Punctuated Equilibrium in Comparative Perspective

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We explore the impact of institutional design on the distribution of changes in outputs of governmental processes in the United States, Belgium, and Denmark. Using comprehensive indicators of governmental actions over several decades, we show that in each country the level of institutional friction increases as we look at processes further along the policy cycle. Assessing multiple policymaking institutions in each country allows us to control for the nature of the policy inputs, as all the institutions we consider cover the full range of social and political issues in the country. We find that all distributions exhibit high kurtosis values, significantly higher than the Normal distribution which would be expected if changes in government attention and activities were proportionate to changes in social inputs. Further, in each country, those institutions that impose higher decision-making costs show progressively higher kurtosis values. The results suggest general patterns that we hypothesize to be related to boundedly rational behavior in a complex social environment.

Institutional Friction

Governments in the modern age deal with a wide array of conflicting, unrelated, and poorly understood social issues ranging from fostering technological innovation and economic growth to protecting human rights, providing opportunities for citizen participation in public affairs, delivering the mail, curing cancer, fighting large-scale war, providing health, education, and welfare services, and interpreting scientific evidence about issues such as global warming, genetic engineering, and the likely future cost of hydrogen fuel cells. Governments must act as "master jugglers" as they allocate agenda space to the increasingly complex set of issues that clamor for policymakers' attention.

Although all governments face dizzying arrays of issues, constitutional designs differ at the national level and different institutions within the same country have various characteristics. While scholars have examined a variety of aspects of constitutional design in influencing the course of public policy, we address an entirely new facet: whatever the constitutional design, do political systems

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Some of the data used here were originally collected by Frank R. Baumgartner and Bryan D. Jones, with the support of National Science Foundation grant number SBR 9320922, and were distributed through the Center for American Politics and Public Policy at the University of Washington and/or the Department of Political Science at Penn State University. Neither NSF nor the original collectors of the data bear any responsibility for the analysis reported here. The authors express their appreciation to the NSF and their respective universities for previous support which makes this analysis possible. Baumgartner also expresses his thanks to the Camargo Foundation and Sciences-Po Cevipof for generous support during the period this article was written.

American Journal of Political Science, Vol. 53, No. 3, July 2009, Pp. 603–620

 ISSN 0092-5853

process issues in response to changing social conditions in a roughly comparable fashion? Are some dramatically more efficient or responsive than others? Within countries, does institutional design affect outputs? The U.S. system was designed explicitly to be inefficient in translating demands into policies. Parliamentary systems, on the other hand, are supposed to reflect voter demands and to provide greater powers to leaders to act as they see fit. That is, they are supposed to be more efficient in the translation of inputs into policy outputs. Regardless of these differences, we hypothesize that a study of government outputs across different countries will display certain common characteristics based on the limitations of human cognition and that these similarities will be more prominent than whatever institutional differences may also be present. Of course, electoral systems, the organizations of political parties and interest groups, bureaucratic design, and many other elements of institutional design may affect the efficiency with which governments become aware of, and respond to, changes in their environments. The relative importance of institutional differences compared to universalistic problems of cognitive limitations is an unanswered question, however.

Our goal is to present a new approach to studying inputs and outputs of political systems comparatively. A common approach in comparative policy studies is to focus on one stage of the policy process and to compare that stage cross-nationally. For example, see scholars have compared welfare state development (a final stage in the process of producing public policies) across nations (see Esping-Andersen 1990). Others have looked at parties and electoral systems, a process closer to the input stage (for examples, see Budge, Robertson, and Hearl 1987; Keman and Budge 1990; McDonald and Budge 2005). And many have studied the impact of institutional design (see Huber 1996; Rockman and Weaver 1993; Strøm 1990; Thelen et al. 1993; Tsebelis 2002). But comparing processes in a single stage can tell us very little about the processes that may link the various stages of the policy process and nothing about whether differences in institutional arrangements account for the differences in outputs.[1]

[1]Our use of the phrases "stage" and "policy cycle" is considerably broader than what has often been done in the literature before us, where the terms often refer only to what we call the decision-making stage. We use the word "stage" to refer to the various steps in the process by which social issues come to the attention of government and are translated into public policy outputs. Stages range from social inputs (such as real-world changes in the economy) to governmental monitoring functions, to decision making, to policy outputs (e.g., budgets). We refer to this entire process as the "policy cycle," noting that stages further along the cycle (from social inputs at the beginning of the cycle to outputs at the end) tend to be subject to processes with higher decision costs and therefore higher friction.

Within single countries, recent institutional analyses have emphasized the role of decision-making rules in determining whether and what kinds of policy changes will be made. Important work has examined the stability-inducing properties of the U.S. national system within a game-theoretic framework (Hammond and Miller 1987; Krehbiel 1998), and these insights have been extended to a more general and comparative framework as well (Tsebelis 2002). But several limitations to this work are apparent. First, the formulation is spatial and hence is policy-content free. It can tell us nothing about the governmental response to the relative mix of policy issues it faces. Second, it speaks only to the formal decision-making stage of the policymaking process and says nothing about how issues get defined and weighted for importance prior to that stage. Finally, it says nothing about what happens to the course of public policy when action is taken or when shifts are made to these institutional designs that induce so much stability. This work has also been largely theoretical whereas our work is heavily empirical, covering hundreds of thousands of observations across all policy areas and for multiple policy processes in three countries over several decades.

Only a dynamic approach explicitly including the full range of the policy cycle can address the questions we pose, but such an approach is unusual in the literature and so may strike many readers as unfamiliar. We distinguish four stages: social processes, government inputs, policy processes, and outputs. This article examines several indicators at each of three stages for three countries: Belgium, Denmark, and the United States. We note important similarities within each country: as one moves along the policy cycle, from the input stage through the policy process to outputs, the costs to collective action imposed by institutional procedures increase. These costs cause outputs from each stage to be increasingly punctuated, with more and more disjoint and episodic action rather than smooth adjustment as one goes from inputs to outputs. Similarities are stronger than differences in spite of substantial institutional divergences in the three national systems. We use the notion of institutional friction to explain these findings.

Institutional Friction in Comparative Perspective

Social scientists in various fields of inquiry have pointed to factors that inhibit the adaptability of a system to its external environment. For example, students of business organization have long noted that structural designs often limit firms' abilities to respond efficiently to changes in

economic supply and demand. Coase (1937) noted that there may be decreasing returns to entrepreneurship as firms increase in size because of the increased costs of organization, and Robinson (1934) argued that the costs of coordination could very quickly overcome the benefits derived from the division of labor. Harbison (1956) called such internal factors "organizational friction" and classified them according to whether they involved interpersonal relations among firm members, communication systems, or "imperfections in organizational structure" (1956, 376).

In the marketplace, the more efficiently the inputs of demand and factor costs are translated into the firm's product, the better. However, as Paul Ormerod (2005) reminds us, failure, inefficiency, and bankruptcies are quite common in the business world, even among the nation's largest firms. If the largest and most powerful economic actors sometimes fail to adjust to changing market conditions, is it surprising that government policies may be less than efficient? Failure or slowness to adapt to shifting environmental conditions can affect a firm just as a government, but there is a fundamental difference: natural selection works in the marketplace and can derive a net positive outcome from individual-level churning, where inefficient firms are replaced by new ones more in tune with shifts in consumer demands. This is less likely in the world of governments, where institutions are not replaced with the rapidity with which firms come and go in the marketplace. Political scientists, however, have paid little attention to the inefficiencies of government policies in this economic sense. If we do not suspect that governments understand each element of social change to which they must respond, neither do we have a strongly developed theory or set of findings to suggest just how inefficient they may be (or even whether they are less efficient than firms, on average, but this question is beyond our scope here). Baumgartner, Green-Pedersen, and Jones (2006) suggested that one of the remarkable characteristics of the U.S. government is its ability to lurch from one equilibrium to another, at least occasionally reacting to changes in the social, economic, and political environment. In any case, we know very little about exactly how much inefficiency there may be in how governments respond to changing social realities. We use the concept of institutional friction to begin this dialogue.

Some designs, like the United States, are explicitly designed to be less than fully responsive. The framers of the U.S. Constitution did not want the system to react to every small social movement—concurrent majorities, overlapping electoral mandates, and shared control of government by independently elected or appointed institutions were all seen as mechanisms to ensure that the system responded only to public pressures and feelings above some threshold. Parliamentary systems, in sharp contrast, are designed with a different logic in mind. They are supposed to reflect voter demands, at least those reflected in parliamentary majorities. Thus we can expect that different types of governmental structures should be related with different levels of institutional friction. If structural designs matter, there should be differences in the levels of friction apparent in these two types of systems.

If governments addressed the numerous issues facing them by shifting policies and priorities proportionately to changes in the severity of various problems in the environment, then we would say that the translation is efficient. Governments cannot attend simultaneously to everything, however; there are simply too many problems "out there." Because of this mismatch between inputs and system capacity, a government cannot possibly address all the issues that face it proportionately. Of course, the problem is we have no standard to assess the severity of social problems; in politics, people do not even agree on what social conditions constitute problems in the first place.

