, Meirowitz and Woon 2005, Krehbiel 2006a, Krehbiel 2006b, Stiglitz and Weingast 2010). These papers do not consider hybrid models, nor do they consider alternative forms of party influence such as direct pressure (the PU model) or positive agenda power (the AS model). Chiou and Rothenberg’s work (2003, 2006, 2009) is the most comprehensive to date as they consider a series of pivots-plus-party models, but in none of their work do they include a version of the gatekeeping model. Nor does Richman (2011) include a gatekeeping model. Instead, he considers non-partisan pivotal politics (the NP model) and a “party cartel closed rule” model that is equivalent to the PU model. While his analysis considers variation in agenda power, in both of his partisan models, direct party pressure is a constant since he assumes that members of each party vote the same way as the party median. In sum, previous work either fails to consider hybrid pivot-plus-party models or, when they do, fail to consider a gatekeeping version. Our analysis involves both.

6Our NP, PU, and AS models are identical to theirs (Chiou and Rothenberg 2003, Chiou and Rothenberg 2006), and in later work they consider different gradations of direct party influence (Chiou and Rothenberg 2009) along the lines of Volden and Bergman (2006).

7Neither of Richman’s (2011) formal implementations are consistent with a gatekeeping model. Instead, his “party cartel closed rule” model is equivalent to the PU model and his “party cartel open rule” model is equivalent to a model in which each party can veto proposals made by the median. Moreover, we view the “party cartel open rule” model as theoretically implausible. If the majority party can induce its members to vote the same way as its median member, why wouldn’t it also be able induce its members to refrain from proposing bills or amendments located at the floor median or to vote with it on procedural votes, all of which is less visible (and hence less costly) behavior to induce than voting on final passage.

8Although we do not explicitly discuss them in our description of models, we also investigated Chiou and Rothenberg’s (2003) “strong presidential leadership” (SPL) model and several alternative gatekeeping models such as Senate gatekeeping (Gailmard and Jenkins 2007), bicameral gatekeeping, and “pure” party (without pivots) gatekeeping models. Our results for the SPL model were nearly identical to those of the PU model (but with worse fit). In the results, we present and discuss some of the “pure” cartel gatekeeping model and compare them to the hybrid GK and purely non-partisan NP versions.
Status Quo Policies and Gridlock Intervals

As we note in the introduction, the predictions of competing models are difficult to test directly because two quantities of interest (spatial locations of bills and status quo policies) cannot be reliably measured from roll call votes. Other studies that rely solely on roll call votes, such as the analysis of cutpoints, roll rates, or win rates, are also problematic because they attempt to draw inferences from too little data about chamber-specific behavior rather than actual outcomes. However, the theories make predictions not only about bill locations but also about the conditions for legislative productivity and its inverse, gridlock, which suggests another possible method to test the theories. In this section, we review the gridlock interval test and explain why it is substantively and theoretically flawed.

The origin of the test is Krehbiel’s insight that pivotal politics theory generates an *equilibrium gridlock interval*, the set of status quo policies for which attempted policy-making will be unsuccessful and that: “Policy change requires that the status quo must lie outside the gridlock interval” (1998, p. X). Although not explicitly stated by Krehbiel, the following prediction is an immediate corollary.

**Prediction 1** Legislative productivity is increasing in the frequency with which status quo policies lie outside the gridlock interval.

This prediction is the implicit basis for Krehbiel’s (1998, chapter 2) hypothesis that changes in the width of the (non-partisan pivotal politics) gridlock interval are inversely related to legislative enactments. Although Krehbiel (1998) finds support for his hypothesis with respect to salient legislation, Chiou and Rothenberg (2003), who also note that the EGI concept applies to alternative models of lawmaking, point out that the hypothesized relationship between the width of the gridlock interval and legislative productivity requires assuming that “status quo policies in each period are identically and uniformly distributed, which makes comparing the widths of different gridlock intervals at the same time or different points in time possible” (2003, p. 511). Thus, the gridlock test is not quite a test of
Prediction 1, which cannot be tested directly unless status quo policies can be identified relative to the EGI. Rather, it is a test of a modified prediction that requires the critical identifying assumption that status quo policies are uniformly distributed.

**Prediction 2** If status quo policies are identically and uniformly distributed then gridlock is increasing in the width of the gridlock interval.

To see formally why the assumption guarantees a negative, monotonic relationship between gridlock interval width and legislative enactments, let the gridlock interval be $EGI_t = [L_t, R_t]$ in period $t$ and let status quo policies be uniformly distributed over the interval $[q_0, q_1]$, which is constant in every period. Define the predicted level of gridlock to be the proportion of status quo policies that fall within the interval, provided that $q_0 < L_t$ and $R_t < q_1$:

$$G_t = \frac{R_t - L_t}{q_1 - q_0}.$$ (1)

Since the denominator is a constant, it clearly follows that $G_t$ is increasing in the width of the EGI, $R_t - L_t$. In a series of papers, Chiou and Rothenberg (2003, 2006, 2009) rely extensively on the assumptino of uniformly distributed status quo policies and Prediction 2 as the basis for comparing a variety of generalized pivot-plus-party models, and they claim to find greater support for models with strong parties.

