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ARTICLES

Policy Punctuations: U.S. Budget Authority, 1947–1995

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Baumgartner and Jones (1993) described a process of punctuated equilibrium in their study of policymaking in the United States since World War II. Evidence was drawn from a series of particular issue-areas, but the model has implications for all areas of policymaking. In this paper, we explore the validity of this approach with a new dataset that tabulates congressional budget authority at the Office of Management and Budget subfunction level across all areas of the federal budget for the entire postwar period.

We find that government spending is characterized by much greater change than is typically portrayed in the literature, even if there is great stability for most categories most of the time. In addition, overall patterns of spending have been affected by two large-scale punctuations. These punctuations divide national spending into three *epochs*: one of postwar adjustment, lasting until FY 1956; one of robust growth, lasting from 1956 through 1974, and one of restrained growth, beginning in FY 1976. We test the epoch hypothesis against three plausible rival hypotheses: changes in the robustness of the postwar economy; partisan divisions; and public opinion. The epoch hypothesis survives all of these rivals whether modeled individually or together. This paper provides empirical evidence that punctuations occur, not just in some programs or subsystems, but also throughout government.

The General Approach

Policymaking within subsystems in the United States is dominated by a process alternating between periods of relative gridlock and periods of dramatic change (Baumgartner and Jones 1993). Such punctuated equilibria seem characteristic of many complex systems. They are evident in the evolution of species (Eldredge 1985), in economics, when new technologies disrupt prevailing patterns of doing business (Thurow 1996), and in computer simulations of iterated games (Lindgren 1992). These punctuations interspersed with periods of stasis may have both exogenous and endogenous causes. Complex interactions among

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interrelated forces can lead to unpredictable punctuations even when the individual forces themselves are well understood (see Bak 1994).

In policymaking, new ways of thinking about public problems, rapid mobilizations of new constituencies, changes in institutional structures, and the self-reinforcing effects of these trends occasionally combine to create dramatic and unpredictable policy changes in an issue-area. Such punctuations are an important part of policymaking even if most policies most of the time are subject to no such dramatic events. Rather than making moderate adaptive adjustments to an ever-changing environment, political decision making is characterized sometimes by stasis, when existing decision designs are routinely employed, and sometimes by punctuations, when a slowly growing condition suddenly bursts onto the agendas of a new set of policymakers or when existing decision makers shift attention to new attributes or dimensions of an existing situation. Complex interactive political systems do not react slowly and automatically to changing perceptions or conditions; rather, it takes increasing pressure and sometimes a crisis atmosphere to dislodge established ways of thinking about policies. The result is periods of stability interspersed with occasional, unpredictable, and dramatic change (Baumgartner and Jones 1993; Carmines and Stimson 1989; Dodd 1994; Jones 1994; Jones, Baumgartner, and True 1996; Kelly 1994).

Such policy punctuations can occur at all levels of activity—in programs, in agencies, within broad functional categories of government activities, and within government overall. Punctuations may affect, say, related subsystems without affecting the rest of government. But when major changes in the understanding of the role of government occur, virtually all programs and subsystems of activity will be affected. Yet we have no systematic evidence to date documenting such punctuations.

Most evidence for the punctuated equilibrium perspective has relied on general observation and case analysis rather than on more rigorous quantitative analysis. In this article, we develop systematic tests of a punctuated theory of policymaking, using for the first time a new dataset that classifies federal spending in a consistent way for the entire budget and for the entire postwar period. We focus on large-scale punctuations here—those that affect patterns of spending across the entire federal budget—but we also note some evidence that the expected patterns of relative stability interspersed with occasional dramatic change are also apparent in most budget categories and indeed appear to be much more common than previous analyses of the budget would suggest. Our new dataset tabulates congressional budget authority at the Office of Management and Budget (OMB) subfunction level. Spending by function or subfunction should show patterns of stability and change consistent with theories of punctuated equilibrium over the long haul. As our focus here is limited to large-scale punctuations affecting domestic budget authority, we use an ARIMA (autoregressive-integrated-moving average) format to show the presence of two dramatic shifts in spending patterns since World War II. These two shifts effec-

tively divide the postwar period into three *epochs*, which seem to correspond to widely shared, but dramatically different, conceptions of the proper role of government during these three periods.

We test our finding of two large-scale punctuations against three plausible rival hypotheses. The first is that the epochs are in fact simply reflective of changes in the robustness of the postwar economy. In good times, more is spent; in lean times, less. Second, we study the hypothesis that spending eras reflect partisan divisions. When Democrats control both the executive and legislative branches, they increase the size of government. Divided government or unified Republican control yields a lower rate of growth. Finally, we compare the punctuation perspective with one that locates the source of policy change in public opinion. None of these rival explanations can explain these breaks in the observed patterns of budgeting, whether they are taken singly or in combination.

Incrementalism and Its Critics

For better or for worse, the concept of incrementalism dominates discussion of federal budgeting. Scholars drawing on Wildavsky (1964) and others have consistently noted that annual budget results tend to drift rather than to shift abruptly. Budgets seem to have been powerfully affected by the concepts of “base” and “fair share,” which assume that each year’s budget should be based on the previous allocation and that any increment should be shared relatively equally across categories and agencies.

While the work of early bounded rationalists in budget studies is typically cited as supportive of an incrementalist view, that characterization is not entirely true. The work of Davis, Dempster, and Wildavsky (1966, 1974) is noteworthy in its effort to detail the operation of boundedly rational budgetary procedures embedded within budgetary epochs that affect the parameters of budget decision making. These epochs actually shifted the parameters of the incrementalist model (to larger or smaller coefficients during different periods). That would imply a nonincremental step between epochs. Davis and his colleagues did not attempt to study epochs directly, however. Rather, they estimated a statistical model in which exogenous variables that presumably governed epoch shifts were allowed to influence the parameters that described the incremental budgeting procedures observed within the periods.

Subsequent work of the next decade or so directed fire at incrementalism, criticizing both its methodological flaws and theoretical shortcomings, rather than exploring the shift points that the early authors also noted (see Tucker 1982 for a critical review). The most recent studies have tended to bypass the behavioral foundations of budgeting, focusing instead on the external forces that cause variations in expenditure commitments (see, e.g., Berry and Lowery 1987; Blais, Blake, and Dion 1993; Blais, Blake, and Dion 1996; Hartley and Russett 1992; Huang and Mintz 1991; Ostrom and Marra 1986; Su, Kamlet, and Mowery 1993).

While expenditure studies have not followed the lead of Davis and his colleagues, several scholars have argued that shared understandings about the proper role of government and its policy instruments change over time (e.g., Kingdon 1995). In some periods, cultural underpinnings support an active government that may solve some problems and redistribute income, but that may also undermine economic growth. In others, efficiency in government and growth-oriented policies may be favored (Hirschman 1982; Webber and Wildavsky 1986). These epochs of shared understandings can shift fairly quickly (Dodd 1994; Kelly 1994).

Abrupt shifts in policy can also result from an inherently nonincremental nature for some policies (Schulman 1980), and they may affect some subfunctions or subsystems and not others (Baumgartner and Jones 1993). At the highest level, however, shifts in attention, decisions, and policies can affect all categories of government spending simultaneously, although some categories may be affected more than others. This implies that we should be able to isolate periods of higher general government spending and periods of lower spending separated by disjoint punctuations.

Design of the Present Research

Enough theoretical, anecdotal, and limited quantitative evidence has been accumulated in political science concerning disjoint shifts in the policy process that we ought to begin to search for these shifts systematically. We focus on congressional budget authority, whereas previous expenditure/budget studies have examined either appropriations (which can omit trust fund spending and confuse the timing for contract spending) or outlays (which are far “downstream” from the political decision-making process which we wish to observe). Because outlays in effect “spend out” budget authority over a period of time, they will mute punctuations that occur in the actual decision-making process. Budget authority reflects the decisions that policymakers are called upon to make.

The theory of policy punctuations does not lead simply to point predictions of when and in what area the next punctuation will occur. Punctuations are not easily associated with the ebb and flow of political and economic forces. If episodes of disjoint change were simply and directly associated with such forces, then an independent theory of policy change based on notions of punctuated equilibrium would not be necessary. If, for instance, government budgets simply adjust reasonably quickly to economic circumstances, and economic circumstances cyclically undergo booms and busts, then one does not need a theory of political change that acts independently of economic shifts. Indeed, this was the thinking of the early scholars employing quantitative indicators to study public policy (Dye 1966). If electoral mobilizations result in an activist party being elected, and this party expands government, one needs a theory of electoral change, but one does not need an independent theory of policy punctuations. Similarly, if

public opinion drives the policy process, measures of change in opinion should predict outcomes in such a way as to render superfluous any notions of punctuation and disjoint change. If these or other economic and political forces are sufficient to account for observed policy punctuations, then we have no need for a model of punctuations.

