The Supply of Information and the Size of Government in the United States

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"As long as the reason of man continues fallible, and he is at liberty to exercise it, different opinions will be formed."

--James Madison in Federalist #10

Sound information is a necessary condition for effective policy design. When will information relevant to public policy be supplied and when will it be withheld? This question is deceptively simple, but seldom raised either in the academy or in the councils of government. James Madison, in Federalist #10, assumed that opinions (a form of information in democracies) would simply be produced, and would generate political factions; the task of government was to winnow the noxious policy proposals that invariably would be generated by these factions. Yet it is not so clear that people will invariably voice opinions and produce reasons justifying them. Social psychologists in the 1940s and early 1950s produced experimental results that could only be explained by 'group think'. Solomon Asch (1952) showed that people would offer objectively wrong answers on the length of lines if others (confederates of the experimenters) had just previously attested to the wrong answer. The continual struggle to protect whistle-blowers in government, the tendency of agency chiefs to down-play discordant information to leaders, and the decline of objective policy analysis in the federal government all attest that the problem of information suppression continues into the modern day (Williams 1998).

We think a re-examination of Madison's assumption about the free offering of information to government is long overdue. It may not be the case that policy-relevant information is invariably freely supplied. Nor do we uncritically accept the notion that information, as a valuable good, must be paid for, as economists would claim (whether paying costs improves the quality of the information supplied is a different issue). Sometimes it is quite

freely supplied. Rather, the supply of information may wax and wane with political conditions and it may be facilitated or discouraged by different institutional arrangements (Bimber 2003). We hasten to add that we do not underestimate the problem of separating reliable and valid information from biased and error-ridden information. Of course modern governments face Madison's problem of prioritizing—of winnowing the noxious schemes that self-interested citizens press on government. But supply and prioritization are not the same, and we will do well to analyze them separately (Jones and Baumgartner 2005).

In this paper, we explore the idea that the production of policy-relevant information is encouraged in pluralistic political arrangements characterized by jurisdictional overlap and inter-organizational competition. Redundancy, competition, and disaggregation in organizations lead to increases in the amount of information available to policymakers (Landau 1969; Bendor 1985; Heimann 1993, 1997), and it may improve the reliability of that information (Lupia and McCubbins 1995). Here redundancy has a special meaning: the information must be supplied through parallel, independent channels; otherwise the 'echo chamber' effect causes messages to be correlated with no corresponding improvement in the overall supply of information. Sources as well as message content are relevant. As we show here, these aspects of political information-processing can be measured and assessed. Viewing information supply through the lenses of organization theories that have established the role of redundancy allow us to integrate the processing of information in politics with mathematical communications theory (Shannon and Weaver 1949).

Once information supply is correctly understood and measured, we may proceed to assess its causes and consequences. We propose the following hypothesis: the greater the supply of policy-relevant information, the larger the government response, and hence the larger government grows. Information is supplied when political actors think problems exist that government can solve. Governments respond when information indicates that action is desirable. When actors believe that government cannot solve their problems, they will not

bother to supply information; information supply is conditioned on likely success. Political actors will supply information when chances for action by government on the solutions they press have a good chance of being adopted. As a consequence, the supply of information becomes fodder for politics, with conservatives seeking to limit the supply of information and liberals seeking to enhance it. Information supply explains government growth; politics explains information supply. We test these hypotheses using data from the Policy Agendas Project (Baumgartner and Jones 2002).

The Role of Information

Plenty of political scientists have highlighted the role of information in policymaking. Matthews and Stimson (1975), Kingdon (1989), Bradley (1980) and Sabatier and Whiteman (1985) all focus on the legislator as an information-processor, and all point to the roles of both the contents and sources of messages. Sources include interest groups, congressional committees, other legislators, executive agencies and legislative accounting offices. Message content is a more complex matter.