**History-Independence and Theoretical Indeterminacy**

The assumption of uniformly distributed status quo policies may seem like a reasonable solution to the identification problem, but there are two flaws. First, it represents a strong substantive assumption of history independence that is inconsistent with the spirit and intent of spatial theories of lawmaking. Second, when plausible alternative assumptions about the distribution of status quo policies are considered, the relationship between the width of gridlock intervals and legislative productivity is indeterminate. That is, Prediction 2 does not hold generally.
An exogenously fixed distribution of status quo policies means that policy-making at time $t$ has no bearing on the extent of gridlock at time $t+1$. In contrast, spatial lawmaking theorists emphasize the history dependence of status quo policies (even if status quo policies are, strictly speaking, exogenous to the formal representations of the theories). For example, in applying the pivotal politics theory to interpret the broad historical countours of policy change from the late 1970s through the 1990s, Krehbiel writes that “Carter equilibria $x_1$ become Reagan-Bush status quo points $q_2$” and the “funneling effect of liberal policies toward the [Reagan-Bush] median creates Reagan-Bush outcomes $x_2$ which serve as status quo points $q_3$ for Clinton” (1998, p. 43). Brady and Volden are also explicit about the intertemporal dependence of status quo policies, emphasizing that “policy gridlock depends on both the size and the shifting of the gridlock region” (2006, p. 26, emphasis original). Even party theorists such as Cox and McCubbins explicitly recognize that “status quo policies reflect bills enacted in the previous legislative period, as well as exogenous shocks” (2005, p. 174).

To illustrate how history dependence and independence have drastically different implications for policy change and gridlock, consider the series of gridlock intervals for three periods of lawmaking depicted in Figure 2.\(^9\) If status quo polices are history independent so that in every period they have the same distribution over the interval shown in the upper-

\(^9\)Whether the gridlock model is partisan or non-partisan is immaterial. Our argument depends only on the existence of a gridlock interval.
most (unshaded) horizontal bar, then the rate of gridlock will be the same in all three periods because the widths of the intervals are the same.\(^{10}\)

Now suppose instead that status quo policies are history dependent so that all out-of-gridlock status quo policies are brought into the interior of the gridlock interval at time \(t\). Thus, status quo policies at time \(t + 1\) must lie in the time \(t\) gridlock interval. In this case, there is complete gridlock at \(t = 2\) because all of the status quo policies at \(t = 2\) (which lie within the gridlock interval from \(t = 1\)) also fall within the gridlock interval at \(t = 2\). But at \(t = 3\), the gridlock interval shifts to the right, which “releases” a set of status quo policies (those that lie within the \(t = 2\) interval but outside the \(t = 3\) interval), which now meet the condition for policy change. Thus, in stark contrast with history independence, which predicts a constant rate of gridlock, and in contradiction with Prediction 2, gridlock decreases from \(t = 2\) to \(t = 3\) even though there is no change in its width because the gridlock interval shifts.

Another example illustrates the severity of the theoretical indeterminacy. Suppose that there are three periods and that \(EGI_1 = [-1, 1]\), \(EGI_2 = [-1, 0.5]\), and \(EGI_3 = [-1, 0.25]\), as depicted in Figure 3. Note that because each successive gridlock interval is strictly nested in, and therefore smaller than, the preceding gridlock interval, the uniform status quo assumption implies that gridlock is strictly decreasing from \(t = 1\) to \(t = 3\).

\(^{10}\)In this case, the shape of the distribution is also irrelevant.
Alternatively, consider the case of complete history dependence. For purposes of illustration suppose that status quo policies at time $t + 1$ are distributed uniformly over $[L_t, R_t]$, which is the previous period’s EGI.\footnote{We use this assumption for ease of exposition. A slightly different assumption is that status quo policies at $t + 1$ depend on equilibrium lawmaking outcomes from time $t$ as in Krehbiel’s approach, which is a special case of our theoretical-statistical model, but the gridlock predictions are more complicated to describe.} Under this assumption, the predicted level of gridlock is not proportional to the size of the EGI $[L_t, R_t]$ but instead depends on how much of the previous EGI at time $t$ falls in the new EGI at time $t + 1$. Given that the gridlock interval at $t = 1$ is $[-1, 1]$, the status quo policies at $t = 2$ are uniformly distributed over $[-1, 1]$. Since the gridlock interval at $t = 2$ is $[-1, 0.5]$, the proportion of gridlocked policies is 0.75. At time $t = 3$, status quos are distributed over $[-1, 0.5]$ and the gridlock interval is $[-1, 0.25]$, so the proportion of gridlock is 0.83. Thus, given these intervals and the alternative assumption that the distribution of status quos depends on the previous gridlock interval, gridlock is increasing even though the width of the intervals are decreasing—precisely the opposite of the Prediction 2!

Alternative assumptions about the nature of unobserved status quo policies therefore lead to starkly different predictions about the incidence of gridlock. Gridlock is unambiguously increasing in EGI width only if the fixed, uniform status quo assumption holds—a strong assumption in which policy-making is completely independent of the past. If status quo policies instead depend on collective choices made in previous Congresses, as both pivotal politics and partisan theorists emphasize, then the relationship between EGI width and gridlock is entirely ambiguous. Thus, regression analysis of gridlock or legislative productivity using the width of the gridlock interval is not an appropriate method for comparing competing models.

**Legislative Productivity: A Theoretical-Statistical Model**

The gridlock interval tests follows the common approach to empirically evaluating formal theory that proceeds by deriving predictions from the theoretical model, assuming that a
classical regression (or some other standard statistical model) describes the data generating process, fitting the statistical model to the data, and then testing hypotheses about relevant coefficients. If the uniform status quo assumption must be abandoned, then it seems as if we have reached a serious methodological dilemma. Without a clear hypothesis about the sign of coefficients, how is it possible to discriminate between competing models using legislative productivity data?