Fortunately we have a way around this difficulty. We will refer to the set of conditions facing government that may be monitored as *social processes*. These are not directly observed, but include all activities "out there" that are or may become important to government. This may include such things as the weather, demographic shifts, international events, technological developments, economic trends, or anything that may cause a shift in the severity of a problem of concern to government. Droughts and other weather events can affect agricultural prices. New technologies can reduce costs of production at home or overseas, affecting productivity, tax receipts, and job creation. Wars break out, famines occur, immigration and demographic shifts slowly change the face of the domestic workplace. In sum, a wide range of social events are constantly occurring, and these have impacts on the poverty rate, economic growth, unemployment, educational demands, health care costs, international trade, defense, and other things that affect government policies. Note that many of these trends may alleviate social problems (such as the development of a new technology making it easier to deliver some service to the population), whereas other events or trends may create new problems or make existing ones worse.

Social processes of course, are widely monitored by governments, though not perfectly. We refer to information about social processes that governments actually monitor as *political inputs*. Political inputs include information from social movements, the mass media, lobbyists, systematic data collection (such as the unemployment or the poverty rates), and other bits of

information relating to the state of affairs "out there" that actually comes to the attention of government. Governments, of course, have thousands of sources of inputs. Elected officials meet with their constituents and decide on their themes for the next election. Journalists write stories about growing social problems. Bureaucrats systematically collect data on such things as the unemployment rate, terrorist communication traffic, and health care costs. Social processes may be only imperfectly translated into political inputs, but governments cannot respond directly to social processes if they do not become aware of them. The decision-making stage we refer to as *policy processing*, and the decisions that emerge as a result of this activity are *outputs*, including budgets and statutes. So we see a four-step process as we move from (unobserved) social processes to political inputs to policy processes (such as the introduction of legislation and debates or questions in Parliament) and finally to policy outputs (e.g., budgets and other authoritative decisions). We refer to this entire process as the policy cycle and to the steps as stages.

If all the social processes that lead to shifts in the severity of the many problems that are of concern to government could be monitored over time, the distribution of their aggregated changes over time would be Normal because of the Central Limit Theorem (CLT). That is, some things would have gotten worse, others would have gotten better and, because there are thousands of independent series, many of which have no relation with one another, they would often cancel out. Because there are thousands of problems, and no single one of them overwhelms the entire government at any one time, the combined distribution of all of them would be Normal. The CLT applies only if certain conditions are met, however, the most important of which is that the various component parts be independent of each other. Of course, many social processes are related to each other, but across an entire national government there are so many independent ones that the CLT is quite robust. Note that no individual series need itself be Normally distributed; the CLT applies to averages across many independent series and modern governments would be averaging across thousands of different social processes (for more detail, see Jones and Baumgartner 2005, chap. 5). Just like governments, we have no way of directly assessing the underlying social processes; there are too many of them, and for many there are no statistical indicators available. But because there are so many of them, we can assume that changes in the severity of a wide range of them, over time, would be Normal, and this allows us to begin a series of comparisons of this (unobserved) distribution with those that we can actually observe, government actions.

In this article we look at the full range of activities of three national governments across several decades, comprehensively assessing their attention and actions across a comprehensive set of policy areas. Our method may not work in more limited settings, because it is possible that the input series would not themselves be Normally distributed but heavily affected by exceptional stochastic shocks to the system. For example, agricultural series for Denmark over a limited period might be affected by extreme weather events, or U.S. defense policy might be heavily affected by international events and whether the nation is at war. The CLT does not apply to limited data series or series from a single policy area. We are not faced with these problems here, however, since we take larger time periods into account and we look comprehensively at the full range of policy activities of three different national governments.

We have explained above our expectation that changes in social processes across the full range of policy domains must be Normal because of the CLT. However, our results do not depend on this assumption, because we have multiple series in each country. We hypothesize that they should exhibit greater friction (or more punctuations) as we examine change distributions drawn from stages further along the policy cycle. Within any country, observed differences in the distribution of outputs among the various institutional processes cannot be due to differences in the inputs, since the inputs are common to all of them. They must be attributed to differences in institutional design. So our findings are not strictly dependent on the assumption of normality from the CLT, since we test them within countries as well as across nations.

Central to our argument here is that institutional friction increases as political issues progress along the policy cycle and that this institutional friction has consequences for public policies, rendering them more disjointed as decision-making costs increase. Fortunately, there is a rich literature from the natural sciences about the dynamics of friction, and this literature allows us to postulate some specific hypotheses about the distributions of outputs that result from friction-laden processes as compared to those featuring proportionate, or low-cost, decision making.

Stick-Slip Dynamics

In the natural world, there are various specifications for friction, but all of them involve the interaction of two forces: a retarding force and a force directed at overcoming the retarding force. In those situations where scientists can specify exactly these forces, they can model the effects

of friction and make predictions. In many very important cases, however, this is not possible. Earthquakes, for example, are complex nonlinear systems whose full dynamics have not yet been specified, and whose underlying stress-strain dynamics are either inaccessible to measurement or are fundamentally unmeasurable (Rundle et al. 2004). In the face of such complexity, geophysicists proceed by observation and simulation. Their models match quite accurately the observed distributions, however, and we can use a similar approach here.

Earthquake dynamics may be characterized as *stick-slip dynamics*. The relative sliding of two adjacent bodies yields a nonequilibrium process in which movement along the plane of contact is nonlinearly related to the force applied to the system (Awrejcewicz and Olejnik 2007). The earth's tectonic plates are held in place by a retarding force, the "friction" of the plates, while the dynamic processes generated by violent activities deep in the earth's core cause one plate to push on the other. When the forces acting on the plates are strong enough, the plates release, but they do not slide smoothly in response to the pressure applied. Rather, the distribution of the size of movements is leptokurtic: there are many tiny, imperceptible slides, few moderate ones, and a great number of extremely powerful ones—earthquakes. Note that the violent earthquake results from the friction and the associated buildup of pressure, not any momentary increase on the forces pushing to overcome the friction. At any given time, the response to the pressure is out of synch with the level of pressure applied: friction causes the linkage between inputs and outputs of the system to be disproportionate—underresponse because of friction, then overresponse in response to built-up pressures. This is summarized in the Gutenberg-Richter Law, which specifies a power function (Gutenberg and Richter 1954, 17–19).

Power functions are part of a class of probability distributions that are leptokurtic—they have strong central peaks and fat tails. The statistical signature of a disproportionate response model such as the friction model is straightforward: in response to a Normal distribution of real-world inputs, the decision-making process transforms the data by *reducing* those values below some threshold and by *amplifying* those values above the threshold. Such distributions are often called "fat tailed" or "extreme value" distributions and are not uncommon in many natural processes where friction models operate (on power-law distributions in general, see Barabasi 2005 or Watts 2003 for excellent overviews; see Zipf 1949 or Simon 1955 for earlier works).

The most striking characteristic of a leptokurtic distribution, at first glance, is its extremely high central peak. But a leptokurtic distribution differs from a Normal distribution because the distribution with high kurtosis will simultaneously feature great numbers of cases far out in the tails: even five or more standard deviations away from the mean, in an area where the Normal distribution would have no values whatsoever. If we are examining policy change data, the simultaneous occurrence of many cases in the center and large numbers in the extremes makes a leptokurtic distribution strong evidence of a Punctuated Equilibrium (PE) process. Indeed, the high peak refers to many cases with no change; the large tails refer to relatively many cases with extreme changes; the weak shoulders refer to relatively few cases of moderate change. Since we know the social processes are theoretically Normal, leptokurtic distributions later in the sequence of policy processing indicates a status quo bias, inability to make moderate adjustment, and occasional dramatic "catch-up" adjustments. The response is not proportionate to the signal. The greater the friction imposed by decision costs, the greater the disproportionality.

Friction in Government, with Evidence from the United States

The stick-slip dynamics of friction in physical systems also work in social systems. The retarding force is the set of institutional rules that block policymaking action; the amplifying force is political mobilization and the changes it induces in the preferences of decision makers. We cannot observe these forces directly, but that does not leave us helpless, any more than it left earth scientists helpless in their studies of earthquakes.

In the study of American politics, we have evidence that institutional friction does, in fact, affect the distribution of outputs (Jones and Baumgartner 2005; Jones, Sulkin, and Larsen 2003). In this work, authors have shown that the institutions of U.S. government do indeed display increasing kurtosis as one moves along the policy cycle. Markets are closer to efficient (but not entirely so, as cascades and bubbles are sometimes apparent); elections; congressional hearings, bill introductions; presidential activities; law making; and finally budgetary distributions come in order from lowest to highest friction. Jones, Larsen-Price, and Wilkerson (2009) have taken this one step further, showing that in the United States public issue priorities are better reflected by government in the earlier stages of the policy cycle than in the later stages. This is entirely consistent as the higher friction or decision costs apparent in the later stages create more of a disjuncture between the social inputs and response.