As a consequence of the complexity of message content, the role of Information in politics is not a straightforward process of reducing uncertainty about policy impacts, although it has sometimes been conceived that way (Gilligan and Krehbiel 1987, 1989). Information may affect the policy debate by influencing problem definitions and interpretations or by bringing new issues to the policy table. It may not add to the understanding of the programmatic impact of the policy, since policymakers attend both technical and political information for policy decisions (Sabatier 1991). Information is often not used in a neutral fashion, and what policy makers learn from available information must be considered in the context of political interests and political power (Bennett and Howlett 1992: 291). Oftentimes reports presented by those who would influence political outcomes are as biased as the presentations of a defense lawyer with a guilty client.

None of this should deter us from pursuing the role of information supply in the policy process, but it should make us properly cautious in what we claim. If we need no other justification, it is enough to note that standard approaches to policymaking that are rooted in institutions, interests, and political parties are too static to explain policy change (John 1998), especially rapid policy change associated with crises, scandals, and issue redefinitions, all of which require a flow of information and a recognition by political actors that the policymaking environment has changed in a significant fashion. Normatively It is far less cynical about the course of public policy, because politics becomes an adaptive mechanism through which a polity responds to challenges in its environment rather than solely a venue for contentions among competing selfish interests.

Information Processing

Information processing may be defined as collecting, assembling, interpreting, and prioritizing signals from the environment. A *signal* is simply some detectable change in what is happening "out there." All signals are characterized by *uncertainty* (we can't always be sure something out there has actually changed) and *ambiguity* (we can't be certain what the signal may mean). As a consequence, there is always a question of whether there has been a relevant change in the policymaking environment. Moreover, objective changes in the environment—signals—must be distinguished from attention to these signals. Signals are information, but when we become aware of signals, then they become "news." In politics, as in communication theory, signal detection is critical to future action.

Supplying Information

When will information relevant to the policy process be supplied? From one point of view, information may be seen as a scarce and valuable good, one that will not be supplied without remuneration. If policymakers need estimates of the intentions of foreign countries, they set up agencies with paid professional staffs to study and report on the problem. Similarly it is common for Congress to delegate information-gathering functions to specialized committees

and sub-committees, which make recommendations to the chamber. The “pay-off” is some deference by the chamber to the committee (Krehbiel 1991). In a word, policymakers delegate the collecting and assembling of information to others, more expert in the particulars.

These kinds of activities imply that information will be generally in short supply on matters of public policy. Information is a valuable resource since it can reduce uncertainty and can change the expected value of a decision. Only experts provide information, and they will do so only if compensated. This corresponds with classic economics-based understandings of “search” and “information” costs (Downs 1957; Stigler 1961). Because information search is costly, principals (e.g. Congressional Committees or the Legislative Body) must rely on agents (e.g. Bureaucratic Agencies, Congressional Committees, or even fellow Congressmen) to provide information about policy options, consequences, and success.

The relationship between principals and agents is often asymmetric because agents have more information than principals about their actions, and they can choose whether or not to share information with the principals. Principals, therefore, must establish institutions to overcome the asymmetries and provide incentives for the agents to provide information (Austen-Smith and Riker 1987, 1990, Diermeier and Fedderson 2000, Gilligan and Krehbiel 1987, 1989, Krehbiel 1991, McCubbins, Noll, and Weingast 1987, and Miller and Moe 1986.

But this cannot be the whole story, for the observation that information will be undersupplied in politics flies in the face of the clamoring diversity of information that characterizes modern America. Information on policy matters is supplied by interest groups, think tanks, political parties, bureaucratic agencies, and congressional committees. Oversupply rather than undersupply seems to be the problem. Policymakers generally report that they are literally bombarded with information, of varying quality; they are not normally in the position of having to seek it out. As Richard Hall (1996: 90) notes, “Policy-relevant information is abundant, perhaps embarrassingly rich, on Capitol Hill. Interest groups, Congressional Research Service, Government Accounting Office, various administration reports, pre-printed

hearing testimony, studies conducted by academics, think tanks, and policy analysts in and out of government" supply it (see also Bimber 1991).