We propose a solution in which the theoretical and statistical models are much more closely integrated (e.g., Signorino 1999) than in the conventional formal model-hypothesis-regression approach (testing comparative statics, e.g., Carrubba, Yuen and Zorn 2007). That is, we begin with a theoretical model of legislative productivity that embeds the generalized pivot-plus-party models within a stochastic, dynamic framework. Because the model has a stochastic component, it generates a likelihood function over levels of legislative productivity. Our model is both “theoretical” and “statistical” in the sense described by Signorino (2003) and a model of the complete data generating process in the sense described by Morton (1999). Using standard principles of maximum likelihood, we can fit the parameters of each generalized pivot model and then compare the different theoretical models.

The model is a more precise implementation of the “quasi-dynamic” application of pivotal politics proposed and employed by Krehbiel (1998, 2006a, 2006b).\textsuperscript{12} Although the model is not itself game theoretic, it incorporates the equilibrium results of spatial policy-making models (including, but not limited to, pivot models) as part of the stochastic model. In order to generate a likelihood function, the model assumes that there are many issues and that status quo policies are subject to random shocks.

Importantly, instead of assuming that status quo policies come from a fixed, uniform distribution, we assume that status quo policies are partially the result of prior lawmaking and partially the result of stochastic shocks. Policy change in this model therefore results

\textsuperscript{12}Our formalization is closest to that in Krehbiel (2006b), but differs in that he examines roll rates and uses a different empirical method. Krehbiel “bins”, or discretizes, the policy space in his simulations, then evaluates model fit using deviations from predictions rather than maximum likelihood.
from both changes in the gridlock interval (size and shift) as well as exogenous changes in policy (e.g., from policy implementation, advances in technology, or the resolution of policy uncertainty). The stochastic shocks in our model also differ from the uniform status quo assumption in a subtle, yet important, way. Generating Prediction 2 requires viewing the uniform status quo distribution as deterministic (i.e., there are an infinite or nearly infinite number of policy issues) or as stochastic but only in large samples (i.e., if the status quo is a random variable, Prediction 2 holds in the limit). In contrast, our method is more flexible, as it does not require an asymptotic or large sample argument, and generates likelihood distributions for any number of policy issues.

The Model

We describe the details of the model in a generic form so that it can be applied to any version of the pivot model. Suppose there are $N$ issues and $T$ periods. For any period $t$, let the EGI be $[L_t, R_t]$, and the proposer be $P_t$, where $L_t \leq P_t \leq R_t$. In the NP model, $L_t$ and $R_t$ are the relevant filibuster and veto pivots while $P_t$ is the floor median. In the PU model, the endpoints of the gridlock interval are defined by the majority and minority party medians while $P_t$ is the majority party median. In the AS model, $P_t$ and one of the EGI endpoints are both defined as the majority party median while the other EGI endpoint is the relevant filibuster or veto pivot. Finally, in the GK model, $L_t$, $R_t$, and $P_t$ are the same as in the NP model but there is an additional player $G_t$, which is the House majority party median.

For any issue $i \in \{1, \ldots, N\}$ and period $t \in \{1, \ldots, T\}$, denote the status quo by $q^i_t$ and the policy outcome by $x^i_t$. In the initial period, $t = 1$, status quo policies are independently and identically distributed (according to distributions described below). Within every period $t$, policy-making is independent across issues and the outcome follows from standard subgame perfect equilibrium analysis of the model. In the NP, PU, and AS models, the

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13 We follow Chiou and Rothenberg’s (2003) Propositions 1-4 for determining the locations of the pivots $L_t$ and $R_t$ in the NP, PU, and AS models, and we adopt their convention in assuming that the proposer $P_t$ is the Senate floor median in the NP model and that it is the Senate majority party median in the PU and AS models.
outcome function is

\[
x_i^t(q_t) = \begin{cases} 
    P_t & \text{if } q_t^i \leq 2L_t - P_t \\
    2L_t - q_t^i & \text{if } 2L_t - P_t < q_t^i \leq L_t \\
    q_t^i & \text{if } L_t < q_t^i \leq R_t \\
    2R_t - q_t^i & \text{if } R_t < q_t^i \leq 2R_t - P_t \\
    P_t & \text{if } 2R_t - P_t < q_t^i 
\end{cases}
\]  

(2)

In the GK model, the outcome function depends on the location of \(G_t\) relative to the gridlock interval. If \(L_t \leq G_t \leq R_t\), then the outcome is the same as in (2) because the gatekeeper always weakly prefers the outcome of the lawmaking game to the status quo. However, if \(G_t\) lies outside of the interval \([L_t, R_t]\), then there is an additional region of gridlocked status quo points. If \(G_t < L_t\), the outcome function is

\[
x_i^t(q_t) = \begin{cases} 
    P_t & \text{if } q_t^i \leq G_t - P_t \\
    q_t^i & \text{if } G_t - P_t < q_t^i \leq R_t \\
    2R_t - q_t^i & \text{if } R_t < q_t^i \leq 2R_t - P_t \\
    P_t & \text{if } 2R_t - P_t < q_t^i 
\end{cases}
\]  

(3)

and while if \(G_t > R_t\), it is

\[
x_i^t(q_t) = \begin{cases} 
    P_t & \text{if } q_t^i \leq 2L_t - P_t \\
    2L_t - q_t^i & \text{if } 2L_t - P_t < q_t^i \leq L_t \\
    q_t^i & \text{if } L_t < q_t^i \leq 2G_t - P_t \\
    P_t & \text{if } 2G_t - P_t < q_t^i 
\end{cases}
\]  

(4)

Once the policy outcome \(x_i^t(q_t^i)\) is determined in period \(t\), the status quo for issue \(i\) in period \(t + 1\) is a function of the previous policy and a random shock. Substantively, if Congress enacts a new law, the location of the outcome \(x_i^t\) should be thought of as a statute or law while the random shock should be thought of as changes that occur outside
of the legislative process that affect the location of policy relative to legislators’ preferences. Such changes can occur for many reasons: technical or scientific breakthroughs, economic changes, judicial rulings, bureaucratic implementation, shifts in public attitudes, or because experience showed that the policy did not work quite as intended.

