PIVOTS AND BILLS:
TESTING MODELS OF APPROPRIATIONS

Abstract: Scholars have focused on the role of the median member of Congress, the party, and the committee in modeling congressional policymaking. This paper formalizes these models into a common framework so that they can be evaluated against each other using a new dataset of the budget from 1955-2002 that is the first to make appropriations data comparable across time. Findings from time series regressions by appropriations bill show little support for any of the dominant models of policymaking. This analysis also indicates that the incremental models of the budget prevalent in the early literature predict spending quite well, suggesting a new focus on the inception of budget accounts.

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Observers of Congress often focus their analysis on the role of the 218th vote for legislation, the role of the party, or the role of the committee when commenting on the politics of policy formation. Of course, knowing which actors yield power in the policy-making process is also of vital importance to political scientists. The importance of this question has led many scholars to develop numerous models of the policymaking process. Scholars have focused on the role of committees (Shepsle and Weingast 1987), parties (Cox and McCubbines 1993, Aldrich and Rohde 2000), and the pivotal members of the legislature (Krehbiel 1998, Brady and Volden 1998, 2006). This paper develops the first rigorous comparative test of these models to determine the relative importance of party, committee and floor median legislators to the policymaking process.

These models provide different understandings of who has legislative power. Yet previous work leaves unresolved which of these models applies. Although a range of scholars provide indirect tests,1 compelling comparative tests of these models have proven difficult for two primary reasons. First, the models are not specified in such a way to facilitate simultaneous tests: they all employ different modeling strategies and assumptions. Second, and more importantly, scholars have been unable to measure adequately the spatial location both of the status quo and of the policy outputs.

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1 There have been some attempts to test the indirect predictions of the models using other observable implications (Groseclose, Levitt, and Snyder 1999, Krehbiel 1998, Brady 1998, Binder 1999, Binder et. al 1999, Krause 2000, Schickler 2000, and others).
This paper resolves both dilemmas. First, it formalizes the models in a common framework that makes it possible to test them directly against one another. Second, it uses a new dataset with unprecedented power to measure policy outputs in a meaningful and rigorous fashion. Although others have studied the budget and even used it for model testing, the key to this new dataset is that it tracks appropriations and supplemental appropriations at the smallest possible level, the budget account. This low degree of aggregation means that the budget data can be made consistent across time, can account for supplemental spending, can account for the status quo, and can be matched properly with the political variables, something even the Office of Management and Budget has not done.

Using this new budget dataset, my findings from time series regressions by appropriations bill show little support for any of the dominant models of policymaking. However, my findings suggest two additional potential approaches to testing these models, and these are discussed in the final section. The first approach is to test the models on a well-studied policy area that allows for more nuanced predictions of cross-time variation in when the models will apply. The second approach, suggested by findings that an incremental model predicts spending better than the pivot-based models, is to investigate more closely the year of inception of the disaggregated budget accounts. Nonetheless, the lack of support for the pivot-based models suggests that none of our political science models provide an adequate understanding of policymaking that applies across time and across policy areas.

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2 See, for example, Aldrich, Gomez, and Merolla 2005.

3 These data have been checked by the Office of Management and Budget and by the Congressional Budget Office. Both agencies agree that the dataset used here is the proper way to track appropriations consistently over time.
This paper proceeds as follows: The first section presents the formal models used in these tests, clearly stating the assumptions and combining all three models into the pivotal politics framework. The second section presents the new budget dataset used to test the models. It goes into some detail on the importance of accounting for supplemental appropriations, tracking spending at the budget account level, and adjusting the budget to calendar years to match the political variables. It also illustrates the variation in the various medians as measured by ADA scores. The third section tests the three models against the baseline model of incrementalism, with its focus on the budget in time $t-1$ as a predictor of the budget in time $t$.

Section 1. Theory

In order to test the models against each other, it is important to 1) formalize the sometimes informal models of policymaking and 2) integrate them into the same framework for comparison. After briefly reviewing the literature that spawned the theories of policy formation, this section outlines the formal model used for each of the theories of policymaking.

Beginning in the 1960s when the Congressional literature began to flower, observers became interested in studying the role of committees. Fenno (1966) provided an in-depth analysis of the Appropriations Committee and Manley (1965, 1970) analyzed the Ways and Means Committee. These in turn became the basis for formal models developed in the 1970s and 1980s, predicting that the committee system plays a key role in determining policy outputs (Shepsle 1979, Shepsle and Weingast 1987). Legislators who want to secure distributive benefits for themselves delegate control over particular policy areas to committees who can facilitate the necessary logroll. These committee models predict that policy will track with the location of the committee.
Then, in the 1980s scholars began to observe that parties appeared to be more active, prompting studies of the role of party, including those by Rohde (1991) and Sinclair (1989). These studies were the basis for more formal models featuring parties developed in the 1990s (see Cox and McCubbins 1993 and Aldrich and Rohde 2000a, 2000b for the two main examples). While the specifics can vary, the simplest specification has the median member of the majority party in control of the agenda. These party-based theories predict that policy outcomes will be affected by the spatial location of the majority party.

In response to these committee and party studies, a preference-based critique arose in the 1990s. Krehbiel (1998) and Brady and Volden (1998) developed spatial models of American politics that identify the key players whose votes are necessary for the passage of legislation. Under various voting rules and configurations of preferences, these pivotal players can be the filibuster pivot, the veto pivot, or the median voter. Once the pivotal players have been identified, these theories enable predictions about when policy will change and the direction of policy change. The key attribute of these theories is their role for individual “pivotal” lawmakers instead of parties or committees.  