If, on the other hand, institutions of government do not allow for smooth and continual adjustment to the various social, political, and economic forces that affect the federal budget, then no set of indicators should predict clearly when we will observe dramatic shifts in policy outputs. We should expect policy changes to correspond roughly to changes in general understandings of the proper role of government, but the precise timing and size of these changes may not be predictable. Because point predictions do not emerge simply from theories of policy punctuations, it will be necessary to employ a somewhat nonstandard approach. We proceed as follows: First, we hypothesize the existence of punctuations that will emerge in budgetary time series. Second, we hypothesize a generalized stasis between these punctuations, even in the face of changing exogenous circumstances. Economic and political trends may affect these periods of budgetary stasis at the margins, but the stasis should, in effect, dominate the variability in economic and political trends.

To make empirical progress, we first think through what we might expect in recent political history if the punctuation hypothesis were correct. As a starting point, we suggest that the postwar period can be divided into three epochs divided by two major punctuations. Many have argued that the postwar period can be divided into a period of quiescence, especially during the 1950s; a period of political reform and activism during the 1960s and 1970s (see Mayhew 1991, 162); and an “era of limits” in which the public mood has emphasized the virtues of smaller government (see Dodd 1995). Unfortunately we have no way of specifying the exact occurrence of these punctuations, if they exist, and we will need to turn to an examination of our time series to pinpoint them. The absence of any statistically significant punctuations in our budget series would be clear evidence against the theory of punctuated change, but their presence could also be due to rival hypotheses. Our strategy is, therefore, to demonstrate first that there are clearly definable epochs, then to attempt to explain the punctuations we observe with potential rival hypotheses. We use an ARIMA intervention format for this exercise, because it is uniquely suited to study such punctuations (Box, Jenkins, and Reinsel 1994; Box and Tiao 1975; McCleary and Hay 1980; see Wood and Waterman 1994 for examples). If the punctuations “clear the bar” of conventional benchmarks of statistical significance, then we move to the study of alternate hypotheses.

To allow each rival hypothesis maximum power to disconfirm the punctuation hypothesis, we first test these hypotheses singly with appropriate “prewhitening” along with the ARIMA intervention (punctuation) estimates. For example, we do not control for the state of the economy when we first examine the role of

public opinion. We look toward accepting each competing hypothesis on its own merits, one at a time. Once that exercise is complete, we proceed with joint tests. In sum, our design offers three ways to disconfirm empirically the punctuation hypothesis: (1) no punctuations are observed in the data; (2) punctuations emerge, but they are not statistically significant; and (3) punctuations emerge, they are statistically significant, but they can be simply accounted for by traditional political and economic forces.

Can Budgetary Stasis Survive Trends? Three Rival Hypotheses

We consider three important rival explanations for changes in patterns of federal spending.

PARTISAN CONTROL. One view on the growth of the federal budget is that it can be explained by partisan control of the levers of decision making. In the United States, Democrats look far more favorably on the use of government than do Republicans, and hence governmental programs would seem to be more likely to expand under Democrat-controlled governments (Kiewiet and McCubbins 1991; Sundquist 1968). If the Democratic political control hypothesis is true, we would expect to find higher spending during periods of unified Democratic control with its presumed consensus on positive government. During periods when Republicans controlled the White House, we would expect to find fewer increases and more reductions in public expenditures.

CAPITALIST SURPLUS. It is possible that democratic politics is simply a way of dividing up the enormous wealth produced by a relatively unfettered capitalist system. That is, budgeting in a democracy is driven by the health of the economy (Kamlet and Mowery 1987; Su, Kamlet, and Mowery 1993). As the economy grows rapidly, politicians have only to allocate the excess resources, and expenditures naturally increase. As the economy falters, government spending either adjusts by falling to a lower level or it drops only very slowly due to an inherent ratchet effect as politicians allow inflation to reduce real expenditures, rather than face the disagreeable job of removing an allocation already in place. In this view, epochs should be evident, but changes in government spending would follow, not precede, changes in the national economy. In any case, if the economy drives the budget, any patterns in budgeting should be associated with cyclical patterns of growth in the national economy.

POPULIST REPRESENTATION. Surely, in a democracy, public policies follow public opinion. Indeed, empirical evidence indicates that this may happen (Page and Shapiro 1992; Stimson, MacKuen, and Erikson 1995). It is plausible that epochs of public spending, if they exist, just follow changes in public opinion. So it behooves us to examine whether any disjoint changes in budgets are simple and direct reflections of public opinion.

Data and Methods

To study these aspects of national budgeting, we have constructed a new dataset that tabulates U.S. budget authority from Fiscal Year (FY) 1947 through FY 1995 (see Appendix for details). The analyses in this paper concentrate on domestic spending, because spending for defense and international relations may be confounded by mixtures of internal and external influences (Correa and Kim 1992; Mintz 1988; True 1995). Budget subfunctions focus on the long-term government purpose that is served—e.g., food and nutrition assistance, conservation and land management, pollution control and abatement, or atomic energy defense activities. Subfunctions can be aggregated into functions (such as income security, natural resources, or national defense) and, with care, into macrofunctions (such as mandatory or discretionary spending).

Time series of annual budget data present special problems for statistical analyses because they usually fail to meet the classical assumptions for linear regression. Most series of annual budget levels exhibit nonstationarity, significant autoregression, and a nonnormal univariate distribution. As a consequence, regression analysis can yield inappropriate results, making it a poor tool for differentiating among rival hypotheses (Beck and Katz 1995; Granger and Newbold 1974; Padgett 1980; Tucker 1982; Wanat 1974). Here we control for nonstationarity by using annual percentage changes of subfunction budget authority. We control for nonnormal univariate distribution of the dependent variable by using the median annual percentage change. And we control for autoregressive and moving average components by using ARIMA.

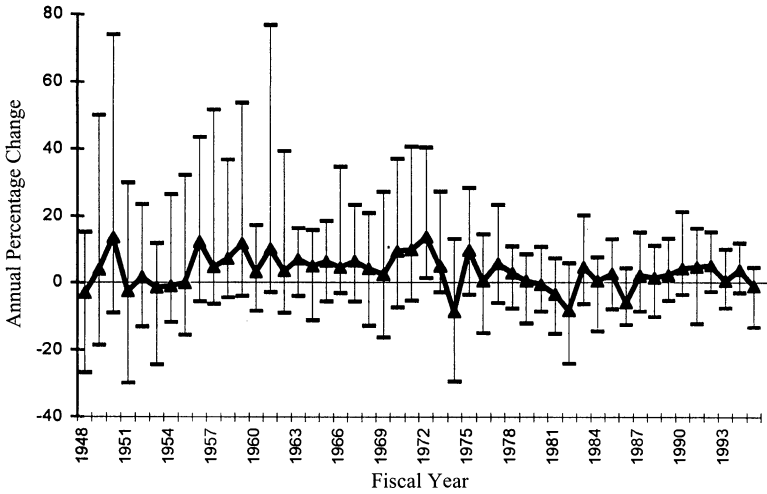
We focus on subfunctions rather than on the size of the entire budget because congressional budgeting is disaggregated, with both top-down and bottom-up components. Hence a subfunction analysis should come closer to approximating the dynamics of decision making. Percentage changes permit consideration of changes without regard to the size of the subfunction and are more appropriate for studying changes in the relative direction of government policy than first differences. Because different processes are likely to characterize various governmental agencies and the policy functions they perform, one must be careful in using summary or pooled measures in budget analysis (Hsiao 1986; Tucker 1982). We represented the subfunction changes with the medians and intersextile ranges rather than the more familiar means and variances because annual means are too responsive to the outliers in these series (Mandelbrot 1963; Western 1995). These measures aid in controlling the statistical problems found in budget data as discussed above. (Additionally, we have, however, checked results using aggregate totals; the results indicate that our findings are robust.)

Isolating the Punctuations

Figure 1 presents the medians of annual percentage changes in the domestic budget from FY 1947 through FY 1995 after the effects of inflation have been

FIGURE 1

Medians and Intersextile Ranges of Annual Percentage Changes in Domestic Budget Authority



Note: Years on the x-axis refer to the end year for the change; e.g., 1948 = 1947 to 1948.

removed.¹ It also includes the intersextile ranges for the annual percentage changes to depict the variability in these annual changes.