Variable Thresholds and the Inequality between Discovery and Abandonment

Friction means that decision makers underrespond to changes in the severity of problems when these remain below some threshold of urgency, focusing attention instead on those few areas where concerns are so great that they must be attended to immediately. However, in politics, thresholds are context dependent, not fixed. Further, the model is not balanced: increases in attention may be more subject to extremes than decreases. As a given social indicator becomes more troubling over time, the model predicts no response whatsoever during the early periods—the issue is "under the radar" and government may not even track its severity in any systematic manner. After the severity of the issue has passed some threshold, on the other hand, there may be a rush to make up for past inattention to the issue by dramatically increasing policy outputs directed to it. The issue may be systematically tracked and a specialized agency or bureau may even be created to focus on it. Attention to the problem becomes institutionalized, and this may induce a second inefficiency. Not only is government slow to pay attention to new policy problems, but, once established, policies may be continued long after the severity of the problem which justified them in the first place has declined. Reactions to improvements in the state of the world, by reallocating attention or resources to other areas with more severe problems, or more rapidly growing ones, are slow. Institutional friction in the forms of sunk costs, long-term budgetary commitments, identification with means rather than ends, and bureaucratic inertia makes it hard for governments to reduce attention to issues that are improving just as it inhibits them from paying attention to problems that are just emerging (see Lindblom 1959; Simon 1997; Wildavsky 1964).

We can assess these dynamics easily by looking at the left- and right-hand tails of the distributions we will explore in the empirical section below. Contrary to some popular myths, governments do indeed withdraw attention from established policy areas, though these dynamics are indeed less punctuated than those associated with growth in attention. Virtually all distributions we have observed have a positive skew.

Thresholds in the policymaking process are not simple hurdles a policy issue must pass to gain attention. They are contingent themselves on a network of interacting variables, causing context to matter. If policymakers are attending to a problem, it can be easier to attract attention to a related issue. Effectively, this means that the threshold can sometimes be lowered, as for example when policies are related to the "war on terror" in recent years in the United States, or with the rise of immigration and associated issues of social integration in Denmark or Belgium. For some issues seen as priorities, the threshold can be low. (John Kingdon [1984] has referred to a similar process in discussing "windows of opportunity" for issues to come to the agenda.) Just as the threshold can sometimes be low, it can other times be high: during periods when official attention is focused intently on one set of issues (such as during times of war or economic crisis), it may be particularly difficult to put other issues onto the agenda. So thresholds are contingent. Further, governments of different political majorities may "favor" some issues over others; this too is a form of institutional friction. If rising indicators of the severity of an issue are ignored because the constituents who might benefit from that action vote for the wrong political party, this is another form of inefficiency. For example, a new government may come to power after a previous government ignored a growing social problem, and the new government may pledge to "make up for lost time." So our conception of friction is entirely compatible with the dynamics of elections and parties' issue preferences.

The characteristics of thresholds that we describe here suggest that the concept is surprisingly complex. One cannot expect, and indeed empirical evidence does not suggest, that increases in a given social indicator (say, the poverty rate) will automatically and repeatedly generate a certain level of government response when they pass certain numerical points. The reason is that the agenda can handle only so many issues at a given time. During "slack" periods when few other items compete, attention may focus on a given problem. However, during periods when the wrong government is in power, or when there are several even more urgent problems affecting the nation, even higher numerical levels of need may be insufficient to induce government attention. These characteristics suggest it will be impossible to assert simple linkages between given levels of social problems and government response. However, a different empirical approach is indeed possible, and we turn to this now.

Testing the Friction Hypothesis in Comparative Perspective

We test two central hypotheses. The first is the General Punctuation Hypothesis:

H1: Output change distributions from human decision-making institutions dealing with complex problems will be characterized by positive kurtosis.

This implies that we should *universally* observe positive kurtosis whenever we look at indicators of change in the activities of governments. Jones and Baumgartner (2005, chap. 7) claim this based on an analysis of policymaking distributions in the United States, which is too limited to do more than establish the feasibility of the hypothesis; our comparative test will provide a more convincing base.

Friction might be universal but we expect to find different levels of friction in different institutions. Because institutional costs are lower in what we have termed the input series, higher in the parts of the policy process that require coordination among multiple actors or heavy bureaucratic procedures to be followed, and highest in those output processes such as budgeting that come only at the end of a long and complicated series of processes, we can propose the Progressive Friction Hypothesis as follows:

H2: Kurtosis values will increase as one moves from input to process to output series.

Initial studies of budgetary outputs show important commonalities across many institutional structures. Baumgartner, Foucault, and François (2006) assessed the distribution of changes in French government spending patterns from 1820 to present, with more detailed ministerial data from 1868, and found strong support for a PE model. Levels of kurtosis were similar to the U.S. findings (and remained in place when periods of war or foreign occupation were excluded from the analysis; major stochastic shocks do indeed increase kurtosis but when these are excluded the analysis showed that internal causes of kurtosis remained clearly apparent and the effects were nearly as strong). Breunig (2006) has shown similar results in studies of Germany, Denmark, the United Kingdom, and the United States. Jones et al. (2009) looked at national budgets in the United States, France, Germany, the United Kingdom, Canada, Denmark, and Belgium as well as Danish local government spending, and U.S. state budgets. In each of the series explored, a power-law distribution was found: budget changes are highly disproportional in each system so far analyzed.

In sum, in every case where investigators have looked at budget change distributions using the friction approach, they have found strong evidence for PE processes (see also Breunig and Koski 2006; John and Margetts 2003; Jordan 2003; Mortensen 2005). The general punctuation hypothesis, at least for budgets, seems well confirmed. But budgets come at the end of a long process of decision making, reflecting complex negotiations among many actors. Perhaps the legislative process is more straightforward, or perhaps parliamentary leaders are better able to implement their governmental agendas than in the United States. If so, then we should see important differences from the U.S. results when we look at a range of governmental procedures in other countries like Belgium and Denmark. In this respect, Denmark represents a unified political system with a unicameral national parliament, dominated by strong political parties. Belgium is also a parliamentary system dominated by political parties but a federal one with a bicameral parliament. This article therefore presents new and relevant tests of the general and the progressive friction hypotheses on entirely different political systems.

Issues in Comparative Analysis

Considering the U.S. roots of the friction hypotheses, a number of important unanswered questions remain that can only be addressed through comparative analysis. For example, it is empirically unclear whether the complex separation of powers and federal structure of the U.S. government should produce higher or lower levels of friction than unified parliamentary systems. On the one hand, the multiple veto-points and concurrent majorities of the U.S. system seem to point clearly to higher friction values because they would appear to raise decision costs. On the other hand, the multiple access points of the U.S. government may in fact allow it to evolve over time in reaction to changing social pressures. Federalism may reduce the stakes of national politics, making national policies less costly than where a single decision must be made universally applicable across the national territory. That is, where policies are the result of dozens of local decisions rather than just one national one, these decisions may be made more easily as each one mobilizes a smaller and less diverse constituency. Another difference is in the role of political parties. The powerful parties that dominate some national political systems, like Denmark and Belgium, could make access to the agenda very difficult (or disproportionate), but decision making once initial agenda-access has occurred may be very simple (Walgrave, Dumont, and Varone 2006). If this were the case we might observe high kurtosis in the input functions of government but no further increase when we move from inputs to decision making, for example, law making.

Our point here is not to say which of these hypotheses is correct, but simply to point to the vast potential of a comparative approach in answering these and similar questions. By assessing governmental efficiency in a new and comprehensive way, by defining it in terms of friction and assessing it via distributional analysis, we open the

door to a wide range of comparative analyses. We explore these questions empirically in the section that follows.

Political inputs are what get fed into the political system from the outside: electoral outcomes, media coverage, (organized) public opinion (e.g., demonstrations). Media coverage in most systems can shift from topic to topic with few institutional costs. We expect low friction for media coverage. Many activities in all governmental settings are relatively low cost; these reflect efforts to monitor or to discuss social issues but do not require coordinated action. So, we expect some of the policy processes to be low cost in all three countries. Oral questions in Parliament, for example, require little more than a single MP's arousal of attention for whatever reason. Written questions to ministers in Parliamentary settings impose few costs for similar reasons. Some decision-making processes are relatively simple as well; presidential executive orders in the United States require only one signature, for example. Congressional hearings in the United States are scheduled by a decentralized set of committee and subcommittee chairs; they fall in a middle range in terms of cost as they are rarely spontaneous and do require planning, but are not so onerous as to impose similar costs as the passage of legislation. Those policy processes that require multiple actors to coordinate their activities, that impose high costs such as long delays and significant investment in time and study, or that are subject to multiple veto players should have higher friction and therefore show higher kurtosis in their distributions of outputs. The passage of laws requires significant concurrent majorities in the United States, less so in Denmark or Belgium (but is still more difficult in those countries than purely monitoring functions such as questions). Executive orders in Belgium may have high costs as they are adopted officially by the entire cabinet, acting as a group (rather than, as in the United States, requiring only a single signature). Budgets, in all cases, are the highest cost activities. Budgetary resource allocation comes with most costs and entails the heaviest procedures in all countries. In sum: inputs should be low cost; policy processes higher cost; and budgetary outputs should be highest cost.

