Explaining Punctuations

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Abstract

Previous research on the causes of punctuations has focused on two causes: cognitive and institutional friction. We break out these general categories into more specific possible causes of punctuations in budget and other distributions of change over time. We discuss empirical strategies for investigating these different possible sources of large changes in budgets, and demonstrate the degree to which observed punctuations can be explained by each possible cause, with data from the US federal budget, US state-level revenue and spending series, and other sources. Our goal is to advance our collective understanding regarding the sources of punctuated changes, moving toward a fuller elaboration of the punctuated equilibrium model of budgeting and policy change more generally.

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Introduction

Frank Baumgartner and Bryan Jones explored the reasons for punctuations in federal spending in their 2005 *Politics of Attention*. They laid out two general reasons for these: Cognitive and Institutional Frictions. The idea was that limitations on attention inevitably cause over-attention to a relatively small number of items and under-attention to the bulk of issues that fail to cross a threshold of urgency and therefore gain attention. Over time, as issues rise and fall in urgency, individual and institutional attention shift not slowly and proportionately, but in jumps and starts. If policy making follows the allocation of attention, then we can see incremental drift when attention is allocated elsewhere (as it is hard to justify a massive budget change in the absence of attention), and the possibility—though no certainty—of dramatic changes in those cases where attention is focused on a topic where some urgency or crisis seems apparent. This is a general explanation of the observed distribution of changes from a wide variety of government and institutional decision-making processes, and has been confirmed many times. In this paper, we seek to unpack the concept of friction that lies at the core of this theory and to explore empirically the patterns of variation observed in a variety of empirical distributions. We seek better to understand the conditions where we observe distributions with different degrees of punctuation. Our approach is highly empirical and our goal is to promote thinking about next steps in the theory of institutional causes of punctuation.

The Basic Observation, Again

Figure 1 shows aggregate changes in government spending across OMB subfunctions from 1947 to 2009. This is a simple update of the Jones-Baumgartner figure 4.14, which started the discussion about punctuations in budgets (2005, 111). Clearly this distribution is not Normal, but instead features a high central peak and extremely wide tails, while the "shoulders," or mid-

range changes, of the distribution are missing. In other words, this is a leptokurtic or "fat tailed" distribution. Empirically we can determine the extent to which a distribution is leptokurtic by looking at that distribution's l-kurtosis value, which for a Normal distribution will be 0.123, with increasing values indicating leptokurtosis and smaller values playkurtosis.

Our interest is in explaining the punctuations in Figure 1. There are various ways to distinguish between those cases far in the tails and those closer to the central peak. Analysis of the causes of punctuations proves to be highly robust with respect to where we draw this line; for simplicity, we identify the top and bottom five percent of the observed changes as punctuations, and the figure illustrates this with vertical lines. With 3,581 observations in the overall distribution, 360 then are identified as punctuations, half on the negative side and half on the positive side. Note, as is standard in the literature, we have truncated the presentation of the data by clustering all extremely high positive changes at +150 percent.[1]

[1] More complicated definitions of what constitutes a punctuation, such as those beyond the point where the observed distribution passes the hypothetical Normal distribution with similar variance, or controlling for changes in overall variability across time, generate results highly similar to those we present here, so for simplicity, but with knowledge that our results are robust, we choose a very simple definition of punctuation here. Various authors have drawn these lines differently: Jones Baumgartner and True (1998) drew them at +20 and -15; Breunig and Koski (2006) have used quintile regression to analyze separately the tails from the center of the distribution.

Figure 1. Distribution of Changes in Federal Spending, 1947 – 2009

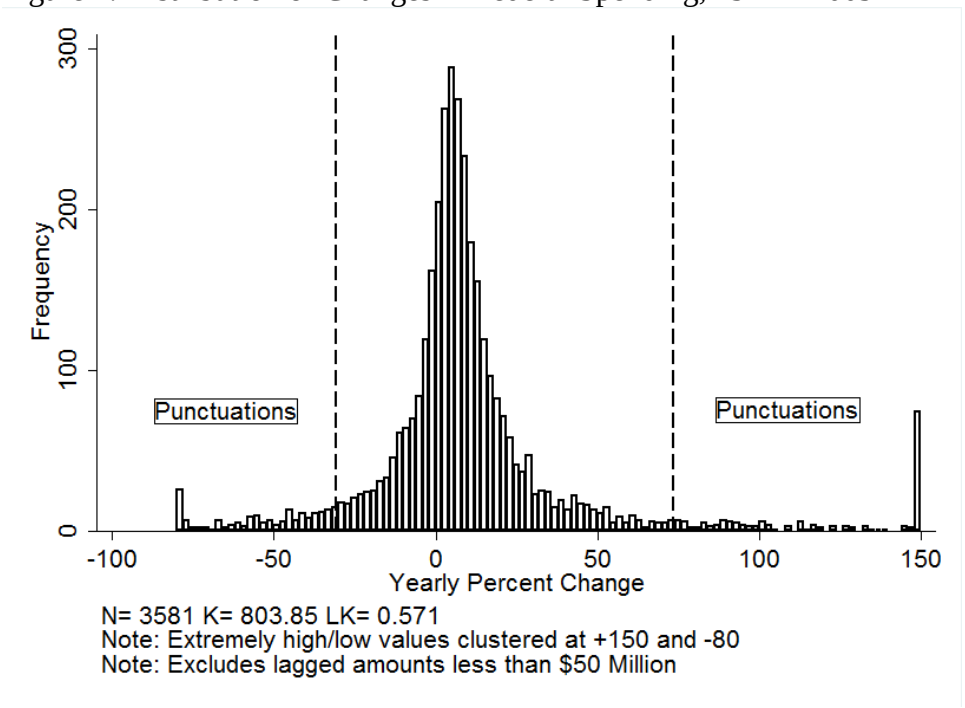


Figure 2 shows that the occurrence of punctuations is relatively evenly distributed over time. Jones, Baumgartner, and True (1998) have demonstrated a general secular decline in the volatility of budgets over the decades from 1948 to the recent period. However, consistent with an analysis of a moving average of kurtosis, we show here stationarity in the series of counts of punctuations over time. Note, however, the dramatic spike in positive punctuations in 2009 corresponding with the stimulus package.

Figure 2. Positive and Negative Punctuations, 1947 – 2009

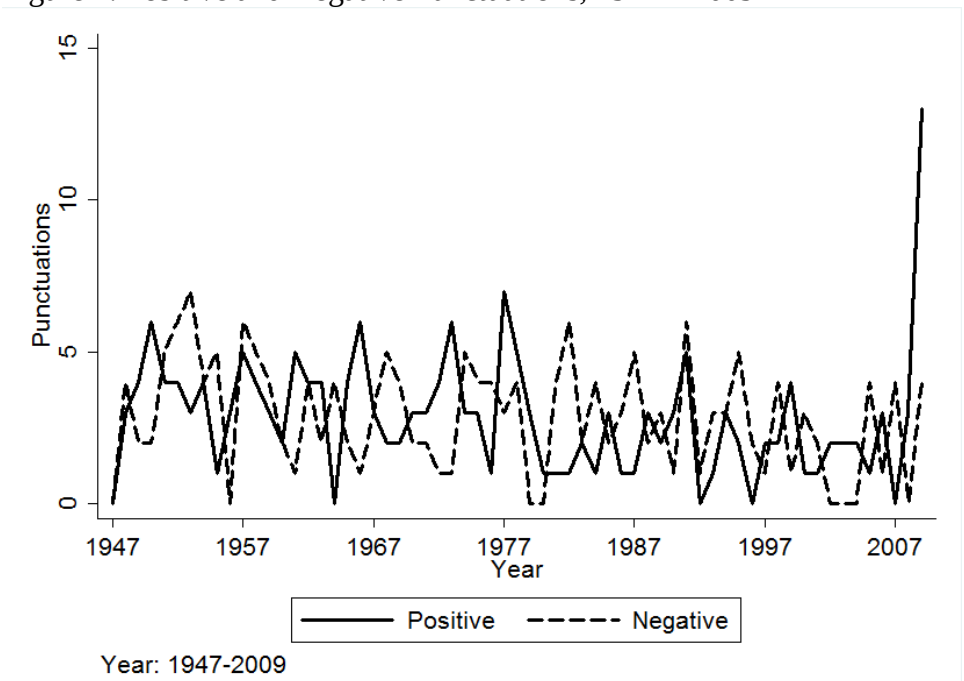


Figure 1 lays out what we are going to explore in the pages to come, and Figure 2 reassures us that a plausible concern, that all the punctuations come from a single period of history, is unfounded. We now turn to a series of considerations of the conditions where we might see more and fewer punctuations.