Figure 1 shows that the typical pattern across domestic subfunctions during the period is for government to grow; exceptions are particularly notable during the early Eisenhower and Reagan presidencies as well as in FY 1973–74 during Nixon's large budget impoundments (Wlezien 1994).² The period between 1956 and 1973 was the period in which the typical federal subfunction grew most—it is the only period in which the median subfunction never declined. Since then, the typical government subfunction has grown only glacially.

By plotting the median and intersextile ranges, Figure 1 provides an overview of the great variability in budget changes over time as well as its average trace across time. Intersextile ranges show the percentage change of the subfunction at the 17th and 83d percentiles of each annual series. In all years, a number of subfunctions decreased even if the typical subfunction grew rapidly in real terms. In each year, a considerable number of federal budget categories saw dramatic

¹Percentage changes are $[t - (t - 1)] * 100 / (t - 1)$, so that a plotted point at 1951 is a percentage change between FY50 and FY51.

²Kiewiet and McCubbins (1991, 189–91) reported a roughly similar pattern for a less inclusive dataset.

downward adjustments, while others were experiencing sharp increases. Even during periods of relative growth, that growth was not evenly distributed; the idea that government programs are rarely cut, only increased, is largely myth. Government is not asleep at the wheel, automatically continuing to spend on whatever it spent on the previous year. However, Figure 1 suggests that incremental budgeting is more prevalent now than in the past (see Jones, True, and Baumgartner 1997 for analysis).

Figure 1 provides some evidence for the presence of three distinct budgetary epochs.³ Both large increases and decreases occur before FY 1956, but large increases are more prevalent from FY 1957 through FY 1973. After FY 1976, both the percentage increases (high sextiles) and decreases (low sextiles) are closer to their medians, indicating a reduction in variability and a reduced number of dramatic adjustments in any budget categories. Historians may argue that the years since World War II constitute a single period in our nation's history—given the disruption in even domestic spending patterns that a major war brings (Peacock and Weisman 1994) and its long-term effects on the institutions of government and the economy (Hughes 1991). But within this period, there seem to be three identifiable epochs: one of large transitions between war and peace; a second associated with general growth of government; and the last associated with spending restraint.

EISENHOWER'S "PEACE DIVIDEND": 1956. In retrospect, the shift from the large changes of the Truman administration and the early Eisenhower years was a dramatic one.⁴ Large growth was occurring in the U.S. military forces and in the atomic weapons called for in the New Look and Massive Retaliation, but the spend-down associated with the end of the Korean War offered the possibility of a real "peace dividend." Early Eisenhower administration concerns that large allocations to the military should not unbalance U.S. institutions or the domestic economy (Huntington 1961; Murphy 1956; NSC-162/2 1953; Schilling, Hammond, and Snyder 1962) appear to have changed radically in 1956 and 1957

³If we use aggregate totals instead of medians, a case can be made for four epochs and three punctuations: FY 1956, 1966, and 1976. However, the punctuation for 1966 is not robust. It is statistically significant using various regressions upon apparently nonstationary series, but it is not statistically significant in analyses made on annual percentage changes or on median first differences. We conclude that the 1966 shift is better characterized as a continuation of the expansions that follow the 1956 punctuation than as a new punctuation.

⁴When Davis, Dempster, and Wildavsky (1966, 539) examined "shift points" in bureau-level domestic appropriations for FY 1948–62, they found the preponderance of the shifts occurred in the first two years of the Eisenhower administration. Fenno (1966) focused on organizational integrity and excluded organizations that had experienced startups or large changes; he then found that his results supported incrementalism (xxiv, 354–55). However, Davis, Dempster, and Wildavsky (1966) did not make this exclusion and found that their results supported both incrementalism and bureau-level shift points, most of which occurred in the FY 1954 and FY 1955 budgets of the Eisenhower administration (540–41).

with major new urban housing and renewal efforts, the passage of the Interstate Highway Act, and multiple national responses to the Soviet launch of *Sputnik* (see Dodd 1994).

Until FY 1956 large increases were prevalent in domestic budget categories, but these were balanced by many large decreases. The high level of median percentage changes after FY 1956 indicate that government had embarked on a period of large real growth that continued through the Kennedy, Johnson, and first Nixon administrations. The middle years of the Eisenhower administration seemed to mark a shift in which the U.S. government adopted both an internationalist stance in foreign policy, emphasizing a globally capable, standing military force and nuclear deterrence, and simultaneously committed itself to improve the domestic infrastructure. Before Johnson's "Guns and Butter," there was Eisenhower's "Bombs and Highways."

THE BUDGET WARS: 1976. The end of the epoch of large increases in the mid-1970s was marked by intense congressional-executive disagreement concerning control of the budgeting process—the so-called "Seven Year Budget War" (Kiewiet and McCubbins 1991, 77). The events of the mid-1970s seem to have acted as a delimiter between an era of growth, in which the typical response of governmental officials was to try to build programs, and an era of restraint, in which politicians have struggled with tax limitations (especially in the indexing of the income tax) and soaring deficits.

In 1973, President Nixon claimed the authority to impound congressional appropriations; these impoundments had considerable effects on the budget process (Wlezien 1994). The ensuing budget fight culminated in the Congressional Budget and Impoundment Control Act of 1974, which was first fully implemented in President Ford's proposed budget for Fiscal Year 1976. The act limited the president's ability to impound congressional appropriations and imposed a measure of discipline on the internal congressional budgeting process. It established the present congressional budget process, the House and Senate Budget Committees, and the Congressional Budget Office (Schick 1995; Wander, Hebert, and Copeland 1984).

The conventional wisdom is that the act resulted not in more fiscal discipline, but less (Fisher 1985; Kamlet and Mowery 1992 [1985]), and this view agreed with the opinions of the participants in the budget process at the time (Kiewiet and McCubbins 1991, 77–91; cf. Schick 1995; Wander 1984). And, of course, deficits soared after that period. The empirical record, however, suggests that the budget battles of the mid-1970s changed the course of U.S. budget policy, transforming the postwar period from one of robust growth in real dollar spending to one of very modest increases.

Our preliminary analysis seems to show the presence of two important shift points, defining three distinct periods in federal budgeting. We move now to some more quantitative tests of these observations.

Statistical Tests of the Punctuation Hypothesis

As we noted above, we are in no position to predict the specific occurrence of policy punctuations other than from an examination of the data (and the finding of a 1956 budget punctuation will surprise many). Having found them, however, we can demand that they survive tests of statistical significance and the imposition of alternative hypotheses. If they do survive, we can be sure: (1) that they cannot be explained by the normal operation of chance phenomena, and (2) that they cannot be easily explained away as spuriously due to rival hypotheses. Tests are performed on domestic spending overall as well as separately on its components of domestic discretionary spending and domestic mandatory spending. We examine three potential interventions: a permanent step intervention for the Eisenhower "peace dividend" (commencing in FY 1956), a temporary pulse intervention in FY 1974 for Nixon's impoundments, and a second permanent step intervention for the Budget and Impoundment Control Act (commencing in FY 1976). We first test a purely statistical hypothesis: whether the steps that we examine can be accounted for by a chance model. Phillips-Perron tests indicated that the time series of the medians of annual percentage changes were stationary,⁵ and we proceeded with the analysis. Table 1 shows the results.

Although there is much year-to-year variability that is not captured by the epoch model, the results are nevertheless dramatic. All interventions are statistically significant. The typical year-to-year real growth in the median domestic subfunction during the first postwar epoch was 1.3%, although the small *N* and

TABLE 1

ARIMA Model of Annual Medians of Domestic Spending

| Parameter | Estimate | Standard Error | t-ratio |
|------------|-----------|----------------|---------|
| Mean | 1.31 | 1.36 | 0.96 |
| Step 1956 | 5.73*** | 1.62 | 3.53 |
| Pulse 1974 | -15.69*** | 3.95 | -3.97 |
| Step 1976 | -6.01*** | 1.23 | -4.87 |

N = .48

Variance (Noise Model): 25.456

Variance (Full Model): 14.840

Proportional Reduction in Error (PRE) = 0.417

Source: Compiled by the authors.