Empirical Approach and Data

For each country, we have collected extensive data on policy activities; the data were coded in a manner that ensured that period-to-period changes could be assessed for each institution. Full details are given in the appendix. Figure 1 gives an overview of all the data series and presents them in the order one should expect based on the logic behind the progressive friction hypothesis. The measures of institutional attention presented below are not exactly the same across the three countries, partly due to data limitations but also because of differences in political institutions—neither Belgium nor Denmark, for instance, has anything identical to U.S. congressional hearings. However, for all three countries we have multiple measures of input, process, and output data, allowing a robust test of our argument for all three countries.

Each of the series is defined in similar ways and each covers a very large number of observations. One of our series, annual U.S. budget outlays since 1800, has only 187 observations. The other series are typically based on several thousand observations, with the U.S. congressional hearings, *New York Times* stories, statutes, *Congressional Quarterly* stories, Budgetary Authority, and statutes databases each based on several tens of thousands of observations, and the bills and elections data based on more than 100,000 observations each. While the Danish and Belgian data are not as extensive, they too are based on thousands of underlying observations, as our appendix makes clear. In each case, we categorize the events into a consistent series of topics and look at the aggregated distribution of changes from period to period across all the topic categories.

We are interested in the distribution of percentage annual changes. Election results are measured from election to election, not by year. In all cases, we use the "percentage-percentage" calculation method of the differences, which assumes a fixed total level of governmental capacity to attend to issues (see Jones and Baumgartner 2005). Of course, the total size of a governmental agenda is not absolutely fixed. When we use the percentage-count method of calculation, reflecting this, the pattern of our results is similar, in particular the pattern of increasing friction as we move from inputs to policy processes to budgetary outputs. In general, our results are robust with respect to a wide range of details in specification and calculation, though the details are subject to change.

Figures 2 through 4 give examples of three of our series. We present the number of annual changes of various sizes as a histogram, and we overlay a Normal curve with a similar standard deviation in order to facilitate comparison. Rather than present all 32 series, we present just three, one from each country, and one from each stage of the policy process (our web appendix presents all available series). Figure 2 presents U.S. presidential elections; Figure 3, Belgian interpellations; and Figure 4, Danish central government spending. The figures make clear the pattern of increasing kurtosis that we observe as we move from inputs to process to outputs; this is clear by looking at the shapes of the histograms. Beneath each figure we present the LK score, which summarizes the degree of

FIGURE 1 Overview of Data Series Ranked in Terms of Institutional Friction

	U.S. Distributions	Danish Distributions	Belgian Distributions
		Input series	
Lowest friction	Elections, Presidency	National parliamentary elections	Elections
	Elections, U.S. House	Radio news	Demonstrations
	Elections, U.S. Senate		Newspaper stories
	New York Times stories		TV coverage
		Policy process series	
	Bill introductions, House	Questions to the Minister	Party platforms
	Bill introductions, Senate	Parliamentary interpellations and proposals	Government agreements
	Hearings, House	Bills and governmental reports	Written questions in Parliament
	Hearings, Senate		Bills
	Executive orders		Parliamentary interpellations
	CQ Almanac stories		Executive orders
	Statutes		Laws
		Budgetary output series	
	Total annual outlays	Appropriations	Budgets
	Budget Authority by category	Outlays	
Highest friction			

FIGURE 2 Annual Percent Change in Election Results, U.S. Presidential Elections, 1828–2000

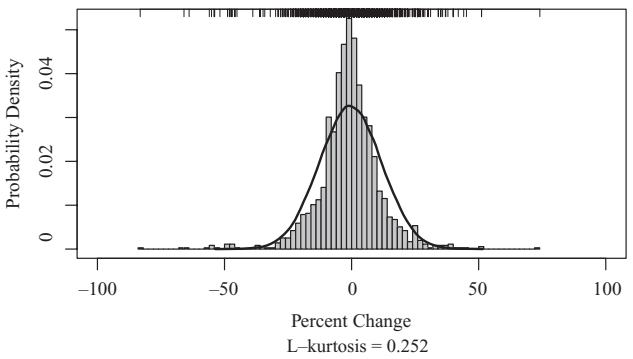
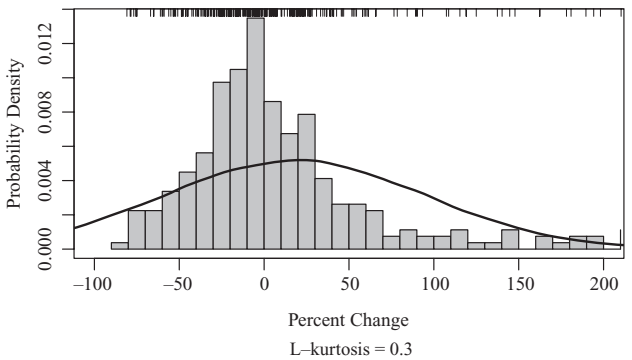


FIGURE 3 Annual Percent Change in Attention, Belgian Interpellations and Oral Questions, 1991–2000



kurtosis in each series. An LK score of about 0.123 marks a Normal distribution. If the LK is higher this means that the distribution is leptokurtic. Tables 1 through 3 present all 32 of our series, with this same statistical summary.

The deviations from Normality are obvious in these three series, each progressively more so than the previous. It is also clear that the various series have different standard deviations, but Normal curves can have any level of variance. Kurtosis measures the relative peakedness of the distribution compared to a Normal distribution and the number of extreme values relative to values near the mode; the variance of the distribution is a related but

FIGURE 4 Annual Percent Changes in Central Government Spending in Denmark, 1971–2003

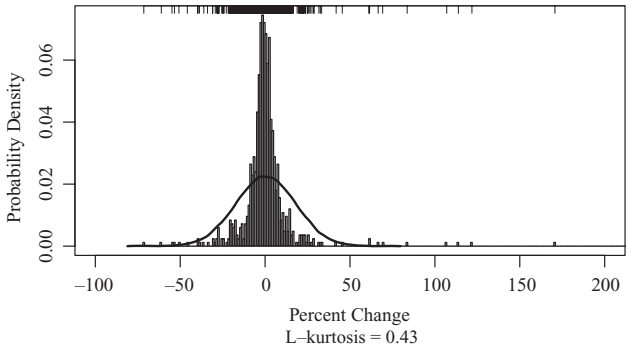


TABLE 1 Levels of Kurtosis for 13 Government Activities in the U.S.

Data Series	N	K	LK
Elections, Presidency (by county)	1778	8.24	0.25
Elections, U.S. House of Representatives	18355	7.17	0.30
Elections, U.S. Senate	1327	6.14	0.22
New York Times stories	1072	26.87	0.28
Bill introductions, House	912	12.66	0.21
Bill introductions, Senate	969	66.00	0.23
Hearings, House	1091	26.89	0.33
Hearings, Senate	1078	34.21	0.27
Executive orders	607	12.17	0.25
Congressional Quarterly Almanac stories	994	28.03	0.29
Statutes	1007	21.02	0.25
Total annual outlays, U.S. federal budget	187	56.04	0.54
Budget Authority for 62 programmatic budget categories	3106	66.47	0.48

Note: Normal distributions have a K value of 3 and an LK score of ≈0.123.
For Tables 1–3, N's reflect the number of annual change values times the number of categories. The underlying number of events on which the annual change scores are calculated is typically much higher.

TABLE 2 Levels of Kurtosis for 7 Government Activities in Denmark

Data Series	N	K	LK
National parliamentary elections	218	5.71	0.25
Radio news coverage	437	18.31	.025
Questions to the Minister	815	14.94	0.27
Parliamentary interpellations and proposals	1080	42.40	0.35
Bills and governmental reports	1069	13.57	0.26
Appropriations	792	198.25	0.49
Outlays	832	86.95	0.43

TABLE 3 Levels of Kurtosis for 12 Government Activities in Belgium

Data Series	N	K	LK
Elections	274	9.00	0.14
Demonstrations	202	10.77	0.30
Newspaper stories	270	11.92	0.19
TV coverage	210	30.82	0.31
Party platforms	510	13.42	0.26
Parliamentary interpellations	267	10.83	0.30
Government agreements	48	12.48	0.38
Written questions in Parliament	269	14.57	0.23
Bills	246	16.51	0.32
Laws	169	15.51	0.29
Executive orders	239	27.61	0.32
Budgets	245	57.75	0.64

different question. We present two measures for kurtosis, K and LK. LK is a scale-free measure of the same concept, more stable statistically and less affected by single outliers. We find the LK measure to be the most accurate single indicator of kurtosis, but we also present the K scores because these are more familiar in the literature. Both reflect the general shape of the distribution, but neither does so perfectly. Therefore, we supplement this hypothesis testing with an analysis based on cumulative frequency plots, which in contrast to the single statistical measure of kurtosis allows us to assess the shape of the entire distribution (we turn to that analysis in a later section).