We consider two alternative assumptions about the nature of status quo policies involving the distribution from which the shocks are drawn and the way in which shocks combine with previous policy. Under the normal additive assumption, the status quo is an additive function of the policy outcome and a normally distributed shock,

$$q^{i}_{t+1} = x^{i}_{t}(q^{i}_{t}) + \varepsilon^{i}_{t}, \quad (5)$$

where $\varepsilon^{i}_{t}$ is independently and identically distributed following a normal distribution with mean 0 and standard deviation $\sigma$. We assume that in the initial period (without prior lawmaking) that $q^{i}_{1}$ is also distributed normally with mean 0 and standard deviation $\sigma$. The normal distribution is reasonable because it is natural to assume that most exogenous shocks are relatively small while allowing large shocks to occur with positive probability.

Under the uniform weighted average assumption, the location of the status quo is a weighted average of the outcome and a uniformly distributed shock,

$$q^{i}_{t+1} = \alpha x^{i}_{t}(q^{i}_{t}) + (1 - \alpha)\upsilon^{i}_{t}, \quad (6)$$

where $\upsilon^{i}_{t}$ is independently and identically distributed uniformly over the interval $[-\delta, \delta]$ and $\alpha \in [0, 1]$. In the initial period, $q^{i}_{1}$ is also distributed uniformly over $[-\delta, \delta]$. Although the additive assumption in (5) seems most reasonable to us, the weighted average in (6) has a nice property in that it encompasses both a model of complete status quo dependence (i.e., $q^{i}_{t} = x^{i}_{t-1}$ when $\alpha = 1$) and the fixed, uniform status quo assumption (i.e., $q^{i}_{t} \sim U[-\delta, \delta]$ when $\alpha = 0$). Our estimate of $\alpha$ therefore serves to measure how close the data are to one
of the two extreme models.\footnote{We reiterate that there is an important distinction between a uniform distribution of status quo policies versus a random shock draw from a uniform distribution. In addition, in the absence of new law, the normal additive assumption is equivalent to a random walk while the uniform weighted average assumption is similar to an AR(1) process.}

Finally, in order to apply the model to legislative productivity, let $b^i_t$ be an indicator variable denoting whether or not a bill passes. Formally, $b^i_t = 1$ if $x^i_t \neq q^i_t$ and 0 otherwise, and let the total number of bills that pass at time $t$ be $B_t = \sum_{i=1}^{N} b^i_t$. Since the model is stochastic and $\varepsilon_t^i, \nu_t^i, q_t^i$, and $x_t^i$ are all random variables, it follows that $b^i_t$ and $B_t$ are random variables as well. Thus, the model implies a probability distribution for $B_t$ for each period $t$ that depends on the relevant ideal points $L_t, R_t, P_t$, and $G_t$, as well as the ideal points in periods prior to $t$, the number of issues $N$, and the stochastic shock parameters $\sigma$ (for the normal additive version) or $\alpha$ and $\delta$ (for the uniform weighted average version).

\textbf{Monte Carlo Approximation of the Likelihood Function}

We compute the distribution of $B_t$ using Monte Carlo simulation methods. While it is possible in principle to derive the distribution of $B_t$ analytically, the results would be quite complicated—there certainly would not be a single parametric equation that holds for any configuration of preferences. In order to set the ideal points $L_t, R_t, P_t$, and $G_t$ we use Common Space scores to compute the values corresponding to each pivot-plus-party model. The time periods $t \in \{1, \ldots, T\}$ are the Congresses corresponding to those for which we have legislative productivity data. In addition, we use one Congress immediately preceding the earliest one in the data as $t = 0$ as a starting period. This ensures that the distribution of status quos for the first period of data is not entirely random but dependent on previous lawmaking to some extent. For example, if the actual legislative productivity data correspond to the 80th ($t = 1$) through 106th ($t = 27$) Congresses, then the initial values (for $t = 0$) correspond to the 79th Congress.