***Statistically significant at < .001 level, one-tailed test. SAS ARIMA maximum likelihood estimates.

⁵Studying percentage changes has the effect of differencing the series. Inspection of correlograms indicates that the series is stationary, and Phillips-Perron tests allow the rejection of the null hypothesis of a unit root in the series using Davidson-MacKinnon asymptotic critical values for .10 (K. White 1993).

large variability from FY 1948 through FY 1955 keeps that estimate from statistical significance (that is, it is statistically indistinguishable from 0).⁶ The first step in FY 1956 signals the addition of 5.7% to the typical real annual percentage increase. Nixon's impoundments for 1974 (the pulse) temporarily subtracted over 15% from this average, while the step function entering in 1976 subtracted 6% permanently (that is, for the rest of the series).⁷ The model thus indicates that the average real growth rate (in median percentage changes across subfunctions) between FY 1956 and FY 1974, the era of expansion, was 7.0%, and after 1976 it was 1.0%.

Discretionary versus Mandatory Spending

The Budget and Impoundment Control Act gave Congress a mechanism for examining and controlling discretionary spending, but it was likely to be less effective in the case of mandatory spending (Padgett 1995). So we disaggregate domestic spending into its mandatory and discretionary components. Discretionary spending is largely considered annually by the Appropriations Committees and Subcommittees, once the traditional "Guardians of the Treasury" (Fenno 1966; Wildavsky 1964); it is financed from the general fund. Mandatory spending usually has a permanent appropriation (Schick 1995), and responsibility for adjustments is dispersed among the Revenue, Public Works, and Appropriations Committees (Cogan 1994); it is usually financed through trust funds.

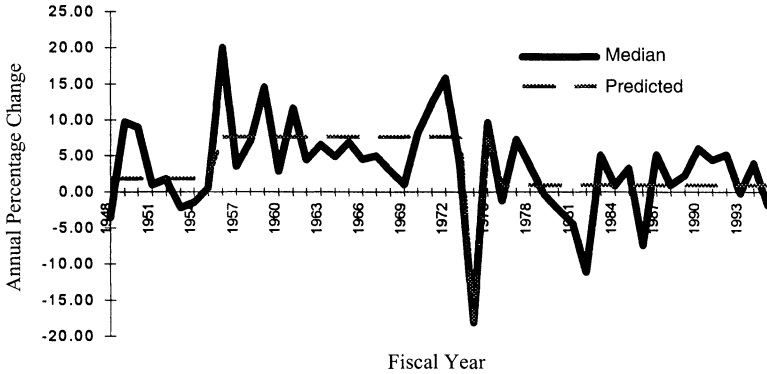
We estimated the above model again separately for subfunctions dominated by mandatory spending and for those characterized mostly by discretionary spending. Discretionary spending changes rose dramatically in the second epoch and dropped dramatically in the epoch of restrained spending. The changes were

⁶SAS PROC ARIMA t-ratios are reported throughout this paper. Greene (1993, 560–61) reminds us to be cautious in the potential presence of autocorrelated errors, for both Monte Carlo and analytical approaches indicate that conventional critical values can overstate the significance of relationships.

⁷Some might argue that the Ford and Carter presidencies were a period of transition from the epoch of expansion to the epoch of limits. Figure 1 indicates that the transition between the postwar adjustment period to the epoch of expansion was probably more abrupt than the second transition, so we tested for the possibility of a period of transition between the changes of FY 1976 and those after FY 1982 (the first complete budget year of the Reagan administration). The coefficients, standard errors, and t-ratios in an ARIMA model with three step interventions vitiate any statistical claim for significance for a fourth epoch for total spending and for discretionary budgets. For mandatory spending, the estimate for the 1976 punctuation would be reduced to -2.71 ($t = -2.34$), and the estimate for a 1982 punctuation would be -2.60 ($t = -2.14$). However, political history and the autoregressive nature of mandatory budget changes have caused us to discount the case for a fourth punctuation that affected mandatory spending only. The early Reagan decreases occurred primarily in discretionary spending, and OMB director Stockman's efforts to cut Social Security outlays were singularly unsuccessful (Light 1985). In addition, the strongly autoregressive character of the variable, which is explicitly captured in ARIMA modeling, suggests that post-1982 changes are perhaps better characterized as a slowly changing continuation of the epoch begun in FY 1976. We conclude that the case for the Ford and Carter years as a separate transition epoch is weak.

FIGURE 2

Observed and Predicted Median Percentage Change in Real Budget Authority for Discretionary Domestic Subfunctions



Note: Years refer to the end year for the change; e.g., 1948 = 1947 to 1948.

statistically significant, and the punctuations appear clear. The observed and predicted changes for discretionary spending are shown in Figure 2; they mirror the results of Table 1, in that all three interventions were significant [Mean = 1.83, $t = 1.05$; Step 1956 = 5.81, $t = 2.80$; Pulse 1974 = -25.72, $t = -5.10$; Step 1976 = -6.72, $t = -4.26$; Proportional Reduction in Error (PRE)⁸ = 0.434].

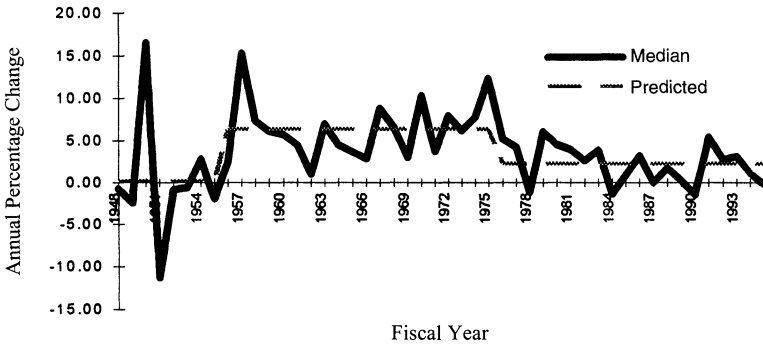
The picture for mandatory spending is a little different. The Congressional Budget Act of 1974 may mark an epoch change for mandatory spending, but it is less likely to have had much causal effect on it.⁹ Although the act called for new forms of mandatory spending to be referred to the Appropriations Committees, existing trust funds (such as Social Security and Medicare hospital insurance) were largely exempt from this new control on backdoor spending. (They also avoided the permanent sequestration requirements of Gramm-Rudman-Hollings [Meyers 1994, 139]).

⁸Proportional Reduction in Error = [Sum of the squared errors from the mean less the sum of the squared errors from the model] divided by the sum of the squared errors from the mean; or, when autocorrelations must be modeled to produce a univariate series that approximates “white noise” [(the variance of the noise model less the variance of the full model) divided by the variance of the noise model]. Thus proportional reduction in error provides information on the contribution of the full model to variance reduction without regard to parsimony. See Wood and Waterman 1994 for another example of its use in ARIMA time series analysis.

⁹In the 1970s, mandatory spending was influenced by two major changes. This was the period of the greatest expansions in indexing of entitlements (Weaver 1988). On the other hand, the 1974 Congressional Budget Act at least provided a framework in which to consider changes to entitlements in the form of the reconciliation process (J. White 1995).

FIGURE 3

Observed and Predicted Median Percentage Growth in Real Budget Authority for Mandatory Domestic Subfunctions



Note: Years refer to the end year for the change; e.g., 1948 = 1947 to 1948.

Congress mandated the de facto removal of the trust-funded programs from the budget agenda through the spread of automatic indexations. As Weaver (1988) explained, indexation is a form of automatic government, yet many saw indexation as a method of control because it avoided recurring congressional bidding wars over election-year increases. By tying certain programs to an external index (typically the consumer price index), Congress surrendered the credit-claiming possibilities of election-year raises in benefits and put those programs on financial autopilot. The third, and by far the largest, wave of such indexation occurred from 1971 through 1980 (Weaver 1988, 139). Consequently, the spread of indexation in the 1970s may have had an effect on mandatory spending similar to the Congressional Budget and Impoundment Control Act's effect on discretionary spending, although the timing is less clearly associated with a single budget year. Indexation may have actually slowed the growth of the typical mandatory subfunction by removing it from the partisan budgetary politics of the day.

Mandatory spending responded to the epochs as discretionary spending did, but the changes were not so large nor was the second punctuation as clear cut as was the case with discretionary spending. Figure 3 sketches medians of annual percentage changes in real budget authority for mandatory subfunctions based on the same step epochs used above. The intervention for Nixon impoundments was deleted because it did not apply to mandatory spending categories. An ARIMA approach estimating a model using only the step functions indicated an FY 1956 increase of 6.2% ($t = 3.59$) from the widely varying early period growth that averaged 0.2% ($t = 0.13$), followed by a 1976 decline of 4.1% ($t = -3.16$) for the last epoch (PRE = 0.24). However,

since mandatory spending includes countercyclical subfunctions such as unemployment compensation and farm subsidies, a fuller model was also estimated to include the effects of changes in economic growth on changes in mandatory spending. Maximum likelihood estimates for the fuller model appear below in Table 3 in the next section. Figure 3 shows the predicted values for the epochs-only model.