Leadership Change, Honeymoons, and Learning

One obvious possibility for the presence of dramatic policy shifts is change at the top. New leaders, especially those with a different ideology from their predecessors, might want to make their stamp by dramatically adjusting spending patterns. We look at this in two ways: first, by considering whether new presidents, eager to live up to campaign promises, usher in large budgetary changes shortly after taking office. Second, we consider the honeymoon and learning hypotheses, which suggest systematic changes in the likelihood of punctuated change over the terms of a president's tenure in office. Under the honeymoon idea, he might be more effective in the first year or two (Eshbaugh-Soha 2005; Lockerbie, Borrelli and Hedger 1998; Pfiffner 1988;

Beckmann and Godfrey 2007) and under the learning hypothesis he might achieve greater success as he has more time in office (Neustadt 2001; Light 1999). We find scant evidence that any of these dynamics play an important role. Table 1 looks at the leadership idea, and Figure 3 considers the honeymoon and learning hypotheses.

Table 1. Punctuations in the First Budget Year of a Presidency

Budget Year	N	% Punctuations
First Budget Year	593	10.12
Subsequent Budget Years	2,988	10.04
Total	3,581	10.05

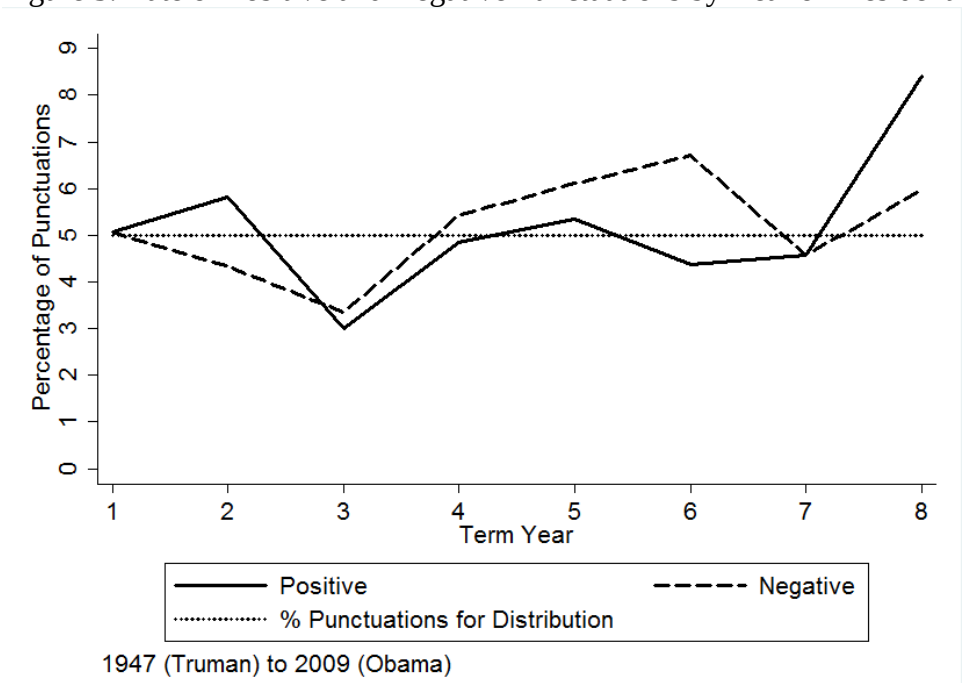
If new presidents were systematically making their mark in the first year when they had the opportunity to do so, we would expect to see a high percentage of budget punctuations in that first year. Table 1 shows, however, that there is no difference.[2] Will Jennings and Peter John (2010) explored this idea using the British speech from the throne, finding that speeches from new Prime Ministers immediately following their elections were somewhat more likely to show large differences from the previous year's speech. Here, we find no effect at all.

Perhaps US presidents learn on the job, or benefit from a honeymoon period? If presidents benefit from a honeymoon period we would expect punctuations to be more likely during the early years of a presidency. On the other hand, if presidents become more adept at working with Congress during their time in office, punctuations may be more likely toward the end of a presidential term. Figure 3 shows the percent of budget changes falling in the positive and negative tails of the overall distribution, by presidential year. That is, for all presidents, we look at those budget changes in their first, second, third year in office, and so on.[3]

[2] Work in progress shows that we also see few turnover effects when we look only at those leadership changes involving a change in partisan control, and when we look beyond the US to a number of other countries based on change in partisan control of government.

[3] A president elected in 2008 takes office in 2009 and submits his first budget to take effect in FY 2010. We count 2010 therefore as the "first year" for the purpose of these comparisons.

Figure 3. Rate of Positive and Negative Punctuations by Year of Presidential Term



By definition, five percent of all budget changes are negative and positive punctuations. The figure shows that there is little fluctuation around this average, with all the values falling between three and eight percent, but no strong trend in any direction. If anything, we might argue that there is a slight trend for the eighth year of a president's term in office to be associated with a slight increase in punctuated change. This, however, is an extremely modest effect and is most likely a random fluctuation in the data.

Characteristics of the Policy Domain

Domains where spending is strongly driven by demographic trends, such as retirement and education, should logically have dynamics distinct from those domains that are subject to endogenous or exogenous shocks. Certainly some domains are heavily driven by exogenous shocks, such as disaster relief of farm price supports.

Carsten Jensen (2009) was the first to publish such results, showing that for a large number of West European states spending on old-age pensions was relatively low in

punctuations as compared to the more volatile spending on unemployment compensation. With pension spending heavily determined by the number of eligible beneficiaries (but also affected by occasional changes to the formula), spending there produced fewer punctuations. Unemployment compensation is affected both by occasional changes in the underlying formula and by rapid shifts in the number of those eligible. Clearly, he showed, there is reason to think that policy domains might vary systematically in terms of their susceptibility to punctuated change.

Christian Breunig and collaborators showed strong differences in levels of punctuation across policy domains in the US federal budget (with lk scores ranging from 0.2 for interest on the public debt to 0.6 for Medicare) and the Danish national budget (with lk scores ranging from close to zero for welfare and 0.6 for waterways). Further, they showed that for the cases where the budgets could be compared, the same issue-domains tended to have low or high lk scores in both countries (Breunig, Koski, and Mortensen 2010). Finally, Breunig and Koski (2012) showed similar results looking at a different set of policy comparisons in the 50 US states (and also when comparing annual budget totals from state to state, more on which below); they found education spending to be at the low end of the lk scale, with parks at the top.

We follow the general pattern of Breunig et al. (2010) here and simply list, by US OMB subfunctional category, the number of positive, negative, and total punctuations in the budget series, using the same data from Figure 1 above. Recall that by definition there are 180 positive punctuations, and 180 negatives. Table 2 shows how these punctuations are distributed across OMB subfunctions. Here, we see that topics driven by exogenous shocks tend to have the most punctuations (disaster relief, farm support), while those topics associated with mandatory programs have fewer (Social Security, Medicare).