Institutions and interest groups affect the information that enters policy arenas. Institutions filter and direct this information, in addition to structuring the relationships among political players including interest groups (Bimber 1991; Heitshusen 2000). As has been amply noted, interest groups are more than mere influence peddlers. They provide information about the political feasibility of policy alternatives and technical information about the substance of policy alternatives (Bauer, Pool, and Dexter 1969; Bradley 1980; Cobb and Elder 1972 [1983]; Esterling 2004; Hansen 1991; Heitshusen 2000; Milbrath 1963; Sabatier and Whiteman 1985; Wright 1990, 1996).

Information does not seem to be a scarce resource in Congress. The economics of information breaks down when there are multiple, competing sources of information. Competition among the various interest groups and agencies seeking policy benefits encourages them to share information with Congress in order to shape the policy debate. An interested party who might wish to withhold information can be certain that another source is likely to provide the information. Thus they are likely to provide a great deal of policy information to policymakers, and this has collective benefits. Lupia and McCubbins (1995) show that an increase in competition among non-redundant sources of information increases the chance for verification.

This does not mean that the issue of supply is solved. The structure of a political system can induce increases in the supply of information. Studies of congressional committee jurisdictions indicated that overlapping jurisdictions in which committees mutually interfered with one another led to break-downs in informational monopolies, thereby increasing the supply of information available for policymaking (Jones, Baumgartner, and Talbert 1996; King 1999; Baumgartner, Jones, and MacLeod 2000). In general, we strongly suspect that pluralist, non-hierarchical systems produce more information than unitary, hierarchical systems, such as

those envisioned in many conceptions of delegation to experts. That information may be less reliable (but the question of bias is open), and it will be more difficult to prioritize, because it comes from diverse sources. But there will likely be more of it. Finally, ebbs and flows of information may occur, stimulated by the perceptions of participants that policymakers are open to this information. In fact James Madison and his colleagues seemed to have understood this as well since the separation of powers and federal system they devised seems perfectly designed to generate multiple independent sources of information.

Entropy and Information

Our approach to the supply of political information centers on the notion that more information is supplied when messages on a variety of policy topics are produced by multiple non-redundant sources. Message content is simplified into a count of topics addressed in the message via content coding. If we think of a single source of information, then increases in the number of messages that the source can choose to send implies an increase in the information available. Then, by extension, as the number of sources increases, information similarly increases. This is a meaning of information supply that is very close to that developed by Claude Shannon in the 1940s to analyze telephone transmissions. Shannon's measure, entropy, has been widely adopted in many fields of endeavor (Pierce 1980).

Entropy in policymaking implies the absence of concentration of policy effort in issue categories. Information supply is associated with variability in message content across potential sources. The more different messages are supplied and the larger the number of sources providing the information, the greater will be the supply of information (and the larger the entropy coefficient). Talbert and Potoski (2002), following agenda-setting work in mass communication studies (Chaffee and Wilson 1977; McCombs and Zhu 1995), adapt Shannon and Weaver's (1949) classic formula for entropy in communications transmission to policy

agendas. For reasons that will become apparent, we follow this lead, but first we will need to explain exactly what the entropy index will tell us about policymaking.

Claude Shannon, working at Bell Laboratories in the late 1940s, developed the notion of entropy to analyze uncertainty in the transmission of messages. Shannon's notion of uncertainty can be understood in terms of selecting an object from a set of categories. If we observe an object, the question is how certain we can be that the object came from a particular category. Entropy is a summary measure for this type of uncertainty. Entropy is defined as:

$$\mathbf{H = \sum P(x)\cdot \log(1/p(x)) = -\sum P(x)\cdot \log(p(x)),} \qquad (1)$$

Where **x** represents an object, **P (x)** is the probability that an object falls within a particular category, and the index is summed over all the categories.[1]

If all objects are in one category, and we observe an object, we know with certainty what category it belongs in. In that circumstance, H = 0. In Shannon's information theory, the object is a 'message' and the category is the 'source'. When H = 0, we can learn nothing new from observing a message, because we could already predict what the message would be without observing it. In Shannon's theory, information comes from uncertainty—or, actually, the reduction in uncertainty after we observe the message or object. In general, the more concentrated the objects are within categories, the lower the entropy; the more spread around the objects are within the categories, the higher the entropy. Observing a message offers more information in the latter circumstance.