4 Of course, throughout this time period, there have been those who argue that “it depends”. More traditional models of policy formation, in contrast to these general models, suggest that policy formation may vary across policy areas and even across time. For example, Mayhew (1966) examines the role of party in determining agricultural policy between 1947 and 1962 and finds that the role of party varies over this time period. He also analyzes other policies, such as city, labor, and Western issues, finding a different role for party in each. Lowi (1964) and others also argue that policymaking changes over time and across issues. There are many other models of policymaking that are rich in detail. Sinclair (2000) analyzes the “unorthodox” ways in which policy gets passed in recent Congresses and Kingdon (1984) examines why some issues make it onto the national agenda to become policy (for other examples see
At their most basic level, legislative theories of politics predict that the key players in the policy process will pull the location of policy toward their own ideal points. In its simplest version, Black’s (1948) Median Voter Theorem predicts that under majority rule with an open amendment process, a collective body will pass policy at the ideal point of the median voter, the pivotal player. Building on this basic model, theorists developed spatial models that rely on understanding the location of these necessary, or “pivotal”, players. Using this concept of pivotal players, this section sets out a model based only on preferences with no role for party, one with an agenda-setting role for the majority party embedded within the pivotal politics framework, and one with an agenda-setting role for the committee. It applies these models specifically to the appropriations process and explicitly addresses the assumptions embedded in the models.

**Basic Model**

Like Krehbiel and Brady and Volden, this project assumes a unidimensional policy space and players with ideal points and symmetric single-peaked preferences. Following Chiou and Rothenberg (2003), however, it extends the unicameral model to a bicameral legislature. In order to incorporate the second chamber, the model explicitly considers the sequential decision-making process (Fenno 1966, Polsby 1984, and Sinclair 1995 among many others). Additionally, a rich existing literature examines specific policy areas, including Derthick (1990) on Social Security and Hansen (1991) on agriculture. Unfortunately, the rich description of each policy area usually trades off with a cohesive predictive framework that would allow their predictions to be tested in other policy areas, giving an indication of the generality of their findings.

5 The assumption of a unidimensional policy space is particularly benign within individual appropriations bills.
process. The game is as follows: 1) the House agenda setter proposes a bill; 6) 2) the House votes on whether to accept this bill or resort to zero spending; 7) 3) the Senate median either accepts the bill under a closed rule or rejects it leading to zero spending; 4) the filibuster pivot decides whether to filibuster, which would lead to the reversion point outcome, or to accept the House median’s proposal; 8) 5) the President signs or vetoes the proposal; and 6) if the bill is vetoed, the veto override pivot in each chamber decides whether to sustain or override the President’s veto.

**Floor Model Agenda Setter**

In the floor-based model, the agenda setter who makes the proposal in stage 1 of the game is simply the House median. This reflects the majoritarian nature of the House. Alternatively, a proposal at the median could simply be the result of sequential voting under an open rule. The key attribute of the floor-based model is that the proposal in Stage 1 is at the median of the House.

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6 Assigning the proposal rights to the House differs from Chiou and Rothenberg’s assignment of proposal rights to the Senate. Since the House addresses appropriations legislation first under the Constitution and in practice, this is likely to be a more accurate representation of the process. For their analysis, assignment of agenda control did not change the equilibrium gridlock interval, since the pivotal players remained the same. However, when the reversion point is zero the assignment of agenda control directly determines the equilibrium policy outcome since the reversion point zero results in a point prediction of policy at the ideal point of the agenda setter.

7 This assumption of a reversion point of zero is discussed in further detail later in this section.

8 There are two filibuster pivots, one on the left and one on the right, but the one on the side of the President becomes irrelevant, since the veto pivot is more extreme.
**Party Model Agenda Setter**

While the floor-based pivotal politics models specifically eschew a role for party, other models of policy formation posit a key role for parties in determining policy output (see, for example, Aldrich 1995, Cox and McCubbins 1993, Kiewiet and McCubbins 1991, and Rohde 1991). One way to think of these models is to consider the majority party to be in control of the agenda. This conception of party is much more similar to the *Legislative Leviathan* concept of party from Cox and McCubbins (1993, 2005) than to the conditional party government conception of party from Rohde (1991), Aldrich (1995) and Aldrich and Rohde (1998, 2000a, 2000b, 2001). It posits an agenda setting role for party regardless of the size or homogeneity of the majority party.  

This paper assumes that there is a majoritarian process within the party that leads to policy proposals at the ideal point of the median member of the majority party. There are several ways that such a policy proposal could arise. Most simply, we could think of the majority party as electing a leader to be in charge of the agenda. An open nominations process would result in the leader being the median member of the party. Or, the party caucus could simply vote first under majority rule with an open amendment process on any proposal to go to the House floor. This would lead to a party proposal at the median of the majority party.  

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9 The most directly comparable work with the budget tests the conditional party government model of the budget. Aldrich, Gomez and Merolla (2006) assess whether conditional party government plays a role in budgetary outcomes by including it and interactions of it with the pivotal members in regressions. They find that size and strength of the party matters for House passed appropriations, but they do not address overall policy outcomes.

10 Chiou and Rothenberg incorporate party in an alternate way assuming that everyone in the majority party votes as the median member of the party would. This is an admittedly strong version of party
This proposal by the median member of the majority party then becomes the first stage of the game outlined above subject to a closed rule. The assumption of a closed rule is made more plausible by three facts. First, the median member of the House is a member of the majority party and presumably agreed to the process of allowing the median member of the majority party to set the agenda. Second, closed rules are, in practice, quite common. They were applied to 28% of all bills in the 108th Congress, although this was higher than in previous years (Wolfensberger 2005). Third, the Rules Committee, which assigns the rules to legislation, is the most unbalanced in partisan terms of all of the committees. In the recent Congresses, the House Rules Committee has had 9 Republicans and 4 Democrats, a ratio of more than two to one, whereas other committees, such as Resources (25 Republicans and 21 Democrats) and Judiciary (22 Republicans and 16 Democrats) were more balanced.