Tables 1 through 3 present the K and LK scores for each of the series listed in Figure 1 above, along with the total N on which the calculations are based. (Ns in the table refer to the number of annual changes times the number of categories. The overall number of observations on which these annual calculations are based is much higher.) The tables show that all the series have high kurtosis levels ($K > 3$; $LK > 0.123$), thus clearly supporting Hypothesis 1.

Looking at the U.S. data (Table 1), those with the lowest levels of punctuation are the election series, followed by House bill introductions and executive orders. *New York Times* stories are relatively highly punctuated, showing perhaps some significant staying power of individual topics on the agenda for years at a time. Congressional procedures, reflected in hearings and *CQ* stories,

have some significant kurtosis associated with them. (The Senate bill introduction figure appears an anomaly; note the difference between the K and LK score.) Finally, budgetary figures are both very high on the scale of kurtosis. While each series is not precisely arranged according to order, in general there is significantly higher kurtosis associated with those processes that come further along the policy process.

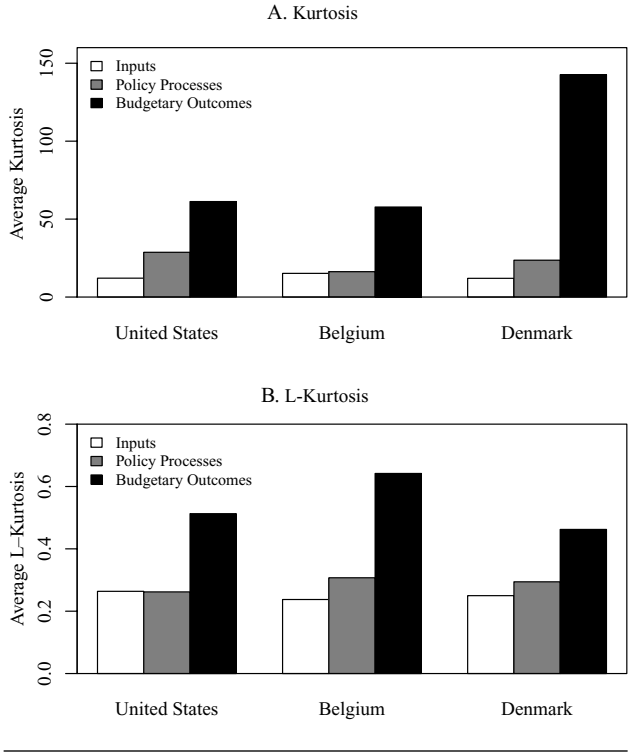
Table 2 presents the results for Denmark. The individual series range in kurtosis with the election series being the lowest, parliamentary questions and bills being moderate, and interpellations (which can only be done by parties, not individual MPs) having higher kurtosis. Finally, the two budgetary measures have very high kurtosis scores. Generally these results are quite similar to the U.S. findings. In a direct comparison between the United States and Denmark, the cross-country differences are swamped by the differences in how each stage of the policy process operates within the countries.

Table 3 presents the Belgian results. They provide further support of the Generalized Punctuation Hypothesis and also illustrate the progressive institutional friction idea we have seen in the other two countries. Each series shows significant kurtosis values, with the policy input series (demonstrations and media coverage) being relatively low; the policy process series (parliamentary activities), higher; and the budgetary series very high in the scale of kurtosis, just as in the other series. According to the K score, there is one anomaly in the Belgian series, that of TV news coverage. The Belgian data are based on only 10 annual measurements of change, so we do not want to make too much of any individual series. The Belgian TV news series deviates from the general pattern but all the others series are in the order that we expect and hence confirm the progressive friction hypotheses.

Tables 1 through 3 above make clear that the General Punctuation Hypothesis and the Progressive Friction Hypothesis are strongly supported. Our review of 32 different institutional outputs in three countries shows not a single one that is Normal. These data are based on hundreds of thousands of underlying observations across several decades of recent political history. The Progressive Friction Hypothesis is generally borne out as well. While each and every series is not precisely in the order we expected, on average we can see that the input series, the process series, and the budgetary output series cluster into low, higher, and highest values of kurtosis. Figure 5 summarizes these results.

Figure 5 shows simple averages of our K and LK measures for the input, policy, and output series in the three nations. The evidence strongly supports the Progressive

FIGURE 5 Progressive Institutional Friction in Three Countries

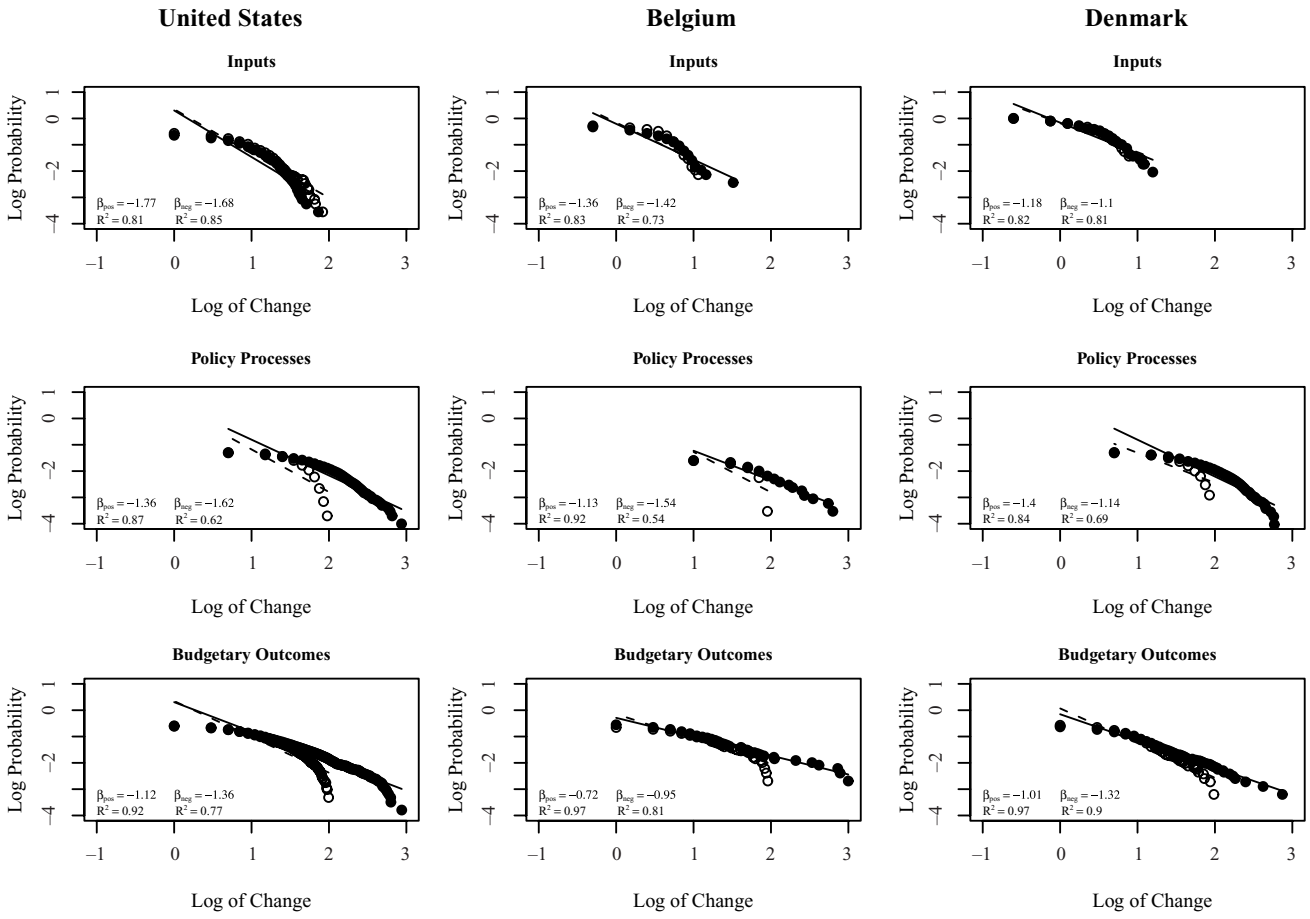


Friction Hypothesis. Budgetary outputs in all three countries are extremely heavy with a status quo orientation and highly likely to be affected by sudden changes, just as the punctuated equilibrium model predicts. These tendencies are noticeably weaker in the "earlier" series, the processes of which involve weaker institutional friction. Input series in each country are much closer to Normal than the other series. Process series are characterized by intermediate levels of disproportionality.