The number of issues $N$ and the status quo parameters $\sigma$ and $\delta$ are free parameters. For each shock assumption and set of parameters, $(N, \sigma)$ or $(N, \delta, \alpha)$, we run $K = 10,000$
iterations of the simulation and then we use the results to compute the probability mass function for each \( B_t \). Let \( m_t(n) \) denote the number of iterations for which \( B_t = n \). The PMF is computed as

\[
p_t(B_t = n) = \frac{m_t(n) + 1}{K + N}
\]

(7)

for each \( n \in \{1, \ldots, N\} \) where the \( t \) subscript for \( p \) indicates that each \( p_t \) is a distinct distribution. The calculation of the likelihood is a version of Laplace’s Law of Succession. It differs from a simple proportion in order to deal with a computational issue known as the “zero frequency problem” (Witten and Bell 1991) in which a rare event may not be observed in a finite number of trials even though it is known to occur with positive probability.\(^{15}\)

Once we compute the likelihood function for a given set of parameters, we can then compute the likelihood for any data set on legislative productivity. Given a set of count data \( y_1, \ldots, y_T \), the likelihood of the data is

\[
L(y_1, \ldots, y_T) = \prod_{t=1}^{T} p_t(B_t = y_t),
\]

(8)

and the log likelihood is

\[
\ln L(y_1, \ldots, y_T) = \sum_{t=1}^{T} \ln p_t(B_t = y_t).
\]

(9)

In our analysis, we use several measures of legislative productivity summarized in Table 1. We use counts of legislative enactments from Binder (2003), which span the 80th through 106th Congresses (1947-2000) and for which there are five different levels of salience. An enactment is counted as salient and included in the data if there is at least one New York Times editorial mentioning the issue, and higher levels of salience correspond to a greater number of editorial mentions. We also use a count of enactments based on the

\(^{15}\)In practice, we frequently encounter the zero frequency problem. If we were to use the simple proportion \( m_t(n)/K \), we often end up with likelihoods of 0 because one or more of the frequencies \( m_t(n) \) corresponding to some observed value \( n \) is 0.
Table 1: Summary Statistics for Legislative Productivity Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>N</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binder 1</td>
<td>27</td>
<td>50.11</td>
<td>13.26</td>
<td>31</td>
<td>82</td>
</tr>
<tr>
<td>Binder 2</td>
<td>27</td>
<td>28.93</td>
<td>9.85</td>
<td>11</td>
<td>52</td>
</tr>
<tr>
<td>Binder 3</td>
<td>27</td>
<td>19.52</td>
<td>7.28</td>
<td>4</td>
<td>34</td>
</tr>
<tr>
<td>Binder 4</td>
<td>27</td>
<td>14.93</td>
<td>5.58</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Binder 5</td>
<td>27</td>
<td>11.56</td>
<td>4.37</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>Mayhew</td>
<td>31</td>
<td>10.13</td>
<td>3.62</td>
<td>4</td>
<td>19</td>
</tr>
</tbody>
</table>

updated version of Mayhew’s (1991) Sweep One series, which covers the 80th through 110th Congresses (1947-2008). A legislative enactment is included in the series if it is discussed in end-of-year assessments of legislative accomplishments. Note that the average and maximum number of enactments are relatively small, especially for the higher salience measures, which suggests that it is important to take into account variation due to uncertainty in small samples, which our method does.

We maximize the likelihood function using a simple grid search for each pivot-plus-party model and for each assumption about the stochastic shocks. For parameters, let $N$ ranges from 25 to 105 in increments of 5, $\sigma$ ranges from 0.025 to 0.55 in increments of 0.025, $\delta$ ranges from 0.35 to 1.25 in increments of 0.025, and $\alpha$ ranges from 0 to 1 in increments of 0.05.\footnote{To make the length of time needed to run the simulations manageable, we conducted the grid search in a two-step process. First, we used a “coarse” grid search with larger increments. We then performed a “finer” grid search with the smaller increments in neighborhoods around the maxima from the “coarse” search.}

**Results**

As a starting point, Table 2 shows the fit of our four theoretical-statistical models to Binder’s level 4 productivity data, which is the level of salience used in Chiou and Rothenberg’s (2003) analysis. Several findings are noteworthy. First, the single best-performing gridlock model is the party agenda setter (AS) model, in which the majority party has a moderate degree of
Table 2: Maximum Likelihood Results, Binder Measure (Salience 4), 80th – 106th Congresses

<table>
<thead>
<tr>
<th>Shock</th>
<th>Model</th>
<th>LL</th>
<th>Issues</th>
<th>σ or δ</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Add.</td>
<td>AS</td>
<td>-92.25</td>
<td>40</td>
<td>0.200</td>
<td></td>
</tr>
<tr>
<td>Normal Add.</td>
<td>GK</td>
<td>-96.32</td>
<td>30</td>
<td>0.475</td>
<td></td>
</tr>
<tr>
<td>Normal Add.</td>
<td>NP</td>
<td>-101.03</td>
<td>30</td>
<td>0.275</td>
<td></td>
</tr>
<tr>
<td>Normal Add.</td>
<td>PU</td>
<td>-108.70</td>
<td>45</td>
<td>0.200</td>
<td></td>
</tr>
<tr>
<td>Uniform WA</td>
<td>AS</td>
<td>-90.44</td>
<td>35</td>
<td>0.525</td>
<td>0.15</td>
</tr>
<tr>
<td>Uniform WA</td>
<td>NP</td>
<td>-94.61</td>
<td>35</td>
<td>0.375</td>
<td>0.05</td>
</tr>
<tr>
<td>Uniform WA</td>
<td>GK</td>
<td>-95.28</td>
<td>30</td>
<td>0.900</td>
<td>0.20</td>
</tr>
<tr>
<td>Uniform WA</td>
<td>PU</td>
<td>-107.71</td>
<td>60</td>
<td>0.925</td>
<td>0.60</td>
</tr>
</tbody>
</table>

party influence. This holds for both shock assumptions. Second, the model with the strongest level of party influence performs the worst, again regardless of the shock assumption.\textsuperscript{17} The non-partisan baseline (NP) and the weakest version of party influence (GK) fall in between. Under the normal additive assumption, GK clearly outranks NP, while under the uniform weighted average assumption, NP just barely outperforms GK. These results contrast with the results of Chiou and Rothenberg’s (2003) gridlock interval tests, which ranks PU the highest.