**Committee Model Agenda Setter**

A third model of policymaking considers the committees to be integral players in the policy process. Beginning with studies such as Fenno’s (1966) analysis of the Appropriations Committee and continuing through Shepsle and Weingast (1987), who proposed that committees could serve to solve the cycling problem inherent in voting by exercising property rights over their particular issue areas, there has been ongoing discussion over the role of committees. Committees can be incorporated into the same model used above for the floor-based and party-based model by replacing the first step of the model. Instead of the House median proposing a
level of spending, the committee proposes a level of spending at the ideal point of the median member of the committee. In the simplest model, committees determine the policy proposal and have a closed rule on the House floor.\footnote{Note that this is different from the assumption that committees have ex post veto power (see Krehbiel 1987 for a discussion of this issue).} It represents the basic feature of the committee model: that the policy outcome is at the ideal point of the median committee member, rather than the median of the House or the party.

**Model Solution**

All players are assumed to have complete information, and thus the appropriate solution concept in this dynamic game is subgame perfect Nash Equilibrium. This game represents the bicameral version of the pivotal politics model when the status quo is exogenous. However, in applying this model to appropriations, the additional assumption, that the reversion point is zero can be made.

In the unicameral legislature that Krehbiel considers, the zero reversion point assumption implies that appropriations will simply track the preferred level of appropriations of the median voter as long as the zero reversion point is extreme “enough”\footnote{For Euclidean preferences, it is sufficient for the zero reversion point to be less than \(2^{*}\min(\text{filibuster pivot}, \max(\text{president, veto pivot}))\)-median, where the names represent the various pivotal players’ ideal points. That is, the reversion point must be far enough from the median voter to lead the otherwise pivotal players to prefer the median voter’s proposal to zero appropriations.}. Similarly, at each stage of this bicameral game, the players, choosing between the proposal of the agenda setter of the House and zero spending, accept the proposal of the agenda setter. Thus, for appropriations with a zero
reversion point, the model predicts policy outcomes at the ideal point of the agenda setter of the House.

Figure 1 illustrates one possible configuration of preferences under the floor-based model. Note that as long as zero is less than $2 \times \min(\text{filibuster pivot, } \max(\text{president, veto pivot})) - \text{median}$, each of the pivotal players prefers the proposal at the ideal point of the median voter of the House to resorting to zero appropriations. In the case where the reversion point is zero and spending is large, as with all appropriations bills, this condition should not be difficult to satisfy and becomes a rather benign condition. Thus, each player will accept the median voter’s proposal. To see this, consider the illustrative decision of the filibuster on the left side of the median. While the proposal of the median voter of the House is further to the right than he would prefer, he chooses not to veto because zero is further from his ideal point. For every other player illustrated here, the median voter’s proposal is clearly better than the zero reversion point. Similar logic applies for any other configuration of preferences where the zero reversion point is sufficiently far away.

**Figure 1: Bicameral Model of Appropriations**

Reversion point for appropriations

\[ = 0 \]

\[ \text{Filibuster}_L, \text{MV}_H, \text{MV}_S, \text{Filibuster}_R, \text{Veto}_R, \text{President} \]

Thus, the prediction of the floor-based pivotal politics model for appropriations is that spending will track with movements in the ideal point of the median voter of the House. This leads to the preference-based prediction: *that as the median voter of the House prefers more (less) spending in a given policy area, spending in that area will increase (decrease).*
The equilibrium policy under the party-based model is at the ideal point of the median member of the House majority party. This is the party-based prediction: *that as the median voter of the majority party of the House prefers more (less) spending in a given policy area, spending in that area will increase (decrease).*

By the same logic as above, this leads to the committee-based prediction: *that as the median member of the Committee prefers more (less) spending in a given policy area, spending in that area will increase (decrease).* Each of these hypotheses is tested using the budgetary data.

**Section 2. Data**

**The Budget**

The direct predictions of the models differ in the spatial location of the policy outcomes they predict. The problem with testing these direct implications has been measuring the location of policy. Just how pro-agriculture was the 1996 Farm Bill? The 2002 Farm Bill? To solve this problem of measuring the location of policy, this analysis uses budget data. While it is not clear where most bills fall on an ideological scale, appropriations are already on the scale of dollars. We can thus know for sure the direction of change in appropriations and the magnitude.\(^{13}\)

In addition to being a numerical measure of spatial location, spending is also a plausible representation of policy. As Fenno (1966) puts it, “The power of the purse is the historic bulwark of legislative authority. The exercise of that power constitutes the core legislative process …”

\(^{13}\) The magnitude of change in appropriations is adjusted for inflation since constant funding could actually be a real reduction in spending.
Each year fights in Congress about the funding of the government consume many days of debate. How much money should farmers receive in federal subsidies? Should the Environmental Protection Agency receive more money than last year? Does the Bureau of Reclamation deserve a budget increase or should they make do with last year’s funding level? These decisions have real impacts on the implementation of regulations. In effect, the spending decisions are also policy decisions and allow for measurement of the location of policy outcomes.

To measure the spatial location of policy outputs for a test of the models, this analysis uses a unique dataset of appropriations from 1955-2002 that reconstructs the federal budget to make budget categories comparable across time (Cogan 1998). While the budget has been studied before, researchers have failed to make two crucial adjustments. First, they have failed to take into account supplemental appropriations. This can result in attribution of some spending to those who didn’t authorize it and ignoring some spending. Second, they have failed to adjust the fiscal year budget (October to October) to the calendar year Congresses (January to January). Doing so is a key step in using the budget to test political models. This allows the models to be tested against each other in a cohesive way.