Estimating the Underlying Probability Distribution

We can explore the tendencies demonstrated in the previous section in greater detail by looking at the cumulative frequency distributions of each of our series of data, rather than only the kurtosis measures as in Figure 5. Statistical measures of kurtosis are slightly unreliable; in addition to looking at two separate indicators of the concept as in the previous section, we can look graphically at the entire distribution of data, arrayed, as is common in the literature on power-laws, as a simple cumulative frequency distribution. Figure 6 illustrates our findings

FIGURE 6 Cumulative Frequency Distributions of Change in Three Series in Three Countries



Note: Solid circles show the positive tail; hollow circles show the negative tail of the distribution. The series are as follows: input series are national parliamentary or presidential elections, process series are laws, output series are budgets. For a full set of plots for each of our series, see the web appendix.

for one input series (elections), one process series (laws), and one output series (budgets) in each country.[2]

A power-law distribution is one that follows the following form:

$$X \sim k\tau^{-\alpha} \tag{1}$$

where X is the cumulative frequency of values above some value, τ,

k is a constant,

τ is a range of observed values, and

α is an empirically derived estimate.

If we transform simply by taking the logs on both sides of this equation, we have

$$\log(X) \sim \log(k) + \alpha \log(\tau) \tag{2}$$

[2]Figure 6 presents presidential election results for the United States, parliamentary elections for Denmark and Belgium, laws, and budgets. The series are similar to others we might have presented. In our online appendix, we present full distributions for all 32 data series listed in Table 1.

Plotting such a relationship on a log-log scale produces an equation as follows:

$$X \sim k + \alpha\tau, \tag{3}$$

which is a straight linear regression where k is an intercept term, α is the slope of the line, and τ is the range of observed values, as before. So a very simple graphical test can determine if a relationship fits a power-law test. There are two things to look for: whether the series arrays along a straight line for some or all of its range, and the slope of that line. Extreme-value series indicative of a power-law function will array on a perfectly straight line over several orders of magnitude. Normal distributions, which have a lower kurtosis and relatively few extreme values compared to what we see here, will show a sharp downward curvature in a log-log presentation, not fitting a straight line in any range at all. If the data do fit a straight line, we can also assess the slope of the line. The more extreme the distribution, the flatter the line. K, the

constant term, is also of interest as it can distinguish series with generally higher or lower numbers of extreme values.

The plots in Figure 6 show the cumulative frequency of annual percentage changes of various sizes, the same data that we have analyzed above. (Negative changes are multiplied by −1 in order to display them on the same scale as the positive changes.) The data are presented on a log-log scale. A power-law distribution indicated by a straight line on the log-log plot is a clear indication of a punctuated equilibrium process. The test is identical to that of looking at kurtosis values or the shape of a frequency distribution; indeed the underlying data are the same. In contrast to a single statistical measure of kurtosis, however, this presentation of the data allows us to see the entire distribution.

In each case, we find that budgets (presented in the bottom row of the figure) do indeed array on a straight line for several orders of magnitude. Policy process series array along the line display a power function for the middle parts of the series, but the tails do not follow power functions. Input series in each country show a much sharper drop-off; they are not Normal but clearly not Paretian either. Further, the slopes of the lines are increasingly flat as we move from inputs to process to output series, indicating that more and more cases are falling in the tails, and hence are extreme punctuations. Finally, we can see that the negative tails of the distributions always have steeper slopes than the positive tails. As Jones and Baumgartner (2005) discussed, this may reflect the fact that governments are quicker to surge into new policy areas than they are quick to drop their attention to established policy areas.

Overall, this more detailed graphical presentation confirms the general patterns presented in Tables 1 through 3 and in Figure 5. It confirms the General Punctuation Hypothesis as well as the Progressive Friction Hypothesis. We provide a complete series of frequency distributions, semi-log and log-log presentations of all 32 of the data series we have explored in our online appendix.

Conclusions

We have shown evidence for the first time on the generalized punctuation and the progressive friction hypotheses over 30 different government processes in three countries. Looking at dozens of processes across three nations and covering several hundred thousand observations, we have not found a single Normal distribution, even though the Central Limit Theorem implies that Normality would be expected in the social input series that serve as the grist for the mill of the policymaking process. Further, the degree of punctuation in these distributions increases as one moves from inputs to policy processes and finally reaches its highest values in the budgetary outputs of government. Thus, we confirm our hypotheses.

Our process approach delivers some novel insights in the comparison of politics across countries, but we may have raised more questions than we have answered. Comparative analyses are often static: they compare institutions rather than the processes happening within these institutions. Political institutions are, for instance, compared by counting the number of veto players (Tsebelis 2002) and policy is compared through static welfare-state models (Esping-Andersen 1990). The comparative dynamics view presented in this article allows us to compare political processes, not only institutions. Further, the empirical scope of our approach is comprehensive, assessing all policy domains in each country studied, typically over several decades. Such approaches were previously not possible because of a lack of data.

We observed more similarities than differences among the countries we studied. Across countries, distinct electoral, parliamentary, and budgetary institutions produce similar distributions of outputs. Elections do not suffer from much institutional friction and therefore do not experience the excesses of stasis and large changes; law making and budgeting, by contrast, produce outputs that are much closer to power-laws, implying very high friction. Increasing institutional costs and the challenges of complexity produce increasingly punctuated series along the policy cycle regardless of the institutional specifics. Differences in political systems when the U.S. separation of powers system is compared to European parliamentary democracies with strong political parties often attract considerable scholarly attention. However, at least in the democracies we studied, the effects of the policy process dominate the country effects. Boundedly rational human behavior and similarities in how the processing of inputs must occur in any organization may explain our findings. No institutional design can do away with human cognitive limits.

In any case, a likely fruitful avenue for future research could well be an examination of the particular mechanisms that impose such striking similarities across democratic systems. Our approach has been highly quantitative, and we have looked at stochastic models of entire political systems, but this could be systematically coupled with a more in-depth study of the comparative workings of institutions using more qualitative methods to understand the processes which lead to friction in greater detail, and why it is lower in some institutions than in others. Friction works in many ways. The fact that we find, in this article, that comparable institutions, although functioning

differently and embedded in different polities, yield similar outputs raises questions about the specific workings of friction in each setting. Probably, in all countries and all institutions, functionally equivalent sources of friction are at work hindering flexible adaptation to changing problems. However, this general picture provides only a baseline for comparison. We need to start looking for variation within this general picture. In a sense, we now know that policy agendas are invariably punctuated—this has previously been demonstrated for the United States, and in this article we have shown this also applies to very different political systems. Future work should go beyond that finding and focus on the question *why* some institutions yield more punctuated outputs than others. What precise types of constraints lead to what kind of punctuated processes? How can we measure friction directly? We plead for a cross-fertilization of classic comparative institutional design research with comparative policy output studies as presented here. Examples of future research questions might be: Does an institution with many veto players produce outputs that are more punctuated than an institution with fewer veto players? Do institutions with long and winding procedures produce more punctuated results than ones with simpler rules? Does single-party majority law making lead to less punctuated legislation than law making in fragmented coalition systems? Are policy punctuations related to electoral shifts, or do they come equally in between elections?[3]

Second, the Generalized Punctuation Hypothesis laid forth in this article stems from the complexity of the social processes with which governments deal. Are there, however, government institutions that deal with such simple or well-understood social problems that their output change distributions might indeed be proportionate to changes in inputs? Are small towns of small enough scope that their decision-making process might be closer to comprehensively rational, or do they suffer from a lack of professionalization and institutional capacity? In any case, while there is no question that organizations of the scope of national governments face a bewildering array of social problems and therefore cannot possibly be comprehensively rational, comparative analysis of a wide range of organizational structures of different size might yield a range of results.

[3]John and Jennings (2008) have shown, for example, that of the 27 largest shifts in the priorities listed in the U.K. Queen's "speech from the throne," laying out the government's priorities for the next year, only six came in the first year of a new government. The vast majority of policy shifts, apparently, came from continuing governments, not new ones.

Third, we have noted that governments do not directly assess social processes, but become aware of them only as they are manifested in politics. Are these processes themselves highly punctuated? We have found that even certain input series, for example media coverage or party manifestos, are substantially punctuated. So, the signals that go into the political system are already punctuated. Policy institutions do not react directly to the real world but to politically processed signals that are already affected by the friction associated with processes of social mobilization. Assessing the relative levels of punctuation added by the institutions of government as compared to social institutions such as corporate lobbying, social movements, professional networks, media systems, and citizen mobilization would open a wide range of fruitful new avenues of research. How much friction comes from the operation of the institutions of government, and how much from broader social and economic forces related to the difficulty in translating social processes into political information and demands that governments can recognize?