Because all of the models in Table 2 are estimated using the same data, it is appropriate to compare shock assumptions by comparing the likelihoods while holding the theoretical assumptions about party strength constant. For three of the four theoretical models, the uniform weighted assumption produces a better fit. Also, the values of $\alpha$ are low for the AS, GK, and NP models (0.05 to 0.20) and high for the PU model (0.60). The relatively low values of $\alpha$ for the AS model suggest that most status quo policies are more random than inherited, but the fact that they are non-zero nevertheless also suggests that inherited status quos do play some role in generating the data.\textsuperscript{18}

\textsuperscript{17}These results also hold if we assume that the shock distribution is logistic additive instead of normal additive. The results for the logistic distribution are substantially similar to those for the normal distribution, so we omit them from the presentation.

\textsuperscript{18}This result might be due to time constraints and the possibility that the agenda setter chooses some subset of policies outside the gridlock interval to place on the agenda rather than placing all such policies on the agenda. Such a model would be an interesting extension for future work but introduces additional parameters and requires additional assumptions about the agenda setting process.
To get a better sense of why the model with party agenda setting power (AS) fares better than the strongest party unity model (PU), Figure 4 presents observation-specific likelihoods using uniform weighted average shocks, plotted against the observed productivity levels. Overall, there are 17 observations for which the AS likelihood (circle) is higher than the PU likelihood (triangle). Both models appear to fit well with the middle-range of productivity levels as well as for extremely low levels (high gridlock), and for many observations the difference in fit between the two models is small. The PU model appears to do somewhat better for a few congresses with observed productivity in the mid-to-low range (6-10 bills) while the AS appears to do much better when observed productivity is high (more than 18 bills).

Note that the fit of the PU model for four observations (88th, 89th, 94th, and 95th) is especially poor, as the triangles are at the bottom of the figure. Each of these observa-
tions corresponds to unified Democratic government with filibuster-proof Senate majorities, which implies that the PU model gridlock interval is essentially zero for these observations, so the distributions of $B_t$ for these congresses put all of the mass at the maximum level of productivity, $B_t = N$. But since the value of the parameter $N$ selected by maximum likelihood differs from the observed productivity level, the probability mass put on the observed level is zero. Thus, these are observations for which the zero-likelihood problem is relevant, although the root cause of the zero-likelihoods is theoretical rather than computational: the PU model predicts congresses with EGI widths of zero under unified government with a filibuster-proof Senate majority and therefore predict full productivity.

In contrast, the fit of the AS model for each of these Congresses (88th, 89th, 94th, and 95th) is very high, which suggests that the observed level of legislative productivity is close to the mode of the probability mass function. Moreover, the AS model fits very poorly for only one congress (103rd). There is also only one observation (96th) for which the PU model does substantially better than the AS model. Overall, Figure 4 suggests that the AS model has the best overall fit because it predicts all levels of observed productivity well.

In Table 3, we present the maximum likelihood results using counts from Mayhew’s Sweep One data as the productivity measure. Mayhew’s measure tends to count fewer pieces of legislation as highly significant than Binder does, and his data span a longer time period that includes the four Congresses during George W. Bush’s administration. Table 3 shows that the ranking of the AS, NP, and PU models are identical to Table 2: the AS model clearly outperforms the baseline NP, which outperforms the (worst-fitting) PU model. However, in contrast to the results using the Binder level 4 measure, we find that for the most salient legislation, the GK model—the pivot-cartel hybrid—consistently does the best. These results suggest that parties might exercise a mix of positive and negative agenda control, though our method does allow us to make distinctions on individual bills.

There are also a few other differences between the results for the Binder and Mayhew measures. For the Mayhew measure, the normal additive shocks outperform their uniform
Table 3: Maximum Likelihood Results, Mayhew Productivity, 80th – 110th Congresses

<table>
<thead>
<tr>
<th>Shock</th>
<th>Model</th>
<th>LL</th>
<th>Issues</th>
<th>σ or δ</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Add.</td>
<td>GK</td>
<td>-103.35</td>
<td>25</td>
<td>0.375</td>
<td></td>
</tr>
<tr>
<td>Normal Add.</td>
<td>AS</td>
<td>-105.19</td>
<td>25</td>
<td>0.250</td>
<td></td>
</tr>
<tr>
<td>Normal Add.</td>
<td>NP</td>
<td>-116.16</td>
<td>25</td>
<td>0.225</td>
<td></td>
</tr>
<tr>
<td>Normal Add.</td>
<td>PU</td>
<td>-121.63</td>
<td>25</td>
<td>0.275</td>
<td></td>
</tr>
<tr>
<td>Uniform WA</td>
<td>GK</td>
<td>-108.63</td>
<td>25</td>
<td>1.050</td>
<td>0.45</td>
</tr>
<tr>
<td>Uniform WA</td>
<td>AS</td>
<td>-115.52</td>
<td>25</td>
<td>1.175</td>
<td>0.65</td>
</tr>
<tr>
<td>Uniform WA</td>
<td>NP</td>
<td>-124.46</td>
<td>25</td>
<td>1.025</td>
<td>0.65</td>
</tr>
<tr>
<td>Uniform WA</td>
<td>PU</td>
<td>-133.16</td>
<td>30</td>
<td>1.250</td>
<td>0.65</td>
</tr>
</tbody>
</table>

weighted average counterparts for each model. For the GK model, the normal additive shock does better by 5 points in the log likelihood scale, and for the AS model, it does better by over 10 points. In terms of the $\alpha$ parameter, our estimates put much greater weight on $\alpha$ for the Mayhew measure ($\alpha = 0.65$ for AS) than for the Binder measure ($\alpha = 0.15$). This provides evidence against the fixed uniform status quo assumption, but we view it tentatively since there is no clear “winner” across both two data series in terms of the random shock assumptions.