Figure 2 illustrates the importance of these two innovations. First, unlike previous analyses by regular appropriations bills, this dataset accounts for supplemental spending. Wlezien (1993, 1996) showed that appropriators systematically underappropriate in regular appropriations bill knowing that the President can then request more spending in the supplemental appropriations bill. For example, under the Balanced Budget and Emergency

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Deficit Control Act of 1985 emergency spending did not count toward the budget caps. Appropriators learned to place spending for such accounts as the Federal Emergency Management Agency disaster relief in supplemental rather than regular appropriations bills. Although spending for disaster relief in total didn’t change much, an analysis of regular bills would show a decrease in spending.

Looking at Figure 2 below, we see that if the appropriators used this practice with the FY1999 budget and if we didn’t include spending in supplemental appropriations (as illustrated under A), we would attribute a low level of spending to the 1998 Congress. Previous analyses of the budget have not taken supplemental appropriations into account. Given the games that appropriators play, accounting for the supplementals, as this dataset does, prevents attribution of, in this example, low spending in a given area to a Congress that subsequently appropriates a large amount for that area in a later supplemental appropriation bill. It is thus crucial that measures of policy outputs include supplemental appropriations, which can only be done by using disaggregated data.15

Second, this dataset allows for consideration of calendar year, rather than fiscal year, appropriations data. Totals by fiscal year, as illustrated in Figure 2, may include funding authorized in two different calendar years by two different Congresses. By taking into account supplemental bills and the dates of passage of the appropriations bills, the dataset ensures that only spending authorized in a given calendar year is attributed to that session of Congress. Looking again at Figure 2, we can see that taking the total by fiscal year, as many analyses have, would attribute spending for the FY1999 Supplemental bill to the 1998 Congress that didn’t vote

15 See Cogan, Muris, and Schick (1994) for a discussion of the importance of the study of microbudgeting.
for the spending. Additionally, it would not attribute the FY1998 Supplemental spending to the
1998 Congress, which did vote on that spending. When using political variables that are only
available on a calendar year basis, this dataset ensures that measurement of the location of policy
matches up with the timing of the measurement of changes in the positions of the pivotal players.
These two adjustments are key when using the budget as a measure of policy and have generally
been ignored by previous researchers.

This dataset has appropriations broken down by subaccount. These appropriations can
then be aggregated by bill. These totals for each of the thirteen appropriations bills, adjusted for
inflation, serve as the dependent variable in this paper. Although this way of aggregating might
be considered overly broad, the findings are substantively the same when particular policy areas are the unit of analysis, so the lack of support for the models is not a result of bundling together budget areas.

Using the budget as the dependent variable means that the analysis can be informed by extensive previous budgetary analysis. This literature has two main insights when using the budget as a measure of policy. First, it provides general insights into how to model the federal budget, including the structure of the budget and covariates of the level of appropriations. Because the process is a complicated one, the insights that Schick (2000) and Wildavsky (1992) provide into the procedures of the budget and the roles of various political actors are invaluable. Second, many studies have incorporated political explanations into models of the budget and these provide suggestions for both the formal model of the budget and how to operationalize the political variables. This literature helps us to understand both budgetary outcomes and which institutional actors are important.

Structure of the Budget

To account for the slow increase that most spending exhibits, some researchers, drawing on Lindblom (1959, 1964) and Wildavsky (1964), have posited an underlying behavioral model of the budget as incremental. This model is based on the premise that the actors are boundedly rational and use incremental changes to simplify the budgeting process.\(^\text{16}\)

\(^{16}\) Bendor (1995) formalized the Lindblom’s model and found that an incremental search for policy alternatives was not necessarily advantageous (see also Patashnik 1999 for an extension of the bounded rationality model).
Much of the literature on the budget, particularly in the 1960s and 1970s, has attempted to test this incrementalism model. Davis, Dempster, and Wildavsky (1966), for example, explore this basic idea that the level of appropriations and the level of the President’s request in the current year depend in large part on the level of appropriations or requests in the previous year. They find that presidential requests are a fixed mean percentage of last year’s requests and appropriations are a percentage of the previous year’s request plus an autoregressive error term.

This work spurred much criticism and confusion over what incrementalism means and how it should be applied (see Tucker 1982 for a critical analysis of this debate). As Berry (1990) points out, the various researchers have very different conceptions of incrementalism to the point where he argues that the word has lost its usefulness. Accordingly, while this paper continues to use the term incrementalism (contra Berry), it uses a specific definition of incrementalism. The term incrementalism here refers to lawmakers’ lack of attention to the base, as indicated by the correlation of spending in time $t$ with spending in time $t-1$. Despite this discussion of the meaning of the term, many empirical works have found that spending in year $t$ is correlated with spending in year $t-1$. When attempting to explain the level of appropriations, thus, it is crucial to account for this autoregressive process that so many researchers have observed.