Table 2. Punctuations by OMB Subfunction

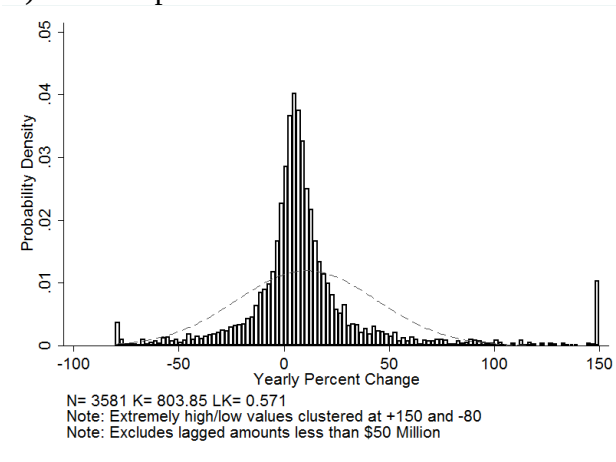
Topic	Positive Punctuations	Negative Punctuations	Total
Disaster Relief and Insurance	11	15	26
Military – Other	14	12	26
General Property and Records Management	9	10	19
Farm Income Stabilization	9	9	18
Community Development	8	8	16
Other Advancement of Commerce	9	7	16
Other General Government	5	10	15
International Security Assistance	7	6	13
Training and Employment	5	7	12
Veterans Education, Training, and Rehabilitation	2	10	12
Defense Related Activities (General)	4	7	11
Housing assistance	6	5	11
Emergency Energy Preparedness	3	7	10
Int. Development and Humanitarian Assistance	5	5	10
Area and Regional Development	6	3	9
Higher Education	5	4	9
Criminal Justice Assistance	4	3	7
Pollution Control and Abatement	5	2	7
Atomic Energy Defense Activities	3	3	6
Central Personnel Management	3	3	6
Energy Conservation	4	2	6
General Purpose Fiscal Assistance	2	4	6
Ground Transportation	3	3	6
Conservation and Land Management	3	2	5
Energy Information, Policy, and Regulation	1	4	5
General Retirement and Disability Insurance (excluding social security)	3	2	5
Research and General Education Aids	3	2	5
Social Services	4	1	5
Space Flight, Research, and Supporting Activities	4	1	5
Unemployment compensation	3	2	5
Conduct of Foreign Affairs	2	2	4
Executive Direction and Management	2	2	4
Air Transportation	2	1	3
Elementary, Secondary, and Vocational Education	3	0	3
Federal Employee Retirement and Disability	1	2	3
Health Care Services	3	0	3
Military Construction	1	2	3
Recreational Resources	2	1	3
Water Resources	2	1	3
Department of Defense (General)	1	1	2
Income Security for Veterans	1	1	2
Legislative Functions	1	1	2

Other Labor Services	0	2	2
Other Transportation	1	1	2
Federal Correctional Activities	0	1	1
Federal Law Enforcement Activities	1	0	1
Federal Litigative and Judicial Activities	1	0	1
Food and nutrition assistance	1	0	1
Foreign Information and Exchange Activities	0	1	1
General Science and Basic Research	1	0	1
Hospital and Medical Care for Veterans	0	1	1
Medicare	1	0	1
Water Transportation	0	1	1
Dept. Defense (R&D)	0	0	0
Dept. Defense (Personnel)	0	0	0
Dept. Defense (Operation and Maintenance)	0	0	0
Dept. Defense (Housing)	0	0	0
Dept. Defense (Procurement)	0	0	0
Interest on Public Debt	0	0	0
Social Security	0	0	0
Other Veterans Benefits	0	0	0
Central Fiscal Operations	0	0	0
Other Income Security	0	0	0
Other Natural Resources	0	0	0
Agricultural Research and Services	0	0	0
Consumer and Occupational Health and Safety	0	0	0
Health Research and Training	0	0	0
Total	180	180	360

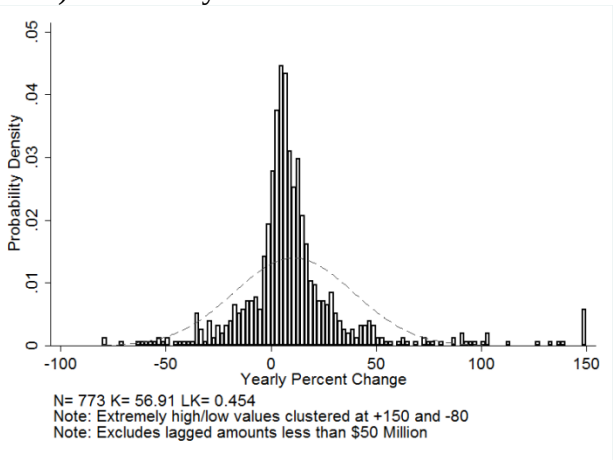
Figure 4 compares budget distributions for discretionary, mandatory, defense, and total spending. Holding the range of the axes constant across distributions reveals some key differences. Notably, the distribution associated with discretionary spending has wider tails and a slightly smaller central peak than the distribution associated with mandatory spending. This illustrates that punctuations are taking place more often for discretionary topics, while incremental changes are more prominent among mandatory categories.

Figure 4. Comparing Budget Distributions across Spending Types

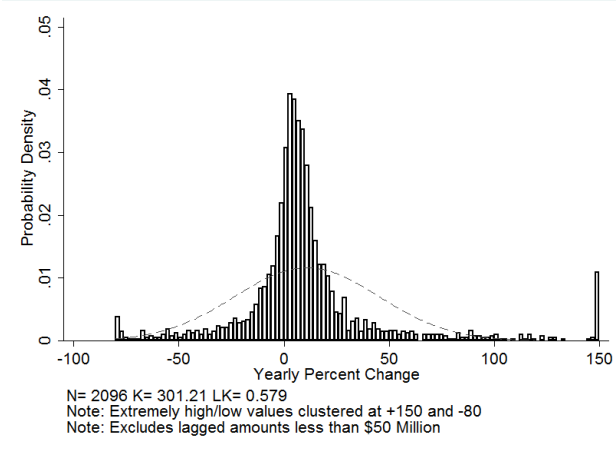
A) Total Expenditures



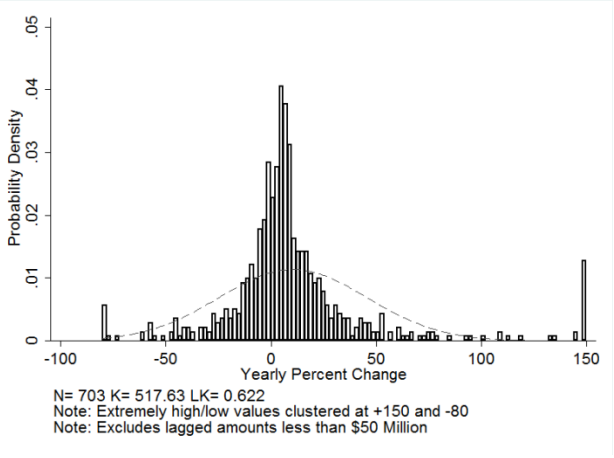
B) Mandatory



C) Domestic Discretionary



D) Defense



We plot the slopes of each distribution on a log-log scale and estimate a slope parameter (see Jones and Breunig 2007 or Jones et al. 2009 for an example of this type of analysis). Table 3 presents these statistics along with the l-kurtosis values associated with each distribution. Higher absolute values for the slope coefficients indicate steeper slopes and therefore shorter tails. Lower absolute values for the slope reflect fatter tails, and therefore a more punctuated or extreme distribution. Here we find supporting evidence that the mandatory spending distribution is less extreme than the distributions for discretionary or military spending. Looking either at the positive or the negative budget changes, mandatory spending categories have much steeper slopes: -1.4 for the positive changes, and 1.7 for the negatives, as compared to -1.2 and 1.3