Testing the Rival Hypotheses

Having shown the presence of large-scale punctuations in the federal budget, we turn now to see if these can be explained by three plausible theories.

PARTISAN CONTROL. If the punctuation hypothesis is correct, then traditional political divisions will not be very important in causing government to grow or shrink when we control for the epoch. On the other hand, the political control hypothesis calls for Democratic presidents, in league with a Democrat-controlled Congress, to have increased the size of government and domestic spending more than Republican presidents, and this should hold regardless of epoch. The long-term budget record indicates that this has not been the case. Rather, there seems to have been a period of increases in the Eisenhower, Kennedy, Johnson, and Nixon presidencies, and a period of more restraint in the Ford, Carter, Reagan, Bush, and Clinton presidencies, as shown in Table 2.

Table 2 presents the direction of change, in percentage terms, for all 62 programmatic subfunctions of government since FY 1947, by presidency. It includes not only discretionary domestic spending and mandatory domestic spending but also national security spending in order to provide a broad overview of any partisan differences over time. Based upon an examination of the distribution of annual percentage changes for all programmatic subfunctions and upon Spearman's rho tests of subfunction rankings under various break points (Bohrnstedt and Knoke 1988, 326–28), we defined a large annual increase as greater than +20% and a large decrease as more than –15% (after the effects of inflation have been removed). We have divided the Eisenhower administration into two parts to sharpen our view of the first and second epochs in growth discussed above. Note that the secular tendency for government functions to grow less, on average, in later years is more important than the particular individuals who hold the presidency.

The apparent unimportance of partisan control led us to make more systematic tests of the partisan activism hypothesis that Democratic congresses and presidents have been more active in their support of the growth of domestic programs than Republican or divided alternatives (see Kiewiet and McCubbins 1991 or Sundquist 1968). We extended the previous ARIMA models with a dummy variable for those years when both the presidency and the Congress were Democratic (= 1 when both were Democratic; else = 0). The results for changes

TABLE 2

Percentage Changes in Budget Authority by Presidencies

| Administration (Fiscal Years) | N | Large Increase [>20%] | Large Decrease [<-15%] | Incremental [-15% <20%] |
|-------------------------------|------|--------------------------|---------------------------|----------------------------|
| Truman (FY 1948–53) | 281 | 24% | 24% | 52% |
| Eisenhower 1 (FY 1954–55) | 103 | 21% | 22% | 56% |
| Eisenhower 2 (FY 1956–61) | 316 | 29% | 12% | 59% |
| Kennedy (FY 1962–63) | 106 | 18% | 13% | 69% |
| Johnson (FY 1964–69) | 324 | 19% | 15% | 67% |
| Nixon (FY 1970–75) | 337 | 26% | 15% | 59% |
| Ford (FY 1976–77) | 116 | 17% | 13% | 70% |
| Carter (FY 1978–81) | 248 | 10% | 12% | 79% |
| Reagan (FY 1982–89) | 496 | 11% | 15% | 74% |
| Bush (FY 1990–93) | 248 | 12% | 9% | 79% |
| Clinton (FY 1994–95) | 124 | 7% | 15% | 78% |
| Overall | 2699 | 18% | 15% | 67% |

Source: Compiled by the authors.

Note: The series begins with percentage changes from FY 1947 to FY 1948; outgoing presidents were credited with the fiscal year under way when the new president was sworn in.

in domestic subfunctions (with mandatory and discretionary combined) and for discretionary subfunctions separately provide evidence that years of Democratic activism were not associated with large growth in domestic subfunctions or with growth in discretionary subfunctions either alone or after controlling for the changes in epochs, as shown in Table 3.¹⁰

Table 3 shows that the sign of the partisan control variable is the opposite of that called for in the theory. However, if we assume it takes more than one year for Democratic control to make itself felt, we can lag the partisan control variable for an additional year and reanalyze the relationship. Lagging that relationship an additional year does affect the results. Now the unified control coefficient is statistically significant, but the sign is still negative. In either the simple or the lagged case, the partisan activism hypothesis of larger increases under Democratic control is not supported.

CAPITALIST SURPLUS. It is possible that budgetary epochs might themselves be caused by changes in economic production. If the economy was growing rapidly

¹⁰Divided government, however, does have an effect on budget volatility. The intersextile ranges of annual budget changes are greater during periods of divided government, suggesting that more disparate changes (and hence less predictability) is associated with periods of divided government (see Jones, True, and Baumgartner 1997).

TABLE 3
Effects of Democratic Activism and/or Epochs
on Median Changes in Budget Authority

| <i>Model</i> | Overall Domestic Spending | | | Discretionary Spending Alone | | |
|---|---------------------------|--------------------------------|-------------------------|------------------------------|--------------------------------|-------------------------|
| | <i>Activism Alone</i> | <i>Activism and Epochs</i> | <i>Epochs Alone</i> | <i>Activism Alone</i> | <i>Activism and Epochs</i> | <i>Epochs Alone</i> |
| Mean | 3.51*** (3.78) | 2.08 (1.42) | 1.31 (0.96) | 3.88*** (3.23) | 3.22 (1.75) | 1.83 (1.05) |
| Democratic Activism | -0.67 (-0.44) | -1.55 (-1.33) | — | -1.45 (-0.74) | -2.79 (-1.92) | — |
| Step 1956 | — | 5.61** (3.48) | 5.73*** (3.53) | — | -5.59** (2.77) | 5.81** (2.80) |
| Pulse 1974 | — | -16.34*** (-4.14) | -15.69*** (-3.97) | — | -26.90*** (-5.45) | -25.72*** (-5.10) |
| Step 1976 | — | -6.20*** (-5.03) | -6.01*** (-4.87) | — | -7.06*** (-4.58) | -6.72*** (-4.26) |
| Proportional Reduction in Error (PRE) | 0 | .427 | .417 | 0 | .467 | .434 |
| Akaike IC | 294 | 270 | 270 | 319 | 291 | 293 |
| Schwarz BC | 298 | 279 | 277 | 323 | 300 | 300 |

T-ratios are in parentheses. SAS ARIMA maximum likelihood estimates.

**Significant at < .01 level, one-tailed test.

***Significant at < .001 level, one-tailed test.

in the 1960s and early 1970s, large numbers of budget increases might naturally be more prevalent than later when the economy was growing at a slower pace. Despite the plausibility of this hypothesis, it was not supported by our analysis of the annual percentage changes in budget authority for domestic spending. We studied the effects of real (inflation-adjusted) percentage changes in the gross domestic product on median percentage changes in subfunction spending. The series were deemed to be stationary. Overall, percentage changes in domestic spending had no significant cross-correlation with percentage changes in gross domestic product either during the year of a GDP change or for lags of up to 12 years after. Adding a contemporaneous GDP variable in the epoch equation for domestic spending produced neither a statistically significant coefficient estimate nor any improvement in proportional reduction in error, Akaike Information Criterion (AIC), or Schwarz Bayesian Criterion (SBC).

It is possible that mandatory and discretionary spending are affected differently by the economy. Mandatory spending contains several subfunctions usually considered to have an automatic countercyclical effect on the economy. Countercyclical subfunctions in this macrofunction include farm income stabilization, unemployment compensation, food and nutrition assistance (food stamps), and

other income security (Supplemental Security Income and Aid to Families with Dependent Children). It seems reasonable to assume that mandatory subfunctions with countercyclical elements would generate increased spending when the economy sags and reduced spending when the economy recovers.

As a consequence, we again disaggregated domestic spending into its discretionary and mandatory components, performing separate ARIMA analyses. We did find a complex set of statistically significant direct relationships, which are nevertheless inconsistent with the capitalist surplus hypothesis. Our analysis of discretionary spending allowed us to rule out the possibility that annual economic growth directly influenced annual increases in the median domestic discretionary subfunction.¹¹

As hypothesized, however, mandatory spending had a contemporaneous countercyclical response to changes in GDP, with mandatory spending increasing a bit when the economy sags and declining when the economy improves.¹² Assuming that annual changes in GDP contemporaneously influence annual changes in mandatory spending, we can use ARIMA to produce maximum likelihood estimates of that relationship with and without budgetary epochs. (Recall that we do not incorporate the 1974 pulse for mandatory spending.) The results appear in Table 4.