We also fit the models to several additional measures of gridlock from Binder (2003) in which the level of salience for inclusion in the count vary. While this analysis serves partly as a robustness check to see whether the ranking of models and the parameter estimates hold across the different measures, it also allows us to examine whether party influence might vary with the salience of legislation. To the extent that party resources are scarce and party leaders wield them primarily to enhance the party’s electoral reputation (as emphasized by, e.g., Aldrich 1995, Cox and McCubbins 2005), we would expect the party to conserve its influence only for the most salient legislation. We caution that while our analysis may shed some light on this possibility, it does not serve as a rigorous test of the hypothesis.

The results for the best fitting model for each data series are summarized in Table
Table 4: Summary of Results, Varying Levels of Salience

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Shock</th>
<th>Model</th>
<th>LL</th>
<th>Issues</th>
<th>σ or δ</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binder 1</td>
<td>Normal Add.</td>
<td>PN</td>
<td>-156.02</td>
<td>90</td>
<td>0.325</td>
<td></td>
</tr>
<tr>
<td>Binder 2</td>
<td>Normal Add.</td>
<td>PU</td>
<td>-123.44</td>
<td>80</td>
<td>0.200</td>
<td></td>
</tr>
<tr>
<td>Binder 3</td>
<td>Normal Add.</td>
<td>AS</td>
<td>-112.06</td>
<td>45</td>
<td>0.225</td>
<td></td>
</tr>
<tr>
<td>Binder 4</td>
<td>Normal Add.</td>
<td>AS</td>
<td>-92.25</td>
<td>40</td>
<td>0.200</td>
<td></td>
</tr>
<tr>
<td>Binder 5</td>
<td>Normal Add.</td>
<td>AS</td>
<td>-81.98</td>
<td>25</td>
<td>0.250</td>
<td></td>
</tr>
<tr>
<td>Mayhew</td>
<td>Normal Add.</td>
<td>GK</td>
<td>-103.35</td>
<td>25</td>
<td>0.375</td>
<td></td>
</tr>
<tr>
<td>Binder 1</td>
<td>Uniform WA</td>
<td>PN</td>
<td>-155.46</td>
<td>85</td>
<td>0.725</td>
<td>0.25</td>
</tr>
<tr>
<td>Binder 2</td>
<td>Uniform WA</td>
<td>PN</td>
<td>-119.17</td>
<td>55</td>
<td>0.45</td>
<td>0.10</td>
</tr>
<tr>
<td>Binder 3</td>
<td>Uniform WA</td>
<td>PN</td>
<td>-106.30</td>
<td>40</td>
<td>0.475</td>
<td>0.20</td>
</tr>
<tr>
<td>Binder 4</td>
<td>Uniform WA</td>
<td>AS</td>
<td>-90.44</td>
<td>35</td>
<td>0.525</td>
<td>0.15</td>
</tr>
<tr>
<td>Binder 5</td>
<td>Uniform WA</td>
<td>AS</td>
<td>-80.87</td>
<td>25</td>
<td>1.050</td>
<td>0.55</td>
</tr>
<tr>
<td>Mayhew</td>
<td>Uniform WA</td>
<td>GK</td>
<td>-108.35</td>
<td>25</td>
<td>1.050</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Interestingly, it does appear that party influence varies with the salience of legislation. At the lowest level of salience (Binder 1), the model without party influence does the best for both shock assumptions. At the next two levels, the results are not entirely consistent across shock assumptions. The non-partisan model fits the best for Binder 2 and Binder 3 under the uniform weighted average assumption, which outperforms the PU model for Binder 2 and the AS model for Binder 3 under the normal additive assumption. For both Binder 4 and Binder 5, the AS model fits the best, with the results again consistent across shock assumptions, and the only data for which the GK model fits best is Mayhew’s. Also, with one exception (Binder 2), the PU model does worse than the NP, AS, and GK models, but the preference only PN model is a very close second for Binder 2, with a log likelihood of $-123.91$.) Overall, these results are consistent with the interpretation that if parties’ resources are limited, they will use their influence only on high profile and significant legislation.

To facilitate comparison with work that compares “pure” non-partisan with “pure” partisan lawmaking models, we also computed likelihoods for a non-hybridized party gate-

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19Full results for each salience level, like those given in Tables 2 and 3, can be found in the Supporting Information.