In addition to the political models of the budget, economic models tend to find that inflation, for which the spending is already adjusted, and unemployment are drivers of governmental spending. Not surprisingly, the amount of federal spending has been found to vary with the economic conditions of the time (see for example Alesina and Perotti 1996, Barro 1986, Davis, Dempster, and Wildavsky 1974). This analysis controls for unemployment, which is expected to be positively correlated with spending.
**Political Factors in the Budget**

Although few of the studies of the budget explicitly test a formal model of policy-making, many of them include political factors as explanatory variables for the level of appropriations. They use various ways of operationalizing the political factors, including using the ratio of Democrats to Republicans, the number of Democrats, the number of non-southern Democrats, whether Democrats had a majority in both chambers or just one, the party of the President, and transition from a President of one party to a President of another party. The main drawback of this literature is the lack of a linkage between the political variables that are included and an explicit theory as to how these political variables act on the budget. In explicitly

17 For example, Davis, Dempster, and Wildavsky (1974) modify their original model to include more political variables and find that democratic majorities are associated with more spending. Kiewiet and McCubbins (1985) model appropriations as cooperative bilateral bargaining game and include the majority party to explain the level of requests and appropriations. Auten, Bozeman, and Cline (1984) include the ratio of Democrats to Republicans in explaining departmental appropriations and find that it has a significant effect, as do Su, Kamlet, and Mowery (1993). Browning (1985) uses the increase in the number of non-southern Democrats in the House to explain spending on social welfare. Kiewiet and Krehbiel (2001) use changes in the percentage of Democratic seats minus the percentage of Republican seats to predict changes in appropriations. They find an impact for the President, but not for their measure of party. The specification that allows a test of the divided government hypothesis has been used increasingly since Mayhew (1991) directed attention to the role of unified and divided government on policy outcomes. Alt and Lowry (1994, 2000), for example, examine this at the state level and find that Democrats tend to prefer to use a larger share of the state incomes for the public sector, unified governments react more quickly than divided, that when the legislature is divided, there is a small shift in the direction of the governor’s party, and split branch governments adjust more than split legislatures.
testing the implications of formal models of policymaking, this analysis diverges from the previous attempts to explain the budget with political variables and includes only those variables for which the models make explicit predictions.

Following many studies of policy (including Mayhew 1991), favorable public opinion is often found to be associated with increased spending. For example, Stimson, MacKuen, and Erikson (1995) find that changes in public mood are associated with changes in policy activity. While Wlezien (2004) finds a relationship between public opinion and spending in most areas of the budget, Su, Kamlet, and Mowery (1993) find that public opinion plays a role in defense and low-income benefits spending, but not in other areas. Spending on defense appears to be particularly responsive to public opinion. Bartels (1991 and 1994) investigates the causes of changes in public opinion during the Cold War when the high levels of spending in the early 1980s were associated with public preferences for high defense spending. As enthusiasm for defense spending declined later in the 1980s, spending also declined. The following analysis considers whether public opinion in the form of Stimson’s (1999) public mood variable plays a role in policy outputs, controlling for the other political variables, public mood should be most strongly related to spending in the area of defense.

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18 He finds support for public opinion’s impact on the budget in all but cities, crime, space, and foreign aid.
Ideological Location of Members of Congress

To measure the ideological location of the Members of Congress, this paper uses Americans for Democratic Action (ADA) scores. These scores are adjusted using Groseclose, Levitt, and Snyder’s (1999) algorithm to be comparable across time. A higher score indicates a more liberal Member of Congress. The ADA score of the median voter of the House, the median voter of the party, and the median voter of the Appropriations Committee are used to test the models. Figure 3 shows how these scores change over time. Each of them exhibits fairly wide variation. Importantly, they do not all move in the same direction at the same time. The correlation of the House median with the majority party median is 0.59; the correlation of the House median with the Appropriations Committee median is 0.17; and the correlation of the majority party median with the Appropriations Committee median is -0.048.

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19 This analysis could also use Poole and Rosenthal’s (1997) Nominate scores. I simply choose to use the ADA scores. The correlation between ADA scores and Nominate scores over this time period is 0.87.

20 Their method constrains each member’s mean adjusted score (preference parameter) in and across chambers to be constant over time. While this assumption might be problematic in some circumstances, I think that the benefit of having scores that are comparable across time outweighs the costs of making this assumption. Once adjusted, these scores can range from slightly lower than 0 to slightly higher than 100 due to the shift and stretch parameters used to adjust them.
Section 3. Analysis

In their simplest form, the models each predict that spending will track with the median of the body that the model views as critical to policymaking. Of course, we could conceive of more complicated means of operationalizing the models, but as a straightforward test using new
data, parsimony is an obvious advantage. Spending should track with the median voter of the
House if the floor-based model is correct, with the median voter of the party if the party-based
model is correct, and with the Appropriations Committee median if the committee-based model
is correct.

To test these hypothesis, the simplest specification is:

\[
\text{Appropriations}_t = \alpha + \beta \ast \text{Median of House}_t + \gamma \ast \text{Median of Party}_t + \delta \ast \text{Median of Committee}_t + \varepsilon_t
\]

If the floor-based model is correct, then we expect \( \beta \neq 0 \). If the party model is correct, then we
expect \( \gamma \neq 0 \). If the committee model is correct, then we expect \( \delta \neq 0 \). Note that the models of
policymaking do not provide directional hypotheses with respect to each of the bills. That is,
depending on whether the priorities in the bills can be considered to be consistent with the liberal
or conservative position, the coefficient can have a different sign. A positive (negative)
coefficient means that spending increases (decreases) as the median becomes more liberal. The
models predict only that the coefficients will be different from zero: that spending will track with
changes in the median voter at the floor, party, or committee level.

With such time series data, however, there are two major concerns. First, in order to use
standard regression models, the time series must be stationary. Second, we must address any
serial autocorrelation that the series exhibits. This section addresses each of these in turn.

For a time series to be stationary, the mean, variance and autocorrelation structure must
not change over time. Augmented Dickey Fuller (ADF) tests can be used to test for stationarity.
On the thirteen appropriations bill series, the ADF test shows that all of the series are non-
stationary.\(^{21}\) Table 1 presents the results of these tests. First differencing the data can often result
in a stationary time series, allowing the use of standard regression tools. Fortunately, first

\(^{21}\) I have also examined the autocorrelation function plot and the results are the same.
differences of the appropriations bill spending (adjusted for inflation) are stationary according to
the ADF tests on all but two of the appropriations bill series. Thus for first differences, standard
times series methods are appropriate and this analysis proceeds using first differences in
spending by bill as the dependent variable. For completeness Table 2 reports the comparable
results for the two non-stationary series, Legislative and Transportation Appropriations, but they
should be interpreted with caution, since regression methods are not appropriate for these non-
stationary series.