Messages and Sources in Politics

The crux of information theory is the relationships among the information source, the potential messages that might be sent, and the receiver of the message. In information theory, no attention is given to the capacity of the receiver to interpret the message; that is left to the

[1] Because logarithms are undefined at zero, and many categories are likely to have zero entries, the convention is adopted that for P(x) = 0, 0•log(0) = 0. In practice, for ease of calculation, we added a very small fraction to the actual proportions (estimates for P(x)) equal to .000001.

field of information processing (Jones and Baumgartner 2005). "The *information source* selects a desired message out of a set of possible messages" (Shannon and Weaver 1963:7), and sends it to the receiver. The key question is whether the receiver's level of uncertainty is reduced upon receiving the message.

Legislatures set up committees to study legislation and problems that might be addressed by legislation; as such, committees are a major source of information on policy matters for policymakers. But as is well-known, committees can become parts of policy subsystems that operate at the behest of affected interests. As a direct consequence, a message on, say, agriculture will be less informative to the legislative chamber if it is from the Agriculture Committee than it will be from, say, the Education and Labor Committee.

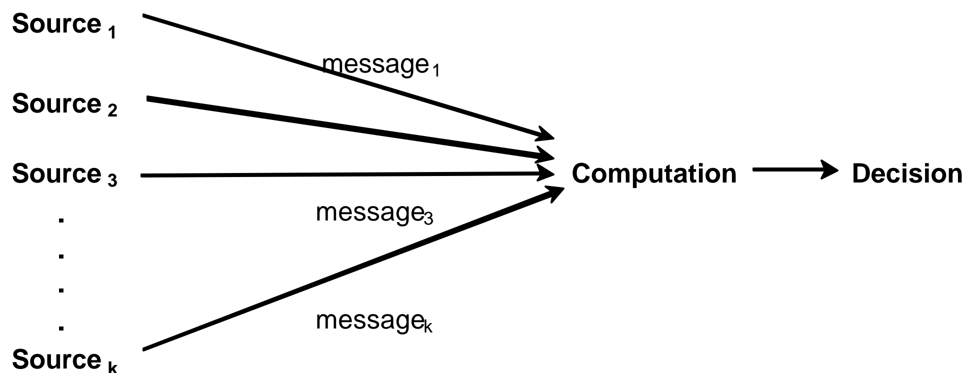
The notions of information that is enshrined in Shannon's entropy are different from those current in the study of congressional committees today (Krehbiel 1991; Gilligan and Krehbiel 1987, 1989). Both define information in relation to uncertainty reduction, but the similarity stops there. In the former case, diversity among supplying sources add to information supply; in the latter, experts hone advice on specific topics and reduce uncertainty on those topics. In the former, diversity of messages and a panoply of potentially competing sources is lauded; in the latter, it is distracts at best and interferes with expert judgment at worst.

If information supply is increased by entropy, the difficulties in prioritizing those messages are proportionally increased, and one would rely ideally on a system of weighting (by, say, reliability of source) and averaging (Jones and Baumgartner 2005b). In Gilligan and Krehbiel's approach, experts define priorities as well as supply (else why turn the policy over to but one set of experts?).

Of course neither of these perspectives holds all truth. We trust our health to a single doctor (but we reserve the right to obtain second opinions!). We may read the New York Times, trusting its journalistic expertise, but a good look at the Wall Street Journal can introduce

issues never touched upon in the Times. In politics as in life, it makes sense to rely on not one expert but on a number of them, especially if they come from different professional persuasions.