20It is also reassuring that the estimated value of \( N \) is decreasing in salience.
Table 5: Pivots, Cartels, and Hybrids

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Shock</th>
<th>Hybrid Pivots-Cartel</th>
<th>Pivots Only</th>
<th>Cartel Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binder 1</td>
<td>Normal Add.</td>
<td>-164.26</td>
<td>-156.02*</td>
<td>-181.82</td>
</tr>
<tr>
<td>Binder 2</td>
<td>Normal Add.</td>
<td>-135.91</td>
<td>-123.91*</td>
<td>-172.38</td>
</tr>
<tr>
<td>Binder 3</td>
<td>Normal Add.</td>
<td>-120.34</td>
<td>-113.65*</td>
<td>-141.15</td>
</tr>
<tr>
<td>Binder 4</td>
<td>Normal Add.</td>
<td>-96.32*</td>
<td>-101.03</td>
<td>-123.00</td>
</tr>
<tr>
<td>Binder 5</td>
<td>Normal Add.</td>
<td>-86.47*</td>
<td>-89.80</td>
<td>-119.19</td>
</tr>
<tr>
<td>Mayhew</td>
<td>Normal Add.</td>
<td>-103.35*</td>
<td>-116.16</td>
<td>-134.53</td>
</tr>
<tr>
<td>Binder 1</td>
<td>Uniform WA</td>
<td>-164.56</td>
<td>-155.46*</td>
<td>-156.18</td>
</tr>
<tr>
<td>Binder 2</td>
<td>Uniform WA</td>
<td>-134.08</td>
<td>-119.17*</td>
<td>-145.73</td>
</tr>
<tr>
<td>Binder 3</td>
<td>Uniform WA</td>
<td>-117.91</td>
<td>-106.63*</td>
<td>-131.62</td>
</tr>
<tr>
<td>Binder 4</td>
<td>Uniform WA</td>
<td>-95.28</td>
<td>-94.61*</td>
<td>-110.01</td>
</tr>
<tr>
<td>Binder 5</td>
<td>Uniform WA</td>
<td>-87.92</td>
<td>-83.02*</td>
<td>-104.56</td>
</tr>
<tr>
<td>Mayhew</td>
<td>Uniform WA</td>
<td>-108.63*</td>
<td>-124.46</td>
<td>-119.18</td>
</tr>
</tbody>
</table>

* indicates best fit

keeping model. In this model, which is Cox and McCubbins’s (2005) cartel agenda model for the House, we assume that if the majority party chooses to allow an issue on the agenda, the outcome will be the floor median’s ideal point (i.e., under an open rule). Table 5 presents results that compare the NP and GK results with those from the pure cartel model. When restricted to these three possibilities, the non-partisan pivots only model does the best for the three lowest levels of salience (Binder 1, 2, and 3 for both shock assumptions, and also for Binder 4 and 5 under the uniform weighted average assumption). The hybrid pivots-cartel model does the best for the highest levels of salience (Mayhew for both shock assumptions and Binder 4 and 5 under the normal additive assumption). Importantly, we note that the pure cartel gatekeeping model performs the worst for all of the data. The results in Table 5 reinforce the importance of supermajoritarian pivots and suggest that party influence plays a role above and beyond, but does not supplant, these basic institutional constraints.

21See the Supporting Information for results for alternative gatekeeping models.
Conclusion

Models, whether theoretical or statistical, have become essential tools for producing and refining scientific knowledge about parties and legislative processes. Formalization ensures that assumptions and derivations are transparent and that the logic of a theory is internally consistent. This is no less true when moving from theoretical models to testing their empirical implications. In some cases comparative statics can be derived without additional assumptions, but it is often the case that deriving clear predictions requires auxiliary hypotheses.

In the case of spatial models of lawmaking and legislative productivity, theory testing requires assumptions about the nature of status quo policies. The gridlock interval test assumes that status quo policies are fixed and uniformly distributed, but this assumption is restrictive and substantively incompatible with the theories of lawmaking that the models represent because it denies historical dependence. We demonstrate how under less restrictive assumptions, the relationship between gridlock interval width and observed gridlock becomes indeterminate and cannot be tested in a regression framework. We solve this problem by constructing a general theoretical-statistical model of legislative productivity in which status quo policies depend on both prior lawmaking and exogenous stochastic shocks, and the flexibility of our model increases confidence in the inferences that we can draw from it.

Our methodological innovation leads to substantive results that, while consistent with the overall pivots-plus-party story in previous work, yield distinct conclusions about the nature of party influence. We are in broad agreement with Chiou and Rothenberg (2003) and Richman (2011) that there is room for a theoretical middle ground in which parties play an important role within the context of supermajoritarian decision-making. Models of pivotal politics are sometimes presented as incompatible with partisan politics, but this is not the case. Our evidence suggests that both kinds of models capture important aspects of the lawmaking process. But we also show that the party influence is not unlimited. The majority party is influential on highly salient legislation but plays little or no role in
shaping outcomes on less significant issues. It therefore appears that parties exert influence where it is most likely to enhance their brand names. Furthermore, our analysis shows that parties wield influence through agenda control rather than by inducing their members to behave cohesively. Not only does this result reinforce our conclusion that parties face (at least some) limits on their power, but it also implies that party influence will affect outcomes rather than behavior and that there is substantial asymmetry between majority and minority party influence.

Our finding that party influence varies by salience and the mixed evidence we present for both positive and negative agenda power suggest at least two new avenues for future research. One possibility is to extend our model by incorporating various constraints on scheduling or agenda power. For instance, an extended model might explicitly limit the number of bills that can be placed on the agenda, the number of bills that the majority party can bring up under a closed rule, or the number of bills that the legislative median will allow the majority party median to block. Such extensions would add additional parameters and require an explicit model of agenda choice. Another related direction would be to investigate the types of issues or political conditions under which parties will choose to exert their influence, for which our approach and other methods for analyzing aggregate outcomes are not well-suited. That is, it may be that the conditions for party influence vary not only across time (in terms of preference shifts caused by elections), but also across issues and policy areas (in terms of relevance to parties and their constituents).

References