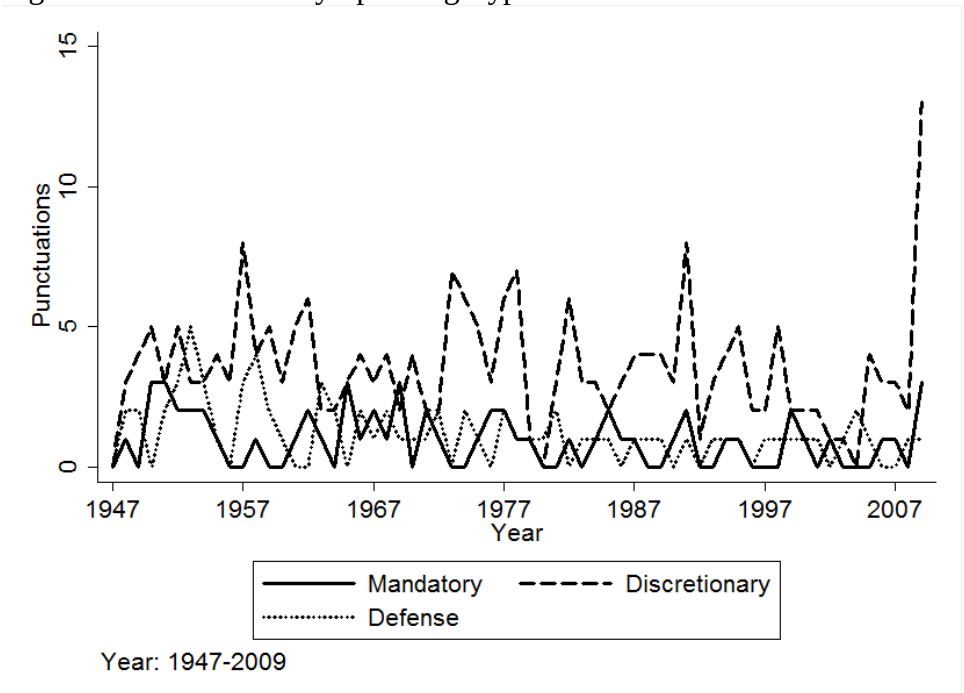
overall. These are substantively important differences in the likelihood of extreme values falling into the different budget types.

Table 3. Exponent Estimates for Functions of Tails of Federal Budget Outlay Distributions

Distribution	Positive Tail	Adj. R^2	Negative Tail	Adj. R^2	L-kurtosis
Full	-1.179	0.987	1.301	0.807	0.571
Mandatory	-1.400	0.975	1.697	0.809	0.454
Discretionary	-1.122	0.982	1.213	0.812	0.579
Defense	-1.039	0.971	1.440	0.849	0.622

Figure 5 shows how punctuations are distributed over time and across spending category. This figure illustrates a) that punctuations are evenly dispersed over time and b) that discretionary spending categories have more punctuations than mandatory or military categories in almost every year.

Figure 5. Punctuations by Spending Type



This short review of spending patterns across diverse categories clearly demonstrates that important differences characterize different areas of the budget. We cannot state that any particular budget category is driven by a purely demographic logic; even in the case of

retirements and pensions, important shifts sometimes occur in the formulae used to determine entitlements. And Breunig et al. (2010) identified Medicare spending as having the highest lk score in all the categories they examined; this is clearly driven by demographics, but also health care costs and significant changes in the size of the eligible population (driven for example by the poverty rate, increases in which can render large numbers of individuals eligible for these benefits). Education spending is largely driven by how many school-age children there are but above this there can be important shifts in teacher salaries and other spending, even on a per-capita basis. So, policies with important demographic elements associated with their spending patterns are not immune from dramatic spending shifts.

While it may be true that a demographic logic does not preclude punctuations, other policy domains clearly are much more prone to it. Disaster relief, military spending, farm price supports, and other similar policies clearly are driven by a logic of response to changing cues. As Jones and Baumgartner (2005) have argued, there is no reason to expect the response to be proportional to the changing cues, and the cues themselves may be changing quite rapidly. Therefore, in these series, driven both by dramatic shifts in real-world events and by institutional inefficiencies leading to under- and over-reactions, we can see why there would be a great number of punctuations. Further specifying the domain-specific elements that determine the likelihood of a policy punctuation is a worthwhile research agenda.

Direct Measures of Inputs

An important underlying difference between mandatory and discretionary spending patterns may be that mandatory spending is highly driven by demographic trends, as discussed in the previous section. This implies that the "inputs" to mandatory series might be systematically different than

those associated with discretionary or defense series. Here we explore further the idea of directly measuring policy inputs.

Jones and Baumgartner (2005) wrote that, given the huge range of activities of a national government, we can assume that the distribution in annual changes to the overall inputs associated with governing are Normal, from the Central Limit Theorem. There is no reason to doubt this logical and highly developed statistical fact. Still, there might be instances where a scholar could directly measure the inputs associated with a given series of outputs, in order to determine if higher kurtosis in the inputs is associated with higher kurtosis in the outputs, as would be expected. It is very difficult, however, to measure inputs, and the decision-making theory at the core of bounded rationality is that decision-makers may never be using a complete model of reality, and therefore that they may occasionally update their model. This means changing the series of input indicators they consider. Further, of course, many of the indicators decision-makers may use will be qualitative and informal.

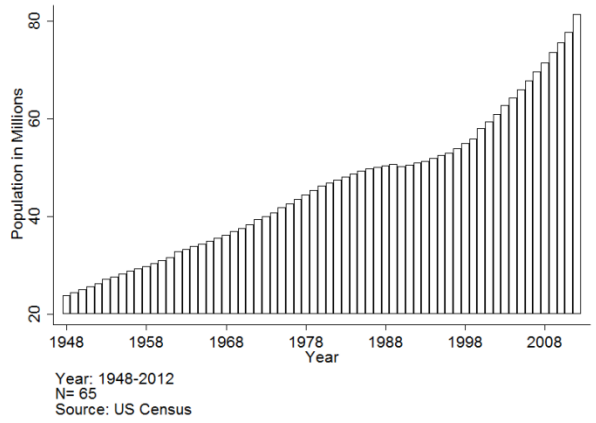
Interview and field-work based research may be highly useful here in assessing differences across issue-domains in the range of indicators—quantitative and qualitative—that are actually used in government decision-making. Thus far, we know if no such studies. This is probably the most significant gap in the literature on the causes of punctuations, or in validating the conceptual model with observations of the process of decision-making in governmental settings.

For some government programs, however, the indicators may be relatively straightforward to assess. Social security payments, for example, are based on a formula that rests on changing age demographics, while spending on disaster relief and insurance is clearly linked to the occurrence of weather related calamities. Figure 6 compares inputs from these

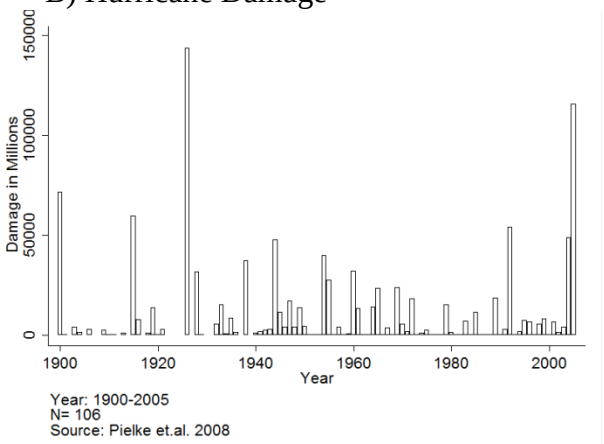
series; with panel A displaying the number of US civilians over the age of 55 by year and panel B annual normalized hurricane damages for the US. In Table 2 we showed that spending on disaster relief and insurance underwent 29 punctuations from 1947 to 2009, while during the same period spending on Social Security saw no extreme changes. Figure 6 goes a long way toward explaining this disparity. Age demographics change incrementally and predictably from year to year, but hurricane damages fluctuate wildly. By linking spending programs to these very different sets of inputs, policymakers ensure that the budget will undergo both incremental and extreme changes. The limits to such an analysis are severe, however: If we knew the relevant input series to relate to each government budget, then we would have solved the complexity problem that causes governments to over- and under-respond to issues in the first place. Nonetheless, there are clear differences by policy area, as the figure makes clear.