The combined model indicates that both budgetary epochs and changes in GDP influenced changes in mandatory budget authority. Their inclusion in the full model resulted in improvements in proportional reduction in error as well as improvements in AIC and SBC. There is a great deal of year-to-year variability of changes in mandatory spending that is not accounted for in these models. However, it seems clear that mandatory spending responded to both of the hypothesized epochs as well as countercyclically to changes in national production. In summary, we found no persuasive evidence that economic growth by itself produced the influences on budgetary changes that we have attributed to budgetary epochs. However, decreases in GDP produce statistically significant short-term increases in mandatory spending.

¹¹The analysis actually indicated that changes in discretionary budget authority precede, rather than follow, changes in GDP. With discretionary spending as the dependent variable, statistically significant cross-correlations occur at lag -1 and lag -6 . With GDP as the dependent variable, statistically significant cross-correlations occur at lag $+1$ ($+0.36$) and lag $+6$ ($+0.33$). Residuals approximated white noise with no statistically significant relationship of residuals with the independent variable. Clearly, GDP changes do not directly influence changes in discretionary budget authority.

¹²Percentage changes in mandatory budget authority were related to percentage changes in GDP for the period under study. The two series were contemporaneously correlated but with a negative coefficient. The only statistically significant cross-correlation was -0.52 at lag 0 . That is, economic declines are associated with increases in mandatory expenditures. The cross-correlation between mandatory spending and changes in gross domestic product was evident whether the time series was of the medians of annual percentage changes or of first differences in the annual sum of the budget authority for mandatory subfunctions.

TABLE 4
GDP Effects on Mandatory Spending

| | Epochs Only | GDP Only | Epochs and GDP |
|---|---------------------------------------|---------------------------------------|---------------------------------------|
| <i>Variable</i> | <i>Estimate</i> (<i>t-ratio</i>) | <i>Estimate</i> (<i>t-ratio</i>) | <i>Estimate</i> (<i>t-ratio</i>) |
| <i>Dependent Variable: Percent Change in Mandatory BA</i> | | | |
| Mean | +0.19 (0.13) | +6.57*** (7.05) | +4.00*** (2.87) |
| <i>Independent Variables</i> | | | |
| Step 1956 | +6.16*** (3.59) | — | +5.43*** (3.90) |
| Step 1976 | -4.10** (-3.16) | — | -4.62*** (-4.39) |
| Percent Change in GDP | — | -0.95*** (-4.09) | -0.96*** (-5.01) |
| Variance (Noise Model) | 22.09 | 22.09 | 22.09 |
| Variance (Full Model) | 16.84 | 16.55 | 10.97 |
| Proportional Reduction in Error (PRE) | 0.24 | 0.25 | 0.50 |
| Akaike IC | 275 | 273 | 255 |
| Schwarz BC | 280 | 277 | 262 |

SAS ARIMA maximum likelihood estimates.

**Significant at < .01 level, one-tailed test.

***Significant at < .001 level, one-tailed test.

PUBLIC OPINION. One might argue that broad understandings about the proper role of government (and consequently, epochs) are just another form of public opinion. If public opinion in a democracy were a simple matter, we should be able to capture it through repeated surveys of a large sample of the population and test for policy relationships (Page and Shapiro 1992; Stimson, MacKuen, and Erikson 1995). The best-known tool for studying historical change in aggregate public opinion is Stimson's public mood measure (Stimson 1991). This measure was developed from an exacting examination and collation of numerous public opinion measures taken by polling organizations since the mid-1950s. It assesses the extent to which weighted aggregate totals of opinion measures, termed by Stimson the public mood, changes over time.

Examining Stimson's domestic policy "mood" measure (Stimson 1991; Stimson, MacKuen, and Erikson 1995) does show a marked increase in liberal preferences for a more active government from 1958 through 1961 (shortly after our 1956 punctuation leading to expansive budgets); however, the mood measure also shows a general shift toward a conservative, less-active government mood from 1962 to 1980 and a steep increase in liberalism thereafter. On the contrary,

our last epoch suggests a continuing budgetary focus on restraining the growth of government from 1976 onward.

We cannot here fully examine the complex relationships between expenditure policies and mass public opinion, yet multivariate ARIMA analysis allows at least a partial look at relationships between Stimson's mood series and budgets over time. Characterizing mood as the independent variable with an ARIMA 1,1,0 noise model,¹³ we found no statistically significant cross-correlations between changes in mood and changes in domestic, discretionary, or mandatory budget authority from 1955 through 1990—whether the variables were measured as annual percentage changes or as first differences. Models with mood alone as well as models with epochs and changes in gross domestic product were estimated. Using mood as the only independent variable and “prewhitening” with its noise model increased (rather than reduced) model variance, AIC, and SBC from the univariate budget noise models.

We estimated a more complete model correlating either first differences in the sums of budget authority by macrofunction (or annual percentage changes in budget subfunctions) as dependent upon the first differences (or percentage changes) in mood and real GDP as well as our hypothesized epochs. None of the models yielded significant cross-correlations between mood and spending, and neither a zero shift, one-year shift (see Stimson, MacKuen, and Erikson 1995, 561), nor a five-year shift produced maximum likelihood estimates of the mood coefficient that were statistically significant. Cross-correlations between mood and both domestic and discretionary spending at lags of minus one year (spending leads opinion) and plus five years (opinion leads spending) fell short of statistical significance.

One cannot conclude from these data that public opinion does not influence public policy, nor even that public opinion fails to influence public spending. Both the opinion measure and the budget measure are highly aggregated, and it remains clearly possible that a disaggregation of either or both of these variables would yield significant results. All we can say for now is that changes in the generalized mood of public opinion, as tapped by Stimson's measure, cannot account for the budgetary eras that we have isolated.

MULTIVARIATE TESTS. As a final exercise, we performed multivariate ARIMA analyses of the punctuation hypothesis and the alternate hypotheses combined, using, as usual, the median annual percentage changes in budget authority for

¹³We used the updated version of Domestic Policy Mood for 1955 through 1990 as presented in Table A-4 of Stimson, MacKuen, and Erikson (1995). Since the mood series is bounded, one would not expect it to have a unit root; however, correlograms and augmented Dickey-Fuller tests indicate that differencing is required before cross-correlations are estimated, and an AR-1 model after one differencing produced acceptable correlograms and Q statistics. In addition, an AR-1 model of annual percentage changes in mood was compared with median annual percentage changes in budget authority with virtually identical results.

domestic subfunctions. Since it employs several independent variables, this approach does not allow for the “prewhitening” of the series studied, and thus must be treated with a measure of caution, but it has the advantage of allowing the comparison of effects in combination. The results are presented in Table 5. Because the public opinion measure begins in 1956, we performed separate analyses for the full period (1947–95) and the period for which the liberalism measure was available (1956–90).

The multivariate ARIMA yields no surprises. The punctuations are statistically significant, whereas the alternate hypotheses are not. Note that the partisan control hypothesis would be statistically significant if a two-tailed test were used (that is, even when the punctuations and the variables assessing the other hypotheses were controlled, there was a tendency for divided governments to spend more than governments unified under the Democrats).

TABLE 5

Multivariate ARIMA Results for Median Annual Percentage Change in Budget Authority for Domestic Subfunctions^a

| Coefficients | Period: 1947–95 | Period 1956–90 |
|----------------------------------|---------------------------------------|-------------------------------------|
| Mean | 4.90** (3.07) | 7.38*** (5.82) |
| Step 1956 | 4.34** (2.91) | — |
| Pulse 1974 | -17.54*** (-5.09) | -17.08*** (-4.75) |
| Step 1976 | -6.79*** (-6.26) | -6.73*** (-5.54) |
| Partisan activism | -4.00^{b,c} (-3.79) | -3.36^c (-2.37) |
| Percent change in GDP | -0.16 (-0.80) | -0.28 (-0.78) |
| Percent change in Public Opinion | — | -0.20^d (-0.78) |
| Variance (Noise Model) | 25.456 | 27.143 |
| Variance (Full Model) | 11.067 | 11.324 |
| Proportional Reduction in Error | 0.565 | 0.583 |
| N | 48 | 34 |

^aSAS ARIMA maximum likelihood estimates; *t*-ratios are in parentheses.

^bInput lagged one year based on cross-correlation function.

^cInsignificant for one-tailed test because of the sign opposite to theory; it would be significant using two-tailed test.