Fourth, we need to elaborate alternative explanations for punctuated outputs. Institutions and political actors are not only affected by constraints and resistance to change but also to cascading and mimicking effects, processes which have the same effects, but possibly for different reasons, as high decision-making costs. Both processes lead to overreactions. Economists have discovered that many market imperfections relate to bubbles and other bidding frenzies; political scientists might gain from an appreciation that shifts in government policies can be just as subject to fads, fashions, and mood swings. Just as friction is produced by the makeup of institutions, cascades are more likely to happen in some institutions than in others. The fact that we established here that mass media coverage in the three countries under study is substantially punctuated—although there are reasons to believe that the institutional decision costs in the mass media are rather low—suggests that friction is only part of the story. Jones and Baumgartner (2005) discussed cascades as well as friction as possible explanations of disproportionality, but more work remains to be done on the different processes that produce these outputs. In any case, we have demonstrated that policy outputs in three widely divergent democratic polities are highly punctuated, that the degree of punctuation increases as we move along the policy cycle, and that these shifts in levels of punctuation cannot be related to different policy inputs. These are important findings but open the way for many more studies to elucidate their precise causes.

Appendix: Data Descriptions

Progressive Institutional Friction in the United States

We use 13 separate indicators of policy change in the United States. In each case, we look at year-to-year percentage change in outputs. The data series are as follows.

1–3. Election results (three series). We look at the difference from election to election in the percent of the two-party vote for the Democrat. For presidential elections, we pool data across all U.S. counties for the period of 1828 to 1992. For elections to the U.S. House of Representatives, we pool across electoral districts from 1898 to 1992. For the U.S. Senate, we pool across seats from 1920 to 1998.

4. *New York Times* stories. Annual percent changes in the percentage of stories across the 19 major content categories of the Policy Agendas Project, 1946 to 1994 (see www.policyagendas.org).

5–6. Congressional bill introductions. Separately for the House and Senate, annual percent changes in the percentage of bills introduced across the 19 major content categories of the Agendas Project, 1947 to 2002.

7–8. Congressional hearings. Separately for the House and Senate, annual percent changes in the percentage of hearings across the 19 major content categories of the Agendas Project, 1947 to 2002.

9. Executive orders. Annual percent changes in the percentage of presidential executive orders across the 19 major content categories of the Agendas Project, 1947 to 2002.

10. *Congressional Quarterly (CQ) Almanac* stories. Annual percent changes in the percentage of stories in the *CQ Almanac* across the 19 major content categories of the Agendas Project, 1947 to 2002. The *CQ Almanac* is an annual volume reporting on the activities of the U.S. Congress. Widely read in Washington in its weekly edition, the *CQ* is a standard source for information on congressional activities. Even failed legislative proposals, if they generated significant congressional debate, are reflected in this measure.

11. Statutes. Annual percent changes in the percentage of laws (excluding commemorative laws) across the 19 major content categories of the Agendas Project, 1947 to 2002.

12. Total outlays of the U.S. government. Annual percentage changes in the size of the entire U.S. federal budget, from 1800 to 1994 (one observation per year).

13. Budget authority by OMB subfunction. Annual percentage changes in 62 consistently defined programmatic spending categories, from the Agendas Project, 1947 to 2003.

Institutional Friction and Policy Outputs in Denmark

Danish data come from the Danish Policy Agendas Project, www.agendasetting.dk. Radio news and parliamentary activities are coded according to a modified version of the same topic categories used in the U.S. Policy Agendas Project; there are 24 major topic categories in the Danish series as compared to 19 in the U.S. Danish parliamentary data are available since 1953, the date of a major constitutional revision (for details, see Green-Pedersen 2005). Radio news data are available from 1984 to 2003. In all, we have seven different series for Denmark: two input series, three policy process series, and two budget series.

The first input series is Danish election results at the national level. We look at the percentage change in the vote for parties at each election since 1920, when the current election system was introduced. We record the vote share of all political parties receiving votes in a given election. The Danish party system has consisted of five to 11 parties over time; elections have been held every fourth year or less, providing us with in total 218 observations across 31 elections from 1920 to 2005.

The radio news data are based on the radio news of the Danish National Broadcasting Cooperation (DR) twice a day (12 AM and 0630 PM). The feature of the radio news was used a coding unit, leaving us with an N of $>$ 60,000 for the period 1984 to 2003.

We report three distinct Danish policy processes series for the period of 1953 to 2003. In order of increasing institutional friction, we look at 1) questions to the minister, 2) nonlegislative debates in parliament (interpellations and parliamentary decisions) and 3) bills[4] and governmental reports.[5] Where the first two parliamentary series reflect monitoring activities, the third series represents policymaking more directly. Questions to the minister have limited institutional costs. They are a few sentences long and can be asked by any Member of Parliament (MP). Nonlegislative debates in parliament impose

[4]The vast majority of bills in the Danish parliament come from the government and are passed in parliament, so bills in Denmark are virtually equivalent to laws. We do not analyze both.

[5]Governmental reports are comprehensive reports on, for instance, the state of Danish energy policy from the government to parliament. Like bills they require a substantial bureaucratic effort.

more costs. The text can be as simple as a question, but they can only be put forward by a party, not an individual MP, and require participation from the entire parliament. Bills and governmental reports take considerable time to put together and the bills require several rounds of parliamentary reading to be accepted.

Finally, we have two budget time series. The first series is based on Statistics Denmark's central government spending data and is measured in inflation-adjusted 2003 kroner. The data are assembled for 14 policy categories, but we followed Mortensen (2005) and excluded the category "other purposes." The resulting 13 categories exist for the 1971 to 2003 period.[6] The second budget series consists of net budget appropriations (*bevilllinger*) published by the Danish Finance Ministry. The data are assembled for 22 policy categories after some categorical adjustments are made in order to adjust for the destruction and creation of government departments over time. These data are available for the 1964 to 2004 period. While the latter series represents spending appropriations, the former represents budgetary outlays.

Institutional Friction and Policy Outputs in Belgium

Belgian data come from the Belgian Political Agenda-Setting Project (Walgrave, De Winter et al. 2005).[7] We have 11 data series covering a broad array of political processes. All Belgian data only cover the 1991–2000 period. So we have, unless mentioned otherwise, 10 consecutive years leading to nine year-to-year percentage changes in outputs. The N's on which change calculations are based are very high, so we believe the Belgian data to yield reliable indicators of policy change in Belgium. All Belgian results are based on a coding system containing 30 major content categories. The Belgian codebook was *not* the same as the U.S. or the Danish codebook; Belgian data were collected entirely independently from the original U.S. Agendas Project. As the number of topic categories is similar to that in the United States or Denmark, and the major topic codes are similar, we believe this difference has no significant effect on our results.

We look at Belgian election, media, protest, and party *input* series (1–5); parliamentary and governmental *policy* series (6–11); and finally *budgetary* output series (12). The Belgian dataset adds significant new types of agendas, especially regarding the input series. First, we can test the friction model on TV coverage, which might display an entirely different dynamic than (single) newspaper coverage. Second, we have data on protest demonstrations, an important source of information for governments anywhere. Third, as political parties are the major players in the Belgian polity, like in most other European democracies, we included a party platform series to assess the nature of change in these documents. Finally, we add a new indicator of the governmental agenda: the government agreement concluded just before government gets confidence from parliament. Belgian newspaper data also include several national newspapers, not just one. Belgian data cover a greater number of different agendas but for a shorter time period than the other data series. The series are as follows:

1. Elections. As the rest of the Belgian data only cover the 1990s we use the 1990s elections only. Belgium witnessed only a few general elections in this period; in order to increase the N we relied on election results on district level. Belgium had a reshuffling of electoral districts between the elections of 1991 and 1995 and, thus, we cannot reliably compare between these elections. Consequently we only have two changes in electoral party results per district: 1987–1991 and 1995–1999. We only took the major parties into account, parties with at least one seat in parliament during the period under study. The total N = 274. Data are available from http://www.elections.fgov.be/.
2. Newspaper stories. Annual percent changes in percentage of the stories across the 30 content categories for five different Belgian newspapers, tabloids, and broadsheets with different partisan leanings (*De Standaard*, *De Morgen*, *Het Laatste Nieuws*, *La Libre Belgique, and Le Soir*) from 1991 to 2000. We code only the front page of each newspaper (as there were no indexes available). Total N $>$ 66,000 news stories.
3. TV coverage. Entire coverage of the main evening news show on four national TV stations: two public service broadcasting (TV1 and La Une) and two commercial stations (VTM and RTL) in

[6]The dataset follows the registration principles for national accounts data outlined by the United Nations Statistics Division. The full dataset consists of 14 main functional categories and 34 subcategories based on a modified version of the international COFOG classification system used consistently by Statistics Denmark from 1971 to 2003. Data are adjusted for inflation using the national Danish Consumer Price Index (CPI).

[7]Belgian Political Agenda-Setting Project (2001–2004) granted by the 'Federale Diensten voor Wetenschappelijke, Technische en Culturele Aangelegenheden' (DWTC). It was conducted by Stefaan Walgrave (coordinator, UA), Lieven de Winter, André Frognier, Frédéric Varone and Benoît Rihoux (UCL), Patrick Stouthuysen (VUB), and Marc Swyngedouw (KUL).

the 1991–2000 period. Friction, we expect, will be low but we anticipate substantial cascades as the TV market is extremely competitive, as we cover and aggregate results for four stations reinforcing potential spikes, and, especially, as we found extremely high correlations (+.90) between issue coverage on the four channels. Total N > 110,000 TV news items.