Table 1: Augmented Dickey Fuller Tests for Stationarity

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<tr>
<th>Appropriations Bill Total</th>
<th>First Difference of</th>
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<td>Appropriations Bill Total</td>
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<tr>
<td>DC</td>
<td>-1.59 (0.74)</td>
</tr>
<tr>
<td>Defense</td>
<td>-1.91 (0.61)</td>
</tr>
<tr>
<td>Energy</td>
<td>-3.02 (0.17)</td>
</tr>
<tr>
<td>Foreign</td>
<td>-1.85 (0.63)</td>
</tr>
<tr>
<td>HUD###</td>
<td>-2.28 (0.46)</td>
</tr>
<tr>
<td>Interior</td>
<td>-2.40 (0.41)</td>
</tr>
<tr>
<td>Labor</td>
<td>-2.15 (0.51)</td>
</tr>
<tr>
<td>Legislative</td>
<td>-1.72 (0.68)</td>
</tr>
<tr>
<td>Military Construction</td>
<td>-2.11 (0.53)</td>
</tr>
<tr>
<td>Rural</td>
<td>-2.10 (0.53)</td>
</tr>
<tr>
<td>Transportation</td>
<td>-1.96 (0.59)</td>
</tr>
<tr>
<td>Treasury</td>
<td>-2.15 (0.51)</td>
</tr>
</tbody>
</table>

# The null hypothesis is that there is that the series is non-stationary. These are the results from the augmented
Dickey-Fuller tests with a trend and a maximum of three lags.
## Commerce, Justice, and State Appropriations
### Housing and Urban Development Appropriations

The second common problem with time series data is the presence of serial
autocorrelation. In this case, the first differences generally still exhibit serial autocorrelation and
this serial autocorrelation is modeled directly using generalized least squares models with the appropriate variance structure. The appropriate degree of autoregressive process was chosen on the basis of the Akaike Information Criterion (AIC) and the structure used is noted in the table of results. When the structure is AR(1) or higher, the equations are estimated using maximum likelihood generalized least squares. When the AIC suggests that the structure is AR(0), ordinary least squares is used to estimate the differenced model.

Tables 2A and 2B show results of generalized least squares estimates of the relationship between change in spending by appropriation bill and change in the spatial location of the pivotal members. Importantly, the tests control for changes in unemployment and the public mood via Stimson’s public mood variable. Recall that to reject the null that spending does not track with each of the political models, the coefficient on the respective median must be significantly different from zero. With the exception of three bills, movement in the pivots is not accompanied by movement in spending. For ten of the bills, the data do not allow us to reject the null that spending does not track with the medians. If the floor-based model predicted spending, we would expect the coefficient on the change in the median voter of the House to be different from zero in all or most of the bills. Only three are. If the party model predicted spending, we would expect the coefficient on the median voter of the majority party to be significantly different from zero in most or all of the bills. None are. Finally, if the committee model predicted spending, we would expect the coefficient on the median voter of the Appropriations Committee to be significantly different from zero in most or all of the bills. Only one is. These null results suggest that the pivot-based policymaking models do not predict spending well.

---

22 The Akaike Information Criterion measures the goodness of fit, penalizing for the number of parameters to be estimated (Akaike 1974).
The three exceptional bills are Defense Appropriations, which is spending for personnel and equipment for the military, Foreign Operations Appropriations, which comprises mostly foreign aid expenditures, and Rural Appropriations, which includes such things as agricultural subsidies and rural electrical cooperative spending.

In the Defense Appropriations bill, the coefficient on change in the House median is negative and significant at above the 5% level. This means that as the median member of the House becomes more liberal as measured by ADA scores, spending on defense falls. This is exactly the direction of the relationship that should be expected. In the area of defense spending, the regression provides some evidence consistent with the floor-based model of policymaking. Spending doesn’t track with either of the other two medians (party or committee).

The Foreign Operations Appropriations model shows exactly the opposite sign on the coefficient on change in the House median. As the median voter of the House becomes more liberal, spending on foreign operations, which includes mostly spending on foreign aid, increases. This is consistent with the floor-based policymaking model, which predicts that spending will track with changes in the House median. As with Defense Appropriations, we can’t reject the null of no relationship between spending on foreign operations and movement in the party or committee medians. These coefficients of opposite sign are consistent with, just as we would expect, the fact that liberals prefer spending on foreign aid and conservatives tend to prefer spending on defense-related issues.

The only other model of an appropriations bill consistent with any of the models of policymaking is the Rural Appropriations model. In it, changes in the House median are negatively associated with changes in spending; as the House median becomes more liberal, less is spent on Rural Appropriations. Changes in the location of the committee median are positively
associated with changes in spending; as the Appropriations Committee median becomes more liberal, more is spent on Rural Appropriations. This finding is puzzling for two reasons. First, there is no prima facie reason to expect that the floor and committee should differ in terms of their preferences for Rural spending. The models of policymaking predict the same sign on the coefficients. Second, these findings don’t help to distinguish between the models of policymaking since two of the coefficients are different from zero. Nothing in the data itself allows us to understand why this relationship may hold. Importantly, changes in the House median and changes in the committee median are only correlated at 0.09, so this result is not driven by collinearity. Nonetheless, it bears further investigation.