Figure 6. Comparing Input Series: US Population Growth and US Normalized Hurricane Damages

A) Population Growth



B) Hurricane Damage



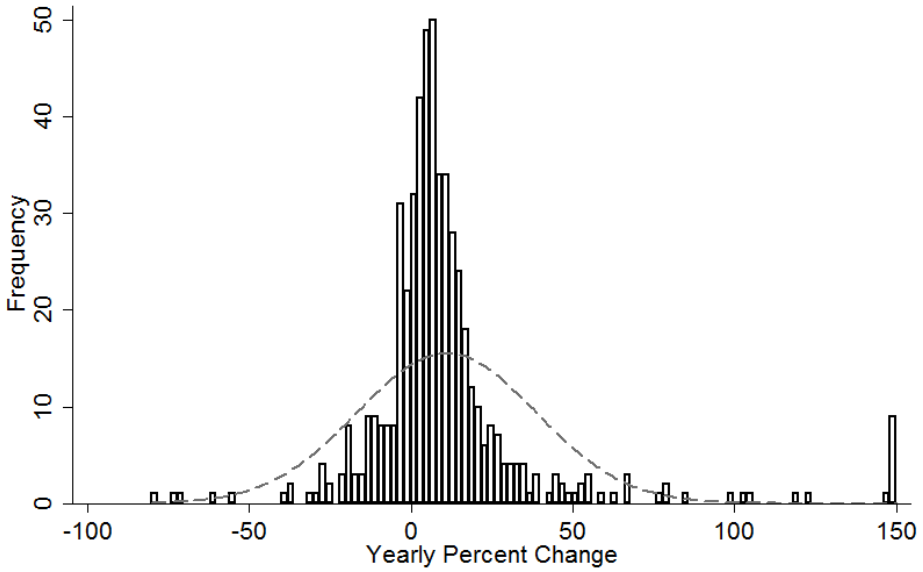
A more general set of indicators that decision-makers may clearly take into account when constructing budget plans is revenues. Federal decision-makers are interested in deficit politics, even if they are not constrained to maintain a balanced budget. However, US state-level budgets must be balanced. Few have studied kurtosis in tax revenues, but these may be a very powerful

predictor of the observed and well-known kurtosis in expenditures. Here we look at federal and state tax receipts.

Tax Revenues

While the size of federal and state budget deficits indicates that the link between revenues and expenditures is far from ironclad, scholarship does suggest that the availability of revenue affects spending decisions at the national and state levels (Friedman 1978; Manage and Marlow 1986; Ram 1988; Blackley 1986). We investigate how l-kurtosis in revenue distributions may lead to l-kurtosis in spending. Figure 7 shows the distribution of aggregate revenues received by the federal government from 1934 to 2011, showing that revenues, like outlays, form leptokurtic distributions.[4]

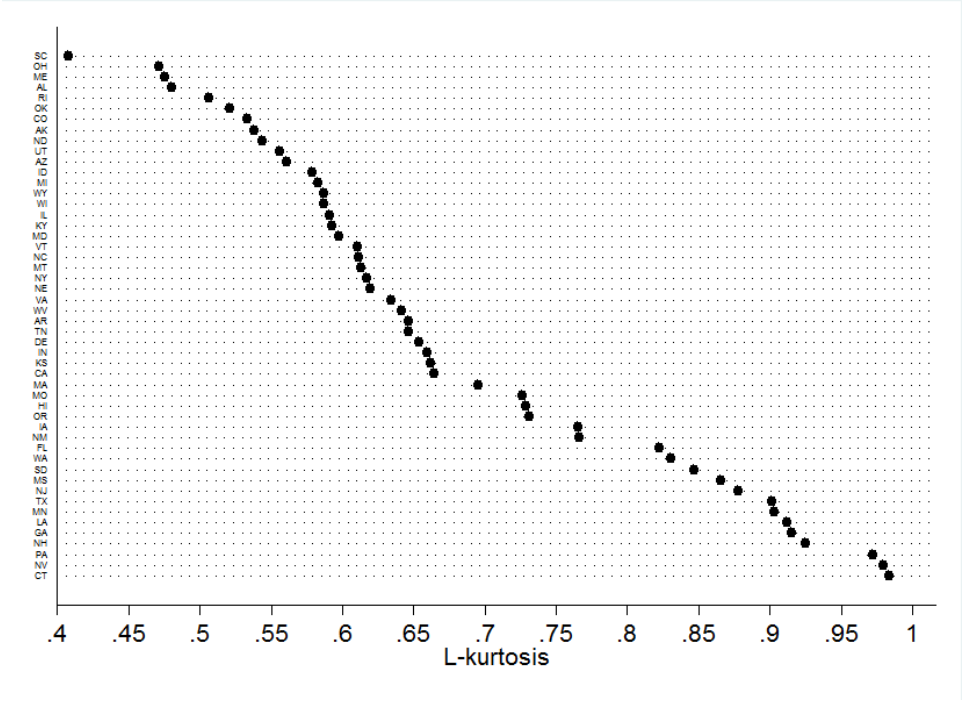
Figure 7. Distribution of Annual Changes in Federal Revenues



[4] These data are available from the OMB. They include annual receipts from various taxes as well as money received from custom duties, sales of various assets, and other financial transactions.

Figure 8 plots the l-kurtosis values associated with the revenue distributions for all 50 states.[5] For each state, this value is well above the 0.123 associated with the normal distribution; ranging from 0.407 (South Carolina) to 0.983 (Connecticut).

Figure 8. L-kurtosis of Revenue Distributions for the 50 States, 1965-2008



Figures 7 and 8 clearly make the point that tax revenues are highly subject to punctuated change. This is because of the ratchet effect of shifting economic fundamentals, and occasional changes in tax rates. As sticky as expenditure decisions may be, changing tax rates is even more politically difficult. Therefore, if a government has a certain mix of tax revenues based on mixes of economic activity x rates of taxation, but the rates of economic activity are slowly evolving, eventually producing strains on the budget, there are strong reasons to expect that governments will not be able to adjust the tax rates slowly and proportionately to these shifting fundamentals. Rather, the system may be allowed to limp along until a more dramatic adjustment takes place.

[5] These data are available from the Bureau of Economic Analysis. They track state receipts across 27 different taxes.

Further, as Figure 8 makes very clear, some states have much greater lk values than others. This is because they have different economic fundamentals, for example relying on mineral extraction taxes in some cases but broad personal and corporate income taxes in others. And, of course, there is no reason to suspect that each state or the federal government would be equally efficient in shifting its many tax rates in order to maintain some reasonable stability in receipts.

These receipts do indeed affect expenditures. Table 4 shows the results of an OLS regression model that predicts the l-kurtosis of state spending distributions with the l-kurtosis of state revenue distributions, along with a series of control variables.[6] The l-kurtosis of revenue distributions is the only variable that is statistically significant. This relationship is positive, indicating that as the leptokurtosis of state revenue distributions increases, so does the leptokurtosis of spending distributions. L-kurtosis is measured on a zero-to-one scale, meaning the coefficient for revenue shows the total relationship between revenue and spending l-kurtosis.

[6] We include controls that may affect the l-kurtosis of state spending distributions. We control for the average annual expenditures for each state, as states with low expenditures may be more likely to see punctuations in spending simply because it is relatively easy to effect a large percentage change between two small values. We control for the l-kurtosis of Gross State Production (GSP) distributions because underlying economic conditions may affect government decisions relating both to revenues and expenditures. We control for the strictness of state balanced budget requirements, expecting that increasing strictness corresponds with increasing l-kurtosis as the flexibility state governments have to respond to problems is limited. This variable is coded so that higher values indicate stricter requirements. We include a dummy variable for states that have a ballot initiative allowing voters to pass measures into law. Our logic is that ballot initiatives, by bypassing the legislature, may increase the volatility of state budgets. Finally, we control for the professionalism of state legislatures, as more professional legislatures may be able to process information more comprehensively. This variable is coded so that higher values indicate increasing professionalism.