^dInput lagged one year based on Stimson et al. 1995.

**Significant at < 0.01 level, one-tailed test.

***Significant at <0.001 level, one-tailed test.

Punctuations in American Politics

Using a new dataset on budget authority, we have shown quantitatively that the postwar history of national government budgeting in the United States is separated into three distinct epochs, divided by two dramatic punctuations. After World War II and before 1956, there was no general patterning to changes in spending within national budget domestic policy subfunctions. This was a period of experimentation and reallocation; this postwar transition period was characterized by large variability in budget categories, but with no consistent trend toward growth or decline overall. Between 1956 and 1974, on the other hand, the typical domestic subfunction grew about 7% per year in real terms. We lived through a period of substantial growth in spending, based on a vision of government that emphasized the need and possibility for programs to solve important social and economic problems. Since 1976, we have experienced a period of slower growth. The typical domestic subfunction has grown only a little more than 1%. Not surprisingly, discretionary functions suffered more dramatic restraints after 1976 than mandatory functions. These three epochs of government spending seem to correspond largely to generalized and widely shared expectations about the proper role of government. They are not explained by any of the rival hypotheses that we have explored.

We urge some caution in interpreting these findings. First, annual budget levels do not produce series that are demonstrably stationary, raising the possibility of spurious regressions unless they are differenced, either by taking first differences or annual percentage changes. Second, budget results are driven by a host of different processes. Heterogeneity tests (Hsiao 1986) indicate that pooling these data would run a significant risk of producing coefficients that are neither robust nor representative. Third, medians are preferable to means in these analyses because means over-react to the many outliers in the series. However, the more stable median masks year-to-year changes in dispersion. Fourth, the secular shift from discretionary to mandatory spending creates some analytical problems. Finally, by examining our budgetary series from a perspective of punctuated change, we were unable to make the theoretical point predictions that are the standard fare of Neyman-Pearson statistical hypothesis testing. While we can make some general predictions based on the theory and on recent political history, we had to isolate the particular punctuations from an examination of the budgetary time series, then subject them to a battery of tests.

Despite these inherent limitations, the bottom line is that two punctuations have occurred in national budget results since World War II, and their effects on the epochs which followed remain robust when we introduce measures of plausible alternative hypotheses into the estimations, either singly or in combination.

A number of theoretical approaches in political science are consistent with the perspective we have developed here. All of these perspectives predict occasional surprising outbreaks of rapidly interacting and self-reinforcing processes. Taken

together, these approaches make an important general point: the partial endogeneity of policy punctuations.

While budgetary punctuations were postulated and demonstrated by Davis, Dempster, and Wildavsky (1974), their models postulated a constant style of budgetary decision making occasionally disrupted by exogenous forces. If we just knew the exogenous forces, we could predict the changes. Newer perspectives have tended to think of political change as not simply driven by exogenous forces, but as some complex combination of outside and inside factors. These perspectives include: (1) new understandings in behavioral decision making; (2) the “tectonics of change” idea, describing how political systems adjust to changes in social technologies and values; (3) patterns of mobilization and stasis (“punctuated equilibria”) characteristic of conflict expansion processes; (4) probabilistic interactions of complex forces via the activities of entrepreneurial politicians in the organized anarchy of the “policy soup”; and (5) the establishment of broad “policy moods” that are alternately energetic and quiescent.

DECISION THEORY. The behavioral foundations of the study of government budgets have been firmly rooted in conceptions of “bounded rationality,” which posits that human decision making is not, and could not be, “omnisciently rational.” Rather, decision makers use various “aids to calculation” in order to accomplish tasks (Simon 1957, 1977, 1983, 1985). A major aid to calculation is the use of routines to make a complex reality predictable. Routines often lead to immediate and automatic action on the part of the decision maker when their rules are invoked. Such aids to calculation, or standard operating procedures, have been shown to be prominent in private firms (Cyert and March 1963) as well as in public organizations (Lindblom 1959).

While the early students of bounded rationality in politics emphasized stability and routine (Fenno 1966; Wildavsky 1964), this is not the only implication. Simon (1983) noted the role of selective attention in setting the decisional agenda, and Jones (1994) has developed a theory of abrupt shifts in choice that stem from shifts in selective attention. When one decision rule is replaced with another, the result can be anything but incremental. Similarly, a shift in the object of attention can lead to a disjoint change in preferred alternatives, even when the alternatives are well defined. In a similar vein, students of political psychology have recently emphasized the role of framing, and the occasional tendency for frames to change, causing changes in behavior (Iyengar 1991; Kahneman and Tversky 1984; Quattrone and Tversky 1988). In a model of selective and partial attention, change does not typically occur smoothly. One adopts a particular frame until forced to reevaluate. Shifting from one frame to another can lead to dramatically different outcomes, not marginal adjustments. Hence, bounded rationality does not simply imply only incremental change in policymaking; it can also lead one to expect occasional radical departures from the status quo.

POLICY TECTONICS. Basing his analysis on the work of anthropologist Gregory Bateson, Lawrence Dodd (1994) has developed a theory of American politics that emphasizes the lag between the worldviews of political participants and the pressures of economic and social change. As participants' views of the world and what they accept as reliable knowledge (their epistemologies) get out of date relative to physical and social technologies, tensions build up, but it typically takes a lot of tension before the participants adjust their philosophies. These tensions are not resolved smoothly; rather, there is a tendency of political epistemologies to lurch as they slowly get out of date, then are rapidly brought into line with changing economic and social technologies. This tectonic view of political change operates, therefore, both at the level of the individual decision maker and at the systemic level.¹⁴

PUNCTUATED EQUILIBRIUM. Theories of conflict expansion and agenda setting since the work of E. E. Schattschneider have stressed the difficulty of new ideas and disfavored groups in "breaking through" the entrenched system of policy-making (Bosso 1987; Cobb and Elder 1983; Schattschneider 1960). Decision making takes place within political institutions, and political institutions amplify the tendency toward decisional stasis interspersed with abrupt change (as opposed to smooth, moderate adjustments to changing circumstances). Baumgartner and Jones (1993) have described a process of punctuated equilibrium in U.S. national policymaking based on surges and declines in attention to particular issues over time. American political institutions make mobilization to overcome entrenched interests necessary, thereby leading to institutionally induced stability interrupted by bursts of change. The model of punctuated equilibrium in political science was originally applied to policy subsystems, but here it seems applicable to government as a whole.

THE "POLICY SOUP." John Kingdon (1995, 80) notes that incrementalism is not a very good description of how issues access the policy agenda, a precondition to policy enactment. Instead, "a subject rather suddenly 'hits,' 'catches on' or 'takes off.'" Kingdon indicates that policymaking is occasionally disjoint and episodic because agenda setting is so. Moreover, he grants an important role to the complex and probabilistic interactions of unrelated forces, building on the "garbage can" theory of Cohen, March, and Olsen (1972). Policy entrepreneurs play a central role in coupling problems, policies, and politics—although this

¹⁴This view of politics has the flavor of the study of earthquakes, in which shifts in the tectonic plates are dissipated through many small tremors. But the forces cannot be completely dissipated this way, and occasionally a very big quake occurs. It has been noted that there are very few moderate earthquakes; they tend to be either very small or quite large. The Gutenberg-Richter law, which describes the relative frequency of earthquakes, has a very small midrange (see Rundle, Turcotte, and Klein 1996). Dodd's arguments anticipate a similar pattern in politics: many incremental adjustments, few moderate changes, and a number of dramatic punctuations.

approach suggests that the same actor pursuing the same strategy at two different times will not necessarily achieve the same result. So policymaking is occasionally nonincremental, and these nonincremental happenings depend on the interactions of unrelated forces coming together unpredictably.

POLICY WAVES. A number of authors have pointed to alternating periods of policy activism and restraint in the American policy process—periods that, for some, look cyclical (Hirschman 1982; Huntington 1981; Schlesinger 1986). For others, the periods look more like distinct epochs. For example, David Mayhew (1991, 157) argues that there have occurred in the United States in the twentieth century periods of “continuous high energy during quite clearly bounded eras.” His analysis of statutes suggests a period of activism from the early 1960s through the mid-1970s. Mayhew (1991) and Kingdon (1995) each point to a broad policy mood that can shift fairly abruptly, and which may be set off or ended by numerous different circumstances. Kingdon gives considerable attention to the idea that policymakers in Washington sense a “national mood” and attempt to promote policies that they believe are consistent with it. Both authors reject a simple association of public opinion with policy mood.