As expected, public mood is associated with spending on defense. As the public mood toward government becomes more generous, spending on defense increases. However, the public mood variable is not associated with changes in spending in any of the other appropriations bills. This finding is consistent with findings from Bartels and others that defense spending is particularly responsive to public mood. Moreover, unemployment is not associated with changes in spending.
Table 2A: Autoregressive Generalized Least Squares Models of Differences in Spending by Appropriation Bill

<table>
<thead>
<tr>
<th></th>
<th>CJS#</th>
<th>DC</th>
<th>Defense</th>
<th>Energy</th>
<th>Foreign</th>
<th>HUD##</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>House median</strong></td>
<td>38026</td>
<td>-8253.813</td>
<td>-1165275**</td>
<td>86752</td>
<td>414071.6***</td>
<td>241658</td>
</tr>
<tr>
<td></td>
<td>(69830)</td>
<td>(6288.04)</td>
<td>(508195)</td>
<td>(58662)</td>
<td>(150215.0)</td>
<td>(525201)</td>
</tr>
<tr>
<td><strong>Party Median</strong></td>
<td>-36567</td>
<td>4358.429</td>
<td>457539</td>
<td>-36681</td>
<td>-108459.0</td>
<td>-103896</td>
</tr>
<tr>
<td></td>
<td>(49229)</td>
<td>(4130.21)</td>
<td>(370313)</td>
<td>(41356)</td>
<td>(97321.8)</td>
<td>(352482)</td>
</tr>
<tr>
<td><strong>Committee median</strong></td>
<td>23762</td>
<td>5705.749</td>
<td>111581</td>
<td>-14928</td>
<td>91527.8</td>
<td>153861</td>
</tr>
<tr>
<td></td>
<td>(34151)</td>
<td>(2932.43)</td>
<td>(253743)</td>
<td>(28690)</td>
<td>(70353.4)</td>
<td>(261574)</td>
</tr>
<tr>
<td><strong>Stimson Mood Variable</strong></td>
<td>25659</td>
<td>20888.659</td>
<td>4616917**</td>
<td>62691</td>
<td>-48858.6</td>
<td>-1908536</td>
</tr>
<tr>
<td></td>
<td>(280986)</td>
<td>(20731.13)</td>
<td>(2240991)</td>
<td>(236048)</td>
<td>(478157.2)</td>
<td>(1880452)</td>
</tr>
<tr>
<td><strong>Unemployment</strong></td>
<td>125009</td>
<td>19297.966</td>
<td>-2298285</td>
<td>558914</td>
<td>139136.6</td>
<td>-5798584</td>
</tr>
<tr>
<td></td>
<td>(570621)</td>
<td>(39779.64)</td>
<td>(4599039)</td>
<td>(479363)</td>
<td>(938963.7)</td>
<td>(3711690)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>803835</td>
<td>733.925</td>
<td>887414</td>
<td>285443</td>
<td>-194224.7</td>
<td>1974949</td>
</tr>
<tr>
<td></td>
<td>(523436)</td>
<td>(28418.01)</td>
<td>(5340481)</td>
<td>(439723)</td>
<td>(619575.5)</td>
<td>(2919421)</td>
</tr>
<tr>
<td><strong>Order of AR Process</strong></td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>47</td>
<td>47</td>
<td>47</td>
<td>47</td>
<td>47</td>
<td>47</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
# Commerce, Justice, and State Appropriations
## Housing and Urban Development Appropriations
### Table 2B: Continuation of Autoregressive Generalized Least Squares Models of Differences in Spending by Appropriation Bill

<table>
<thead>
<tr>
<th></th>
<th>Interior</th>
<th>Labor</th>
<th>Legislative</th>
<th>Military</th>
<th>Construction</th>
<th>Rural</th>
<th>Transportation</th>
<th>Treasury</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>House median</strong></td>
<td>-38520.9</td>
<td>418192.9</td>
<td>-3146</td>
<td>7909.0</td>
<td>-123308.2 *</td>
<td>16909.8</td>
<td>157130.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(130362.7)</td>
<td>(269386.0)</td>
<td>(4160)</td>
<td>(54385.3)</td>
<td>(64232.3)</td>
<td>(62290.8)</td>
<td>(104050.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Party Median</strong></td>
<td>75487.9</td>
<td>-104761.3</td>
<td>4531</td>
<td>-34074.9</td>
<td>25692.7</td>
<td>31332.6</td>
<td>-65669.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(88857.4)</td>
<td>(182508.0)</td>
<td>(2932)</td>
<td>(36204.0)</td>
<td>(41098.5)</td>
<td>(43357.7)</td>
<td>(66560.0)</td>
<td></td>
</tr>
<tr>
<td><strong>Committee median</strong></td>
<td>1929.9</td>
<td>101140.5</td>
<td>1651</td>
<td>-12285.7</td>
<td>103664.3 ***</td>
<td>19908.6</td>
<td>85835.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(62337.6)</td>
<td>(128275.7)</td>
<td>(2034)</td>
<td>(26965.4)</td>
<td>(32820.8)</td>
<td>(29961.2)</td>
<td>(54056.0)</td>
<td></td>
</tr>
<tr>
<td><strong>Stimson Mood</strong></td>
<td>-256294.6</td>
<td>-209008.6</td>
<td>-6153</td>
<td>127509.5</td>
<td>187732.0</td>
<td>190357.1</td>
<td>-139488.7</td>
<td></td>
</tr>
<tr>
<td><strong>Variable</strong></td>
<td>(477188.1)</td>
<td>(969232.2)</td>
<td>(16738)</td>
<td>(190646.0)</td>
<td>(205349.1)</td>
<td>(242419.6)</td>
<td>(334515.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Unemployment</strong></td>
<td>-1470694.3</td>
<td>2033259.2</td>
<td>40860</td>
<td>560649.3</td>
<td>810713.4</td>
<td>-35432.5</td>
<td>396135.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(949809.5)</td>
<td>(1919991.0)</td>
<td>(33990)</td>
<td>(365297.9)</td>
<td>(454526.5)</td>
<td>(432209.8)</td>
<td>(750995.1)</td>
<td></td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>536633.3</td>
<td>2644889.3 *</td>
<td>68312 **</td>
<td>156655.6</td>
<td>59768.5</td>
<td>642414.8</td>
<td>-76126.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(754381.5)</td>
<td>(1494339.8)</td>
<td>(31180)</td>
<td>(270088.3)</td>
<td>(252688.3)</td>
<td>(511794.8)</td>
<td>(410747.6)</td>
<td></td>
</tr>
</tbody>
</table>