Table 4. Predicting the L-kurtosis of State Spending Distributions

Variable	Coefficient (Standard Error)
Average Expenditures	0.000 (0.000)
Revenue L-kurtosis	0.265* (0.128)
GSP L-kurtosis	-0.434 (0.480)
Balanced Budget Requirements	-0.048 (0.029)
Ballot Initiative	-0.005 (0.039)
Professional Legislature	-0.047 (0.035)

N = 50 * = significant at 0.05 p-value Adj. R-Squared = 0.095

We have scratched the surface of input measures here. But if we want a full understanding of the causes of punctuations in output series, one logical place to look is in the various inputs. For the model of disproportionate information processing to be confirmed more strongly, we would want to demonstrate that the output series are even more extreme than the input series. Of course, that is exactly what has been shown here, and each time we have looked so far. But there is much to be gained by further explorations of a diverse array of input series.

Salience and Agenda-Scarcity

The logic of the politics of attention is that punctuations are more likely to occur for issues that the government is attending to. This logic should extend to the news media as well. Punctuations should be more likely for topics that are highly salient in the news. There are good reasons to expect that this is the case. The news media covers policymaking, so as the government attends to different issues, the media may pick up the story. The media may also be an active agenda setter (Walgrave, Soroka and Nuytemans 2007; Cook et.al. 1983; Edwards 1990; Wood 1998) and, by playing a watchdog role, alert the government to issues deserving of attention (Protess 1987). The reason for punctuations to occur in the absence of news coverage would be automatic or formula-driven shifts in attention, as in farm-price supports and other categories where spending automatically responds to occasional dramatic fluctuations.

Peter John and Shaun Bevan (2012) consider the history of British law-making from 1911 through 2008 and distinguish among three types of punctuations: procedural, high-salience, and low-salience. They argue that procedural punctuations may not be what are normally considered to be punctuations at all, but a series of unrelated law-making changes that happen to be in the same issue-domain. We need not dispute that conceptualization here. Their other distinction however is between high- and low-salience punctuations, by which they mean those large changes in the law-making agenda which were, and were not, associated with significant media attention. Among these punctuations identified (see their Table 3), 26 are high-salience and 11 have low levels of media salience, as indicated by having no mentions in *The Times of London* during the time of passage. (They also note that the punctuations are not randomly distributed across policy topics, but show higher likelihood in the areas of education, defense, labor, social welfare, and science.) So, while legislative punctuations in Britain are not guaranteed to be high-salience issues, the majority do attract significant media attention.

In *Making the News: Politics, the Media, and Agenda Setting,* Amber Boydstun (2013) codes the front page of every *New York Times* from 1996 through 2006, recording the policy topic of each story. We use this data to develop a simple measure of media saliency, where a topic is considered highly salient in any year in which it appears on the front page of the *Times* an average of two out of three days. Table 5 shows the occurrence of federal spending punctuations by media saliency.[7] It appears that during periods of high saliency there is a modest increase in the proportion of spending reallocations that qualify as punctuations.

[7] Data on front page coverage in the *Times* is only available for 10 years, so we expand our definition of a punctuation to include the top and bottom 10% of the spending distribution in order to increase the number of reallocations occurring during periods of high media saliency. The *Times* stories are coded according to general policy topics such as education, national

Table 5. Spending Punctuations by Media Saliency, 1996 – 2006

Media Saliency	N	% Spending Punctuation
Low	84	19.05
High	26	23.08
Total	110	20.00

By demonstrating that media attention can be linked to punctuations, this finding highlights the depth of ties between the news media and government. It also speaks to the importance of attention as an indicator of policy change. Even with very simple indicators of salience, we see a correlation between attention and spending punctuations.

Public Opinion: Policy Input, or Media Output?

With a few exceptions (Jones, Sulkin and Larsen 2003), the majority of PE literature looks at government budgeting and distributions of spending changes. Of course, the importance of attention as a catalyst to change need not be limited to governments, but may apply to a broad range of political and social behavior. For example, in *Politics of Attention* Jones and Baumgartner demonstrate that attention scarcities lead to punctuated outcomes in *New York Times* coverage. Here, we consider mass political opinion, asking if attention scarcities can again be linked to punctuated outcomes.

A systematic shift in aggregate, or national, opinion requires a uniform signal, so that individuals around the country can receive and process it simultaneously. While there is some debate over the existence of a national media agenda (Woolley 2000), there are good reasons to suspect that coverage is relatively synchronized across outlets, at least for highly salient issues (McCombs and Shaw 1972; Baumgartner and Jones 1993; Soroka 2002; Baumgartner, DeBoef and Boydstun 2008; Atkinson, Lovett and Baumgartner 2014). If this is the case, then we can expect the news media to provide uniform signals to the public about what issues are deserving

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defense, and international affairs, so, where possible, we match these topics with OMB major functions. In all, we can match 10 different spending categories with news coverage.

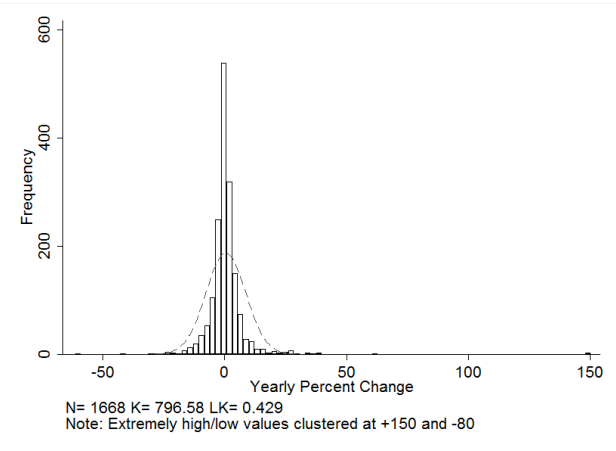
of attention. The media, however, do not cover issues comprehensively, but instead lurch from one hot topic to another (Boydstun, Hardy and Walgrave 2011; Vasterman 2005). For highly salient issues affecting entire national media systems, the rapid movement of media attention from topic to topic might well be expected to induce dramatic shifts in aggregate public opinion. Certainly, the opposite must be the case: in the absence of coordinated attention, it is hard to conceive of the conditions for aggregate opinion to do more than drift marginally this way or that. From this we can expect that for topics receiving high levels of media scrutiny, mass opinion may undergo very large changes, as the public assimilates new information and adjust policy expectations. On the other hand, for the majority of issues that the media is not attending to, we expect public opinion to "drift," fluctuating only moderately with time.

Figure 9 shows the distribution of aggregate annual changes in opinion across three commonly cited measures.[8] Notably, all three distributions show high levels of leptokurtosis, as evident in the high central peaks and wide tails.