All of these approaches suggest that the prediction of just when and what disjoint, rapid change will break out in politics will often be extraordinarily difficult and perhaps impossible. Each of these perspectives imply complex combinations among many forces interacting probabilistically. A major implication seems to be that a kind of consensus about what is the proper role of government can get established; and the groups, parties, and actors contend within the context established during these epochs. Yet this general consensus can undergo relatively sudden upheaval resulting in new understandings and a new consensus. We have shown here that the entire federal budget seems to have been affected by such shared understandings; and, if so, then these understandings have tremendous implications for the shape of our government and its spending patterns.

This paper provides empirical evidence that punctuations occur not only at the level of the issue-area, as Baumgartner and Jones (1993) showed before, but also throughout the national government as a whole. If our findings are supported by additional studies, the potential implications are great: epochs of widely shared beliefs about the proper role of government have more direct influence on policy outputs (as measured by budget changes) than do changes in national economic productivity, changes in partisan control of the government, or changes in public opinion—whether these other factors are tested singly or in combination. More generally, we expect that others who search for them will find more evidence in other areas of American and international politics that complex interactions and self-reinforcing processes create patterns of outcomes best explained by models of punctuated equilibrium. We may avoid these questions by looking carefully only at periods of relative stability, where institutional structures remain intact and where outcomes are therefore more predictable. Expanding our gaze to cover

a greater range of observations creates a more difficult modeling task, but offers the possibility for a more accurate theory of political change.

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Appendix

Data Sources: The primary sources of the budget authority data in this paper are the *Budget of the U.S. Government*, hereafter *BUSG* (serial, FY 1949–94, in print form published by the U.S. Government Printing Office; and serial, FY 1995–97, on CD-ROM from the Department of Commerce). Secondary sources include the *Report of the President's Commission on Budget Concepts* (Washington: October 1967) and the “Budget System and Concepts” sections of contemporary budgets, which were used in defining the contents of the contemporary budget authority by subfunction. The data were recategorized into the subfunctions extant in the FY 1995 *BUSG* and converted into constant-dollar form.

Budget Authority: Budget authority (BA) consists of appropriations and reappropriations, borrowing authority, and contract authority. It should not be confused with budget authorizations. Legally, BA constitutes specific authority to make obligations that will result in immediate or later outlays. The data presented in this paper consist of actual budget authority figures from contemporary *BUSGs* that have been adjusted to conform to the current definition and corrected for inflation. The data are composed of appropriations, borrowing authority, and contract authority for both on- and off-budget federal entities from FY 1976 through FY 1994; of appropriations, borrowing authority, and contract authority for on-budget entities in FY 1967–75; of administrative appropriations and trust fund budget authority for FY 1962–66; of new obligating authority and trust fund expenses for FY 1949–61; and of appropriations and trust fund expenses for FY 1947–48. We omit data from the three months of the transition quarter between FY 1976 and FY 1977.

Current- and Constant-Dollar Figures: We converted the contemporary actual budget figures into constant calendar year 1987 dollars by using the implicit price deflators for the U.S. gross domestic product (GDP) transformed from calendar year to fiscal year. The deflator removed the effects of inflation for the fiscal year in which the new budget authority was available for obligations by government agencies (i.e., the FY 1955 deflator was used on the FY 1955 data), although an argument can be made for using the inflation rate in effect while Congress is considering budgets for the coming year (J. White 1995). The source of the deflators was the *National Income and Product Accounts of the United States* (Washington: U.S. Department of Commerce 1990) and the National Income and Product Tables of the *Survey of Current Business* (Washington: U.S. Department of Commerce) (serial).

Subfunctions: The primary sources of the current subfunction categorization were the *Budget of the U.S. Government for Fiscal Year 1995* and OMB technical staff paper FAB 79-1, *The Functional Classification in the Budget*, dated February 22, 1979. Criteria for functional classification may be found in “The Budget System and Concepts of the United States Government” in the FY 1995 *BUSG* and in the *BUSG* (serial, FY 1948–97).

Macrofunctions: The authors further assigned the data captured in these budget subfunctions to macrofunctions of mandatory domestic spending, discretionary domestic spending, national security spending, and financial aggregates. These macrofunction aggregations parallel but do not exactly duplicate the definitions outlined in the Budget Enforcement Act of 1990. Subfunction categorization was based on our analysis of Table 8-5, “Outlays for Mandatory and Related Programs: 1962–2002,” in the *BUSGs* for FY 1995, 1996, and 1997. Financial functions and subfunctions were excluded from these analyses because they consist mainly of net, rather than complete, transactions. The domestic category consists of all of the subfunctions in the mandatory and discretionary macrofunctions as explained below:

Domestic Mandatory Spending: OMB defines mandatory spending or direct spending as a category of budget authority and outlays provided for in entitlement authority, law other than appropriations acts, and budget authority for the food stamp program. We have operationalized that definition to capture whole subfunctions associated primarily with direct spending programs. The subfunctions herein included in the domestic mandatory macrofunction are:

| | |
|-----|--|
| 351 | Farm Income Security |
| 502 | Higher Education |
| 551 | Health Care Services |
| 571 | Medicare |
| 601 | General Retirement and Disability |
| 602 | Federal Employee Retirement and Disability |
| 603 | Unemployment Compensation |
| 605 | Food and Nutrition Assistance |
| 609 | Other Income Security |
| 651 | Social Security |
| 701 | Income Security for Veterans |
| 702 | Veterans Education, Training, and Rehabilitation |
| 901 | Interest on the Public Debt |

Domestic Discretionary Spending: This macrofunction contains budget authority that is usually provided in annual appropriations acts. The domestic discretionary macrofunction excludes subfunctions assigned to the mandatory, national security, and financial macrofunctions. The subfunctions included in the domestic discretionary macrofunction are:

| | |
|-----|---|
| 251 | General science and basic research |
| 252 | Space flight, research, and supporting activities |
| 271 | Energy supply |
| 272 | Energy conservation |
| 274 | Emergency energy preparedness |
| 276 | Energy information, policy, and regulation |
| 301 | Water resources |
| 302 | Conservation and land management |
| 303 | Recreational resources |
| 304 | Pollution control and abatement |
| 306 | Other natural resources |
| 352 | Agricultural research and services |
| 372 | Postal Service |
| 376 | Other advancement of commerce |
| 401 | Ground transportation |
| 402 | Air transportation |
| 403 | Water transportation |
| 407 | Other transportation |
| 451 | Community development |
| 452 | Area and regional development |
| 453 | Disaster relief and insurance |
| 501 | Elementary, secondary, and vocational education |
| 503 | Research and general education aids |
| 504 | Training and employment |
| 505 | Other labor services |
| 506 | Social services |
| 552 | Health research and training |
| 554 | Consumer and occupational health and safety |
| 604 | Housing assistance |
| 703 | Hospital and medical care for veterans |
| 705 | Other veterans benefits and services |
| 751 | Federal law enforcement activities |
| 752 | Federal litigative and judicial activities |
| 753 | Federal correctional activities |
| 754 | Criminal justice assistance |
| 801 | Legislative functions |
| 802 | Executive direction and management |
| 803 | Central fiscal operations |
| 804 | General property and records management |
| 805 | Central personnel management |
| 806 | General purpose fiscal assistance |
| 808 | Other general government |

National Security Spending: This macrofunction consists of spending associated with national defense (function 050) and international affairs (function 150), except for the financial subfunction 155 (international financial programs). The subfunctions included in the national security macrofunction are:

- 051 Department of Defense—Military
- 053 Atomic energy defense activities
- 054 Defense-related activities
- 151 International development and humanitarian assistance
- 152 International security assistance
- 153 Conduct of foreign affairs
- 154 Foreign information and exchange activities

Financial Subfunctions: These subfunctions reflect large amounts of credit activity, offsetting receipts, or government-wide contra-accounts. Such subfunctions were excluded from programmatic analyses because of their broad use of net, rather than complete, transactions and offsetting receipts. The subfunctions included in the financial macrofunction are:

- 155 International financial programs
- 371 Mortgage credit
- 373 Deposit insurance
- 704 Veterans Housing
- 809 Deductions for offsetting receipts
- 902 Interest received by on-budget trust funds
- 903 Interest received by off-budget trust funds
- 908 Other interest
- 951 Employer share, employee retirement (on-budget)
- 952 Employer share, employee retirement (off-budget)
- 953 Rents and royalties on the outer continental shelf
- 954 Sale of major assets

Details on the construction of this dataset are available from the authors.

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