|                      | 1        | 1          | 0          | 1        | 2          | 2         | 2         |
| **Order of AR Process** | 47 | 47 | 47 | 47 | 47 | 47 | 47 |

| **Observations**     | 47       | 47         | 47         | 47       | 47         | 47        | 47        |

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Despite these three bills that track with the pivotal members, the vast majority (ten) of the bills do not display a relationship with the key voters of the House. None of these ten other bills provide evidence that is consistent with any of the dominant models of policymaking, even in their simplest specifications. None of the thirteen models provide evidence for the party model of policymaking. Only one of the bills is consistent with the committee model of policymaking.

Tables 1, 2A, and 2B provide one more piece of information about budgetary policymaking. Since almost all of the models exhibit a unit root where spending in time $t$ is a function of spending in time $t-1$, these models are consistent with an incremental model of the budget. The implications of this finding are considered further in the next section.

Section 4. Conclusions

The question of why the pivot-based models fail to perform better deserves more attention. First, one could argue that these tests simply use the wrong data to test the hypotheses put forward. Perhaps the budget is an inappropriate vehicle for testing these models because it does not truly measure policy outputs. For example, an increase in spending on the environment may not reflect a movement in policy toward the more pro-environment end of the spectrum. This could arise if the legislation buried a form of pork barrel legislation within an environmental bill, so more spending meant more pork without increasing environmental protection. While there is clearly pork involved, the bulk of the arguments over spending are clearly arguments over policy. Given the yearly wrangling over the budget, this argument that the budget is not policy seems implausible.

It is possible that the appropriations process is fundamentally different from the regular authorizing process. Although the bills pass through similar processes, there are differences. All
appropriations bills go through the same committee rather than being spread like other bills into various committees. Appropriations are theoretically subject to a spending cap determined in advance. Appropriations are fundamentally about spending, not authorizing. These differences might suggest that results from the budget do not generalize well to other policy. If data were available to measure the location of other policies, these same null results might not emerge from that analysis. However, these differences do not give a reason that the models of policy change should not apply to the budget. None of the pivotal politics models of policymaking proscribe their application to the budget. In fact, their authors regularly use budgetary examples in their discussion of the models. This means that the results still cast into question the models of policy change.

Moreover, the budget is not the only possible measure of policy. Regulations, presidential rulings with respect to the environment, and unfunded mandates, such as the Americans with Disabilities Act, are only a few of the many examples of significant policy shifts that would not be fully captured by appropriations. Nevertheless, this unique dataset allows us to make real progress on testing the implications of models of policy change.

Second, one could argue with the modeling decisions, such as the reversion point of zero or the House acting first. Of course, there were many other modeling decisions, but at their base, these are the simplest possible models of the policy process.

The final possibility, and the simplest one, is that the models are inadequate. They do not consistently explain the policy process. The generally null results in Section 3 suggest that incrementalism explains the budget process just as well as considering the role of the pivotal members. A more nuanced view of this possibility is that the models can only be taken to apply to particular policy areas during particular time periods. At the least, testing should specify the
conditions under which each of the models should apply, since it is clear from this empirical analysis that none of them apply all of the time to all of the policy areas. This suggests one avenue for further research. To give the predictions of the models the best shot at being borne out by the data, we should investigate a policy area about which much is known.

The second conclusion to draw from these data is that the time series represent an incremental process. In addition to the econometric implications of the non-stationary process, the very finding of non-stationarity points toward the incremental model of the budget that was prevalent in the early literature on the budget, beginning with Lindblom (1964) and Wildavsky (1964). Since all of the time series of appropriations bills exhibit a unit root, spending in time $t$ is clearly related to spending in time $t-1$.

Although the budget data provide evidence for the incremental model of the budget, with its focus on this year’s budget as a function of last year’s budget, it is not a particularly satisfying political explanation for the budget. Knowing that last year’s spending predicts this year’s spending begs the question of what predicted last year’s spending. Incrementalism simply tells us that spending in the current year is related to spending last year, but it doesn’t tell us anything about the political factors that might be driving spending in either year.

If funding in time $t$ is a function of funding in time $t-1$, then the amount of spending allocated in time $0$ is a large determinant of funding throughout the time series. This suggests that the place to look for political determinants of the budget is in the initial allocation of money. When appropriations are first made for a given budget account, the spending level cannot be explained by simply relying on the level of spending in the previous year. In this way, incrementalism may point us in the direction of a solution to understanding budgeting: investigating initial spending. The budget database used in this analysis has an incredible
advantage over others in that it allows consideration of individual budget accounts, the smallest account for which the government appropriates. As such, it provides information as to when each account began and the level of appropriations in that initial period. Perhaps the floor, party, and committee models are simply operating when spending levels are initially established and before incrementalism can begin to operate. This examination of the inception of disaggregated budget accounts may provide the insight needed to model the budgeting process more accurately. Moreover, if we can do that, it may become clear exactly what the implications of the political models are for the series through time.

\[23\] Since the database covers the period between 1955 and 2002, it only provides initial data for accounts that came into existence during this time period.
WORKS CITED