The diagram below illustrates this decision-making perspective. A decision-maker received numerous messages from potentially competing sources. The higher the number of sources and the less the concentration of messages within a single source, the higher the entropy and hence the higher the supply of information (and hence the more difficult the problem of prioritization). [2]



Entropy and Congress

Now let us turn to the issue of information supply in the policymaking process. We restrict ourselves to Congress for the present, but we stress that the theory of information supply is entirely general. The 'source' is 'the congressional committee system, the 'receiver' is the legislative chamber collectively (because the chamber receives the report from the committee), and the 'message' is the report itself.

For the present, we simply categorize the message as its primary substantive topic. If there are k possible topics that Congress considers, then at any one instant, the committee system can send any one of k possible messages on to the floor. The total amount of information produced by the committee system, per arbitrary unit of time, is the entropy for the

[2] It is critical that we separate the problem of supply and the problem of prioritization; these cannot be solved in a single 'move'.

system, essentially the uncertainty associated with probabilities of sending messages about the k topics.

The total amount of information produced by a single committee, per arbitrary unit of time, is similarly computed for a single committee. If a committee sends only messages about a single topic, then the committee’s entropy, or supply of information, is zero. Here the quantitative calculation of entropy conflicts a little with a qualitative understanding of what is going on. A committee clearly can say something surprising about the topic under its jurisdiction. It is more likely that a committee not normally active in the policy area will do so (Baumgartner, Jones, and McLeod 2000), and it is that aspect of information supply that quantitative entropy measures assess.

The table below depicts this. The committees occupy the rows, the policies t he columns. Each cell entry is the proportion of the time that a committee spends discussing a particular policy—providing information on that policy. Summing down a column indicates p*olicy entropy* for a particular policy; it is the amount of information provided by the system of committees about a policy. Summing across a row provides *committee entropy* is the amount of information provided for all policies by a given committee. The sum of the matrix is an estimate of the total amount of information that congressional committees provide the chamber in a given time period (year or Congress).

Table 1: Congressional Entropy

	Policy A	Policy B	. . .	Policy K	Committee Entropy
Committee 1	P(1A)	P(1B)		P(1A)	$-S_Y P(1Y)\cdot \log(p(1Y))$
Committee 2	P(2A)	P(2B)		P(1A)	
. . .					
. . .					
. . .					
Committee N	P(NA)	P(NB)		P(1A)	$-S_Y P(NY)\cdot \log(p(NY))$
Policy Entropy	$-S_X P(XA)\cdot \log(p(XA))$	. . .	. . .	$-S_X P(XA)\cdot \log(p(XA))$	

For any given year, the estimate of the policy entropy would be the proportion of hearings appearing in a topic category, weighted by the inverse of the logarithm of that proportion, plus the proportion of hearings appearing in the Civil Rights/Civil Liberties category, weighted by the inverse of the logarithm of that proportion, and so forth.

In Shannon's communication theory, more information is associated with more entropy. Shannon's definition of information was technical, and did not incorporate the multidimensional structure of messages that is so critical in politics. The raising of ignored attributes or dimensions provides a key dynamic in issue evolution in politics, as we detailed in Chapter 7. Moreover, our understanding of 'information' involves turning over policy problems to experts for review, analysis, and recommendations.

On the other hand, clearly more information is available when more sources weigh in on the problem. All are not equally valid or reliable, so they would not be equally weighted in the decision-making process. But it is undeniable that more non-redundant sources of information increase the overall level of information, even if those sources produce biased analyses of the problem. In politics, in particular, information often involves raising unappreciated attributes in complex situations. One does not have to be an expert to comment; knowledge and information are not the same thing.

The lack of redundancy is important. It is common for venues of activity to send similar messages. It is of little added interest to read a Hoover Institution report on deregulation when one has already read an American Enterprise report on the same subject. The messages are redundant. Similar venues produce similar messages; that is why multiple non-redundant venues are the key to entropy—a point we made in Chapter 13 with regard to congressional committees.

Complexity, in politics, increases the supply of information. Complexity is associated with entropy. As a consequence, entropy increases the supply of information to policymakers. Because complexity can yield confusion, however, more information does not imply actionable information. Policy action is governed not just by the information flow, but by the processes of attention allocation and the set of institutional rules governing collective action.