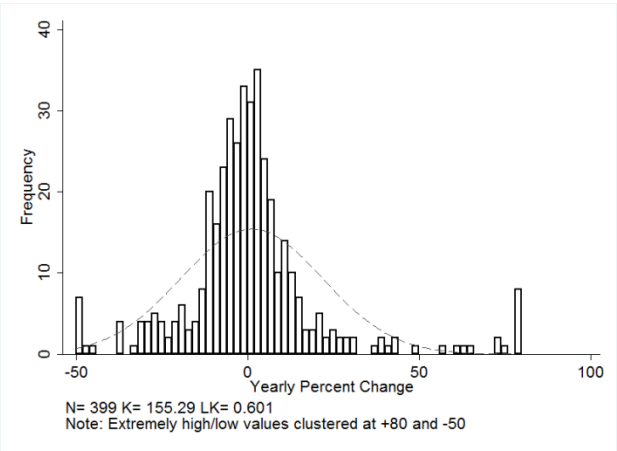
[8] Panel A features public policy mood, an aggregate measure of opinion introduced by James Stimson (1991) and subsequently featured in numerous articles on dynamic representation (Erikson, MacKuen and Stimson 2002; Stimson 2004; Stimson 1995). The Policy Agendas Project makes mood measures available for 61 different policy topics. Panel B shows changes in public spending preferences, aggregated across 13 policy topics. Stuart Soroka and Christopher Wlezien introduce this measure in *Degrees of Democracy* (2010). Panel C features Gallup's Most Important Problem (MIP) polling data, showing aggregate annual changes in the percentage of respondents naming an issue as the MIP for 20 different policy topics. This data is also available on the Policy Agendas Project website.

Figure 9. Three Distributions of Annual Changes in Public Opinion

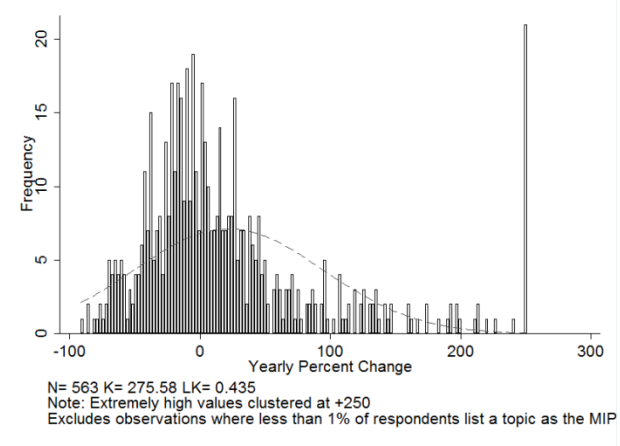
A) Public Policy Mood, 1946-2011



B) Public Spending Preference, 1972-2004



C) MIP Responses, 1947 – 2011



Having established that public opinion follows a punctuated equilibrium pattern of change, we investigate media coverage as a possible cause of this phenomenon. Table 6 reprises our measure of media saliency, which treats a topic as highly salient in any year when it appears on the front page of the *New York Times* an average of two out of three days, and shows that punctuations in opinion are more likely when a topic is receiving comparatively high levels of coverage.[9] These findings support our premise that media attention is an important catalyst for

[9] We consider a punctuation in opinion to be those changes occurring in the top and bottom 10% of each opinion distribution.

large shifts in opinion, and demonstrate that agenda scarcity can cause punctuations in political behavior, as well as institutional outcomes.

Table 6. Changes in Public Opinion during Periods of Low and High Media Saliency

Media Saliency	N	% Punctuations
Public Policy Mood		
Low Saliency	196	18.37
High Saliency	50	28.00
Total	246	20.33
Public Spending Preferences		
Low Saliency	108	19.44
High Saliency	20	25.00
Total	128	20.31
MIP Polling		
Low Saliency	262	19.08
High Saliency	79	24.05
Total	116	20.07

Opinion and Budgets

So far we have established that when issues are highly salient to the press, those issues are more likely to undergo punctuations in both spending and public opinion. Now we bring our analysis full circle, exploring the link between punctuations in opinion and government spending. Scholarship on representation finds that government actors are highly responsive to public opinion (Wlezien 1995; Erikson, Mackuen and Stimson 2002; Page and Shapiro 1992; Stimson 1991). If this is the case, then some punctuations in spending may simply be reactions to shifting public preferences, which, as we demonstrated, are themselves prone to punctuations.

To explore this possibility we compare punctuations in public opinion with punctuations in government spending.[10] Using three different measures of public opinion, the Table 7 distinguishes between periods when the opinion series is in a normal range versus when it has changed dramatically. For the following budget period (that is, with the appropriate lag to

[10] For this analysis we retain our definition of a punctuation as those changes occurring in the bottom and top 10% of the distribution, for both opinion and spending.

account for Congress to pass a budget for the following fiscal year), the percentages in the right column indicate the percent of those budget changes that are in the top or bottom 10 percent of all budget changes. Clearly, spending punctuations occur more frequently for topics on which public opinion is shifting dramatically. This relationship is particularly strong for the public mood measure of opinion, where the likelihood of a spending punctuation doubles moving from the normal range of opinion shifts to the extreme changes.

Table 7. Spending Punctuations by Public Opinion

Opinion	N	% Spending Punctuations
Public Spending Preferences, 1972 – 2004		
Normal Change	102	19.61
Punctuation	26	23.08
Total	128	20.31
Public Policy Mood, 1947 – 2009		
Normal Change	192	17.19
Punctuation	50	34.00
Total	242	20.66
MIP, 1947 – 2009		
Normal Change	232	18.97
Punctuation	58	24.14
Total	290	20.00

Together, the analysis in Table 6 and 7 speaks to the degree to which the media, government, and public are in tune with each other. Large shifts in coverage, spending, and opinion appear to mirror each other quite consistently. Together, these results provide powerful examples of the "politics of attention" at work.

Conclusion

Previous research identifies cognitive and institutional frictions as the primary cause of punctuations in output series from various organizational decision-making processes. Our goal with this paper is to unpack these frictions and encourage a discussion of all those factors that may explain variation in the degree of punctuations seen in various political outcomes. The novelty of this approach is that we directly measure relevant inputs, considering how variance in

the stability of different input series can help explain the occurrence of punctuations. We find that budget categories which are tied to unstable inputs are much more likely to experience spending punctuations than are those categories linked to more stable input series. We also discover that aggregate changes in revenue, public opinion, and media coverage (three basic inputs into government decision-making) all display punctuations of their own.

From this we can reasonably expect that even a government operating without cognitive or institutional frictions would occasionally produce spending punctuations, so long as it was responsive to public opinion, media coverage, or the availability of revenue. Furthermore governments, by tying large portions of their budgets to demographic changes, ensure that many spending reallocations will be automatic and incremental. So, in summary, while it is logical to assume that aggregate inputs will be normally distributed, and while a perfectly attentive government may produce normally distributed outlays to match, actual governments are highly sensitive to specific inputs that are on a case by case basis unstable.

Given the frequency of punctuations in outputs from political processes, our collective goal should be to maximize variance on that dependent variable, which means in particular to challenge the "general punctuation hypotheses" by finding its limits. Certainly, all complex governmental decision-making processes conform to this hypothesis. But theoretically, moving from complex to simple decision-making processes should correspond with fewer observations of punctuations. Where is the line? Can we identify an organization with such a simple task that it produces normally distributed outputs? Once we identify the maximum possible variation on the size of the tails resulting from decision-making processes, we need then to devise ways to test each possible contributor. Some of these ideas may involve simple statistical tests, but with

datasets that have not yet been collected. Some, we have tested here in at least a preliminary manner.

A valuable qualitative approach may be field-work based observations of how decision-makers actually work. Do they indeed "over-attend" to a few dimensions of a complex issue? Do they indeed "catch-up" with trends that overwhelm them? Does this process work by incumbents being overthrown and new leaders developing new decision-making routines, or do individual leaders change? Given the focus on decision-making in the literature on punctuated equilibrium, it is remarkable that so few observational studies have been done. Paradoxically, in an area of research on agendas that has moved perhaps the furthest in terms of methodological sophistication, the biggest gap may be in the simplest form of traditional process-tracing based on close observations of government officials at work.

References

Atkinson, Mary Layton, John Lovett and Frank R. Baumgartner. 2014. Measuring the Media Agenda. *Political Communication,* forthcoming.

Baumgartner, Frank R. and Bryan D. Jones. 1993. *Agendas and Instability in American Politics*. Chicago, IL: University of Chicago Press.

Baumgartner, Frank R., Suzanna L. DeBoef and Amber E. Boydstun. 2008. *The Decline of the Death Penalty and the Discovery of Innocence*. New York, NY: Cambridge University Press.