4. Demonstrations. All major protest demonstrations in Belgium from 1991 to 2000 (N > 4,000) drawing on media analysis and police records (see Van Aelst and Walgrave 2001). Demonstrations entail some organizational costs, but the decision costs are low as it requires only one organization to stage a protest event.
5. Party platforms. Topic codes of all sentences and semi-sentences of all 10 Belgian parties according to the methodology of the Comparative Manifesto Project (Klingemann et al. 2002). Total N is > 36,000 (semi-)sentences. Belgium had three general elections in the 1990s (1991, 1995, and 1999), so we covered 30 party manifestos. We expect rather low friction as parties have every interest in reacting to external signals and internal decision procedures are relatively light (Walgrave and Nuytemans 2006).
6. Written questions. Questions asked by individual MPs to ministers (N > 24,000) in the Lower House (We obtained an electronic file with all parliamentary actions [questions, laws, interpellations] directly from the services of the Belgian Lower House and converted and recoded it according to our needs [see www.dekamer.be]). There are no restrictions and the procedure for asking written question has a very low threshold. We expect low friction.
7. Interpellations and oral questions. These are the means used by opposition parties to challenge the government in the Lower House (N > 10,000). There are very few institutional restrictions but, normally, parliamentary party leaders control the questions and interpellation from their faction. So, some coordination and party agreement are required and we expect a moderate amount of friction.
8. Bills. Bills are easy to introduce as one legislator suffices in the Lower House (N > 5,000). Many bills, though, are introduced by parties or even by several parties. More than two-thirds of the bills are submitted by the government, which is preceded by lengthy and often conflictual negotiations within government. Hence we expect substantial friction.
9. Laws. Laws are difficult to pass, unless they are supported by the government parties in the Lower House (N > 1,200). Success rate of government bills is nearly 100% and as government introduces most bills (see above) we expect the kurtosis of bills and laws to be very similar, with substantial friction in both cases.
10. Government agreement. This is a sentence-per-sentence analysis of the government agreements of 1992, 1995, and 1999 (N > 1,800). The government agreement is the bible of coalition politics and contains the plans the government solemnly promises to carry out during the term. Often very lengthy negotiations precede it. It may be the most discussed, scrutinized, and negotiated text in the Belgian political system. All this makes us expect very high friction. Yet, the government agreement most of the time is a straightforward mix of proposals parties make in their party platforms. Through the Central Limit Theorem an aggregation of several (even non-Normal) series would lead to a Normal outcome. Moreover, government stayed the same almost the entire period under study, which would not make us expect sudden major changes in the agreement. Overall, we expect low to moderate friction here.
11. Executive orders. Every Friday the Belgian government meets and takes a number of decisions. These are recorded here (N > 6,000). Due to the coalitional logic and the collegial procedure in Belgian governments we expect tough decision making and thus rather high friction. Friction should be higher than in the presidential system in the United States characterized by a single executive actor.
12. Budgets. As in Denmark and the United States, budgets should be the stickiest processes preceded by lengthy negotiations within government. Belgian budgets were recorded based on the official documents distinguishing all budget functions (N > 12,000).

For more information concerning each of the series used here, including summary statistics, full codebooks, the datasets themselves, and a complete set of histograms, semi-log and log-log plots of the 32 series analyzed here, see our web appendix, available at http://www.personal.psu.edu/frb1/Comp_friction/Comparative_Friction_Models_home.htm.

References

Awrejcewicz, Jan, and Pavel Olejnik. 2007. "The Occurrence of Stick-Slip Phenomenon." *Journal of Theoretical and Applied Mechanics* 45(1): 33–40.

Barabasi, Albert-Laszlo. 2005. *Linked.* New York: Penguin.

Baumgartner, Frank R., Martial Foucault, and Abel François. 2006. "Punctuated Equilibrium in French Budgeting Processes." *Journal of European Public Policy* 13(September): 1082–99.

Baumgartner, Frank R., Christoffer Green-Pedersen, and Bryan D. Jones, eds. 2006. *Comparative Studies of Policy Agendas.* Special issue of the *Journal of European Public Policy* 13(7).

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): 363–79.

Budge, I., D. Robertson, and D. Hearl, eds. 1987. *Ideology, Strategy and Party Change.* Cambridge: Cambridge University Press.

Coase, R. H. 1937. "The Nature of the Firm." *Economica* 4(16): 386–405.

Esping-Andersen, Gösta. 1990. *Three Worlds of Welfare Capitalism.* Cambridge: Polity Press.

Gutenberg, Beno, and Charles F. Richter. 1954. *Seismicity of the Earth and Associated Phenomena.* 2nd ed. Princeton, NJ: Princeton University Press.

Hammond, Thomas, and Gary Miller. 1987. "The Core of the Constitution." *American Political Science Review* 81(4): 1155–81.

Harbison, Frederick. 1956. "Entrepreneurial Organization as a Factor in Economic Development." *The Quarterly Journal of Economics* 70(3): 364–79.

Huber, John. 1996. *Rationalizing Parliament.* New York: Cambridge University Press.

John, Peter, and Will Jennings. 2008. "Punctuations and Turning Points in British Politics? The Policy Agenda of the Queen's Speech, 1940–2005." University of Manchester. Unpublished manuscript.

John, Peter, and Helen Margetts. 2003. "Policy Punctuations in the UK." *Public Administration* 81(3): 411–32.

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, Christian Breunig, Christopher Wlezien, Stuart Soroka, Martial Foucault, Abel François, Christoffer Green-Pedersen, Chris Koski, Peter John, Peter B. Mortensen, Frédéric Varone, and Stefaan Walgrave. In press. "An Empirical Law of Public Budgets: A Comparative Analysis." *American Journal of Political Science.*

Jones, Bryan D., Heather Larsen-Price, and John Wilkerson. 2009. "Representation in American Governing Institutions." *Journal of Politics* 71: 277–90.

Jones, Bryan D., Tracy Sulkin, and Heather Larsen. 2003. "Policy Punctuations in American Political Institutions." *American Political Science Review* 97(1): 151–70.

Jordan, Meegan M. 2003. "Punctuations and Agendas: A New Look at Local Government Budget Expenditures." *Journal of Policy Analysis and Management* 22(3): 345–60.

Keman, Hans, and Ian Budge. 1990. *Parties and Democracy.* Oxford: Oxford University Press.

Kingdon, John W. 1984. *Agendas, Alternatives, and Public Policies.* Boston: Little, Brown.

Krehbiel, Keith. 1998. *Pivotal Politics.* Chicago: University of Chicago Press.

Light, Paul C. 1995. *Thickening Government: Federal Hierarchy and the Diffusion of Accountability.* Washington, DC: Brookings.

Light, Paul C. 1999. *The True Size of Government.* Washington, DC: Brookings.

Lindblom, Charles. 1959. "The Science of 'Muddling Through.'" *Public Administration Review* 19(2): 79–88.

McDonald, M. D., and Budge, I. 2005. *Elections, Parties, Democracy: Conferring the Median Mandate.* Oxford: Oxford University Press.

Mortensen, Peter B. 2005. "Policy Punctuations in Danish Local Budgeting." *Public Administration* 83(4): 931–50.

Ormerod, Paul. 2005. *Why Most Things Fail.* New York: Pantheon Books.

Robinson, Austin. 1934. "The Problem of Management and the Size of Firms." *Economic Journal* 54: 250.

Rockman, Bert A., and Kent Weaver. 1993. *Do Institutions Matter?* Washington, DC: Brookings Institution.

Rundle, John B., Paul B. Rundle, Andrea Donnellan, and Geoffrey Fox. 2004. "Gutenberg-Richter Statistics in Topologically Realistic System-Level Earthquake Stress-Evolution Simulations." *Earth, Planets, Space* 56(8): 761–71.

Simon, Herbert A. 1955. "On a Class of Skew Distribution Functions." *Biometrika* 42(December): 425–40.

Simon, Herbert A. 1997. *Administrative Behavior.* 4th ed. New York: Free Press.

Strøm, Kaare. 1990. *Minority Government and Majority Rule.* Cambridge: Cambridge University Press.

Thelen, K., et al. 1993. *Structuring Politics.* New York: Cambridge University Press.

Tsebelis, George. 2002. *Veto Players: How Political Institutions Work.* Princeton, NJ: Princeton University Press.

Walgrave, S., P. Dumont, and F. Varone. 2006. "Policy With or Without Parties? A Comparative Analysis of Policy Priorities and Policy Change in Belgium (1991–2000)." *Journal of European Public Policy* 13(7): 1039–52.

Watts, Duncan J. 2003. *Six Degrees: The Science of a Connected Age.* New York: Norton.

Wildavsky, Aaron. 1964. *The Politics of the Budgetary Process.* Boston: Little, Brown.

Zipf, George Kingsley. 1949. *Human Behavior and the Principle of Least Effort.* Reading, MA: Addison-Wesley.