Entropy and Herfindahl

In earlier work, we used the Herfindahl Index, which economists use to assess market concentration, to examine changes in jurisdictional monopolies in congressional committees (Baumgartner, Jones, and McLeod 2000; see also Hardin 1998, 2002). The entropy measure and the Herfindahl Index tap similar aspects of object concentration within categories, since both are based on similar measures (the Herfindahl, on the sum of the squared proportion of items in each category; entropy on the proportion times the log of the proportion). Because of their different formulas, the two measures produce different measures and one is more useful for distinguishing with high versus low general levels of concentration. Still, the two are highly correlated. In our data, for hearings categorized at the major topic level, Shannon's Entropy and the Herfindahl are correlated -.992; for statutes, -.983, for the Congressional Quarterly stories, -.973, and for the New York Times, -.947. Entropy, however, does a better job at distinguishing among situations with low levels of concentration than does the Herfindahl, which is highly sensitive to changes at high levels of concentration but distinguishes less well at lower levels.

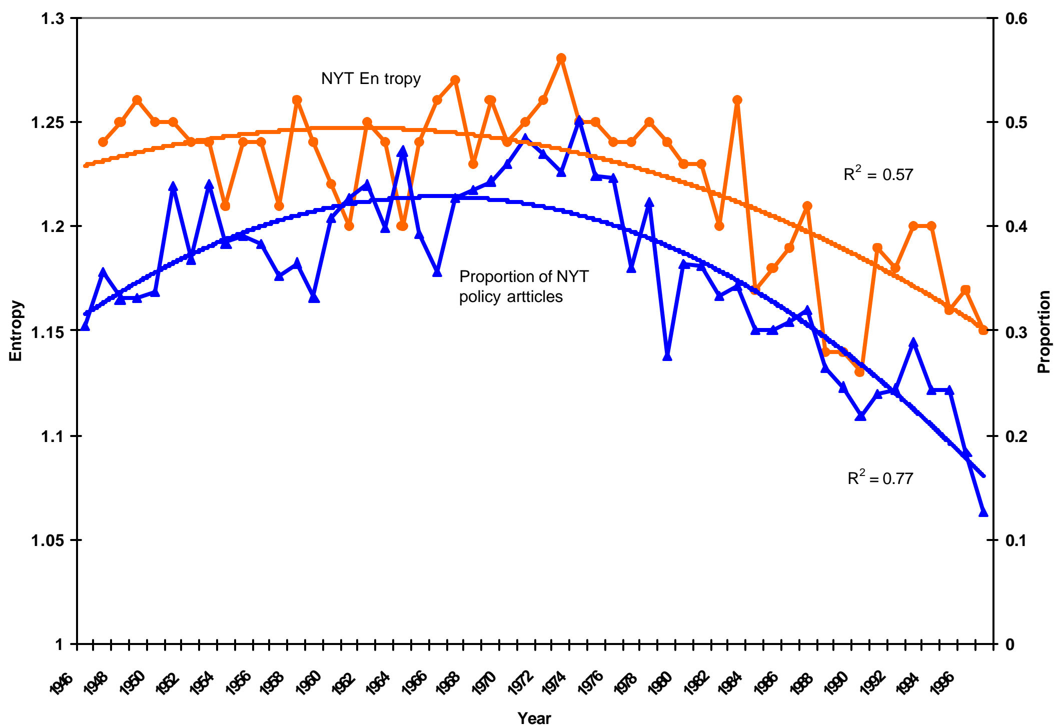
Trends in the Supply of Policy-Relevant Information