Baumgartner, Frank R., Christian Breunig, Christoffer Green-Pedersen, Bryan D. Jones, Peter B. Mortensen, Michiel Neytemans, and Stefaan Walgrave. 2009. Punctuated Equilibrium in Comparative Perspective. *American Journal of Political Science* 53, 3 (July): 602–19.

Beckmann, Matthew and Joseph Godfrey. 2007. The Policy Opportunities in Presidential Honeymoons. *Political Research Quarterly* 60: 250-262.

Blackley, Paul. 1986. "Causality Between Revenues and Expenditures and the Size of the Federal Budget." *Public Finance Quarterly*, April: 139-56.

Boydstun, Amber E. 2013. *Making the News: Politics, the Media, and Agenda Setting*. Chicago: University of Chicago Press.

Boydstun, Amber E., Anne Hardy and Stefaan Walgrave. 2011. Testing and Explaining the Multi-Media Character of Media Storms. Paper presented at the annual meetings of the American Political Science Association.

Breunig, Christian. 2006. The More Things Change, the More Things Stay the Same: A Comparative Analysis of Budget Punctuations. *Journal of European Public Policy* 13 (7): 1069–85.

Breunig, Christian, and Chris Koski. 2006. Punctuated Equilibria and Budgets in the American States. *Policy Studies Journal* 34 (3): 363–379.

Breunig, Christian, Koski, Chris, and Peter B. Mortensen. 2010. Stability and Punctuations in Public Spending: a Comparative Study of Budget Functions. *Journal of Public Administration Research and Theory* 20 (3): 703–722.

Cook, Fay Lomax, Tyler, Tom R., Goetz, Edward G., Gordon, Margaret T., Protess, David, Leff, Donna R., et al. 1983. Media and Agenda Setting: Effects on the Public, Interest Group Leaders, Policy Makers, and Policy. *Public Opinion Quarterly*, 47: 16-35.

Edwards, George C., and Wood, B. Dan. 1999. Who Influences Whom? The President, Congress and the Media. *American Political Science Review*, 93(2), 327-344.

Erikson, Robert S., Michael B. MacKuen and James A. Stimson. 2002. *The Macro Polity*. New York, NY: Cambridge University Press.

Eshbaugh-Soha, Matthew. 2005. The Politics of Presidential Agendas. *Political Research Quarterly* 58: 257-68.

Friedman, Milton. 1978. "The Limitations of Tax Limitation." *Policy Review*, Summer: 7-14.

Jennings, Will, and Peter John. 2010. Punctuations and Turning Points in British Politics: the Policy Agenda of the Queen's Speech, 1940-2005. *British Journal of Political Science* 40(3): 561-586.

Jensen, Carsten. 2009. Policy Punctuations in Mature Welfare States. *Journal of Public Policy* 29 (3): 287–303.

John, Peter, and Shaun Bevan. 2012. What Are Policy Punctuations? Large Changes In the Agenda of the UK Government, 1911-2008. *Policy Studies Journal* 40(1): 89-108.

Jones, Bryan D. and Christian Breunig. 2007. Noah and Joseph Effects in Government Budgets: Analyzing Long-Term Memory. *Policy Studies Journal* 35 (3): 329-348.

Jones, Bryan D., and Frank R. Baumgartner. 2005. *The Politics of Attention: How Government Prioritizes Problems*. Chicago: University of Chicago Press.

Jones, Bryan D., Frank R. Baumgartner, and James L. True. 1998. Policy Punctuations: US Budget Authority, 1947–95. *Journal of Politics* 60 (1): 1–33.

Jones, Bryan D., Frank R. Baumgartner, Christian Breunig, Christopher Wlezien, Stuart Soroka, Martial Foucault, Abel François, Christoffer Green-Pedersen, Peter John, Chris Koski, Peter B. Mortensen, Frédéric Varone, and Stefaan Walgrave. 2009. A General Empirical Law for Public Budgets: A Comparative Analysis. *American Journal of Political Science* 53, 4 (October): 855–73.

Jones, Bryan D, Tracy Sulkin, and Heather Larsen. 2003. Policy Punctuations in American Political Institutions. *American Political Science Review* 97: 151–70.

Jordan, Meagan. 2003. Punctuations and Agendas. *Journal of Policy Analysis and Management* 22: 345–60.

Light, Paul C. 1999. *The President's Agenda: Domestic Policy Choice from Kennedy to Clinton*. Baltimore: Johns Hopkins University Press.

Lockerbie, Brad, Stephen Borrelli, and Scott Hedger. 1998. An Integrative Approach to Modeling Presidential Success in Congress. *Political Research Quarterly* 51: 155-72.

Manage, Neela and Michael Marlow. 1986. "The Causal Relation Between Federal Expenditures and Receipts." *Southern Economic Journal*, January: 617-29.

McCombs, Maxwell E. and Donald L. Shaw. 1972. The Agenda-Setting Function of Mass Media. *The Public Opinion Quarterly* 36: 176-187.

Mortensen, Peter B. 2005. Policy Punctuations in Danish Local Budgeting. *Public Administration* 83 (4): 931–950.

Mortensen, Peter B. 2007. Stability and Change in Public Policy. A Longitudinal Study of Comparative Subsystem Dynamics. *Policy Studies Journal* 35 (3): 373–394.

Mortensen, Peter B. 2009. Political Attention and Public Spending in the U.S. *Policy Studies Journal* 37 (3): 435–455.

Mortensen, Peter B. 2005. Policy Punctuations in Danish Local Budgeting. *Public Administration* 83 (4): 931-950.

Neustadt, Richard E. 2001. The Contemporary Presidency: The Presidential 'Hundred Days' – An Overview. *Presidential Studies Quarterly* 31: 121-125.

Page, Benjamin I. and Robert Y. Shapiro. 1992. *The Rational Public: Fifty Years of Trends in Americans' Policy Preferences*. Chicago: University of Chicago Press.

Pfiffner, James A. 1988. *The Strategic Presidency: Hitting the Ground Running*. Chicago: Dorsey.

Protess, David L., , Fay Lomax Cook, Thomas R. Curtin, et al. 1987. The Impact of Investigative Reporting on Public Opinion and Policymaking: Targeting Toxic Waste. *Public Opinion Quarterly*, 51, 166-185.

Ram, Rati. 1988. "Additional Evidence on Causality Between Government Revenue and Government Expenditure." *Southern Economic Journal*, January: 763-69.

Robinson, Scott. 2004. Punctuated Equilibrium, Bureaucratization, and Budgetary Changes in Schools. *Policy Studies Journal* 32: 25-39.

Soroka, Stuart N. 2002. *Agenda-Setting Dynamics in Canada*. Vancouver, BC: University of British Columbia Press.

Stimson, James A. 1991. *Public Opinion in America: Moods, Cycles, and Swings*. Boulder, CO: Westview Press, 1991.

Stimson, James A. 1995. Opinion and Representation. *American Political Science Review* 89:179-183.

Stimson, James A. 2004. *Tides of Consent: How Public Opinion Shapes American Politics*. New York and London: Cambridge University Press.

Vasterman, Peter L.M. 2005. Media-Hype: Self-Reinforcing News Waves, Journalistic Standards and the Construction of Social Problems. *European Journal of Communication* 20:508-530.

Walgrave, Stefaan, Stuart Soroka, and Michiel Nuytemans. 2008. The Mass Media's Political Agenda-Setting Power: A Longitudinal Analysis of Media, Parliament, and Government in Belgium (1993 to 200). *Comparative Political Studies* 41: 814-836.

Wlezien, Christopher. 1995. The Public as Thermostat: Dynamics of Preferences for Spending. *American Journal of Political Science* 39:981-1000.

Wood, D., and Peake, J. 1998. The Dynamics of Foreign Policy Agenda Setting. *American PoliticalScience Review*, 92(1), 173-183.