We first examine the notion that the supply of policy information ebbs and flows in American politics. Our coding of a sample of New York Times stories allow us to calculate entropy across all topics addressed in that newspaper and to trace this measure across the period of our study. Figure 1 does this, and, in addition, it presents the proportion of policy articles on an annual basis. A quadratic trend adequately fits each series. Peak entropy for the all stories occurred in 1973; not inconsequently, the highest proportion of stories devoted to

public policy matters occurred the following year. Since then editors at the Times have imposed a steady and marked decline of policy-relevant material on the paper's coverage, all the while producing an increasingly less diverse news product. In the 1970s, 40 to 50 percent of coverage was devoted to politics and policy; by the 1990s, this had dropped to around half of the previous material. The New York Times has steadily but surely moved from a strong and diverse outlet for discussion of policy and politics to a less diverse format dominated by style, arts, leisure, and sports. The move to 'soft news' has been well-documented in media studies (Patterson 2000); our contribution is to note the clear and unmistakable decline in diversity and in policy content that has become so marked since the 1970s.

[Figure 1 about here]

Figure 1: The Decline of Policy Information in the New York Times

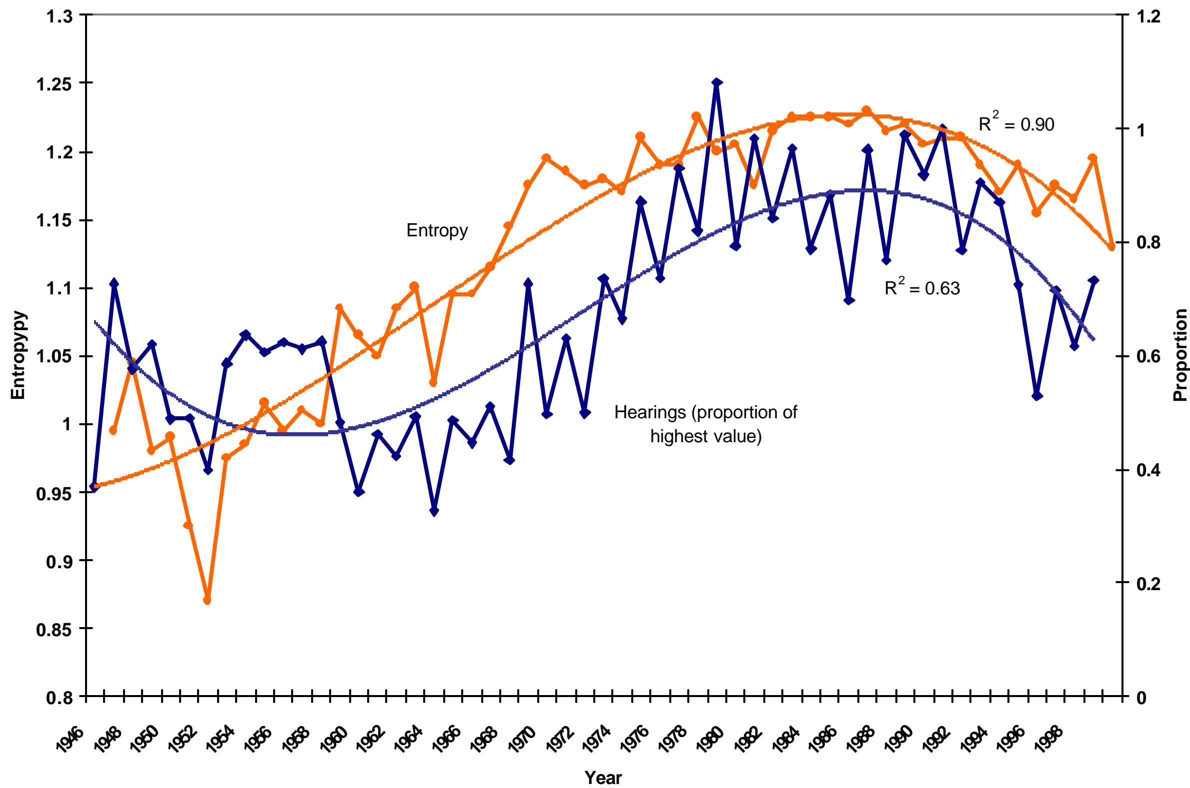


Is the decline in press coverage simply a media phenomenon or does it affect government? Figure 2 presents our entropy measure calculated for each house of congress for major topic categories and committees, averaged across the chambers, as illustrated in Table 1.

The entropy value for each year is the sum of a corresponding committee-by-topic matrix for that year. It indexes the total supply of information made available by the congressional committee system through the hearings process. As can be seen in the figure, the trace of the path of information supply provided to Congress through its committee system traces a roughly similar pattern as does that traced by New York Times coverage.

[Figure 2 about here]

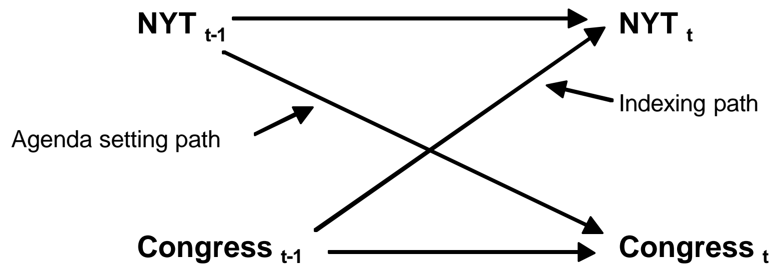
Figure 2: Congressional Entropy and the Number of Hearings



Untangling Press Coverage and Congressional Information

The supply of information provided for policy purposes by Congress and to the public through the press are intertwined—the simple correlation between Congressional and New York Times (for policy stories only) is .62. Does congress respond to issues raised in the press, or does the press simply cover policy matters raised by congress (and other Washington policymakers), as Bennett's (199x) indexing thesis implies? By cross-lagging appropriately, we

can examine which of these is correct (or whether both are partially valid). The diagram below shows how we will proceed. Information supplied by the press is potentially a function of inertial factors plus the influence of the supply of information provided by congress (the 'indexing' path). Similarly information supplied by Congress is potentially a function of the press raising issues (the 'agenda setting path') and inertial factors. The relative sizes of the cross-lagged coefficients will indicate the relative strengths of these causal mechanisms.



As Table 3 indicates the pattern of relationships rules out the agenda-setting path and strongly confirms the indexing path. Congressional entropy at t - 1 positively affects both press entropy and congressional entropy at t, but press entropy at t -1 fails to influence congressional entropy and it even fails to account for the pattern of press coverage at t.

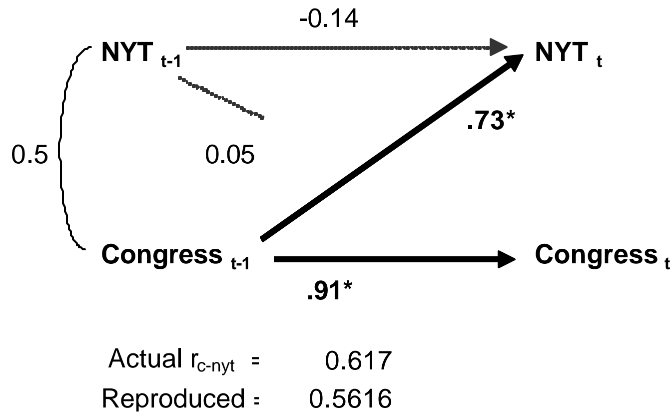
[Table 1 about here]

Table 1: Information Supply, Congress and the Press

Models:	Dependent Variable: NYT Policy Entropy	Dependent Variable: Congressional Entropy
Constant	.954*** (.143)	-.002 (.150)
NYT Policy Entropy, Lag 1	-.145 (.143)	.124 (.155)
House-Senate Entropy, Lag 1	.324*** (.061)	.897*** (.066)
R2	.451	.870
Adj. R2	.423	.863
DW	1.92	2.54
N	41	41

That is, press coverage on policy matters is explained by what congress is doing but not the pattern of press coverage in the past.

The second diagram, below, is a path analysis of the system, where the path coefficients are estimated by standardized regression coefficients. By multiplying through the proper paths, one can calculate an estimated correlation for the correlation between press coverage and congressional information. It comes quite close to the actual, as shown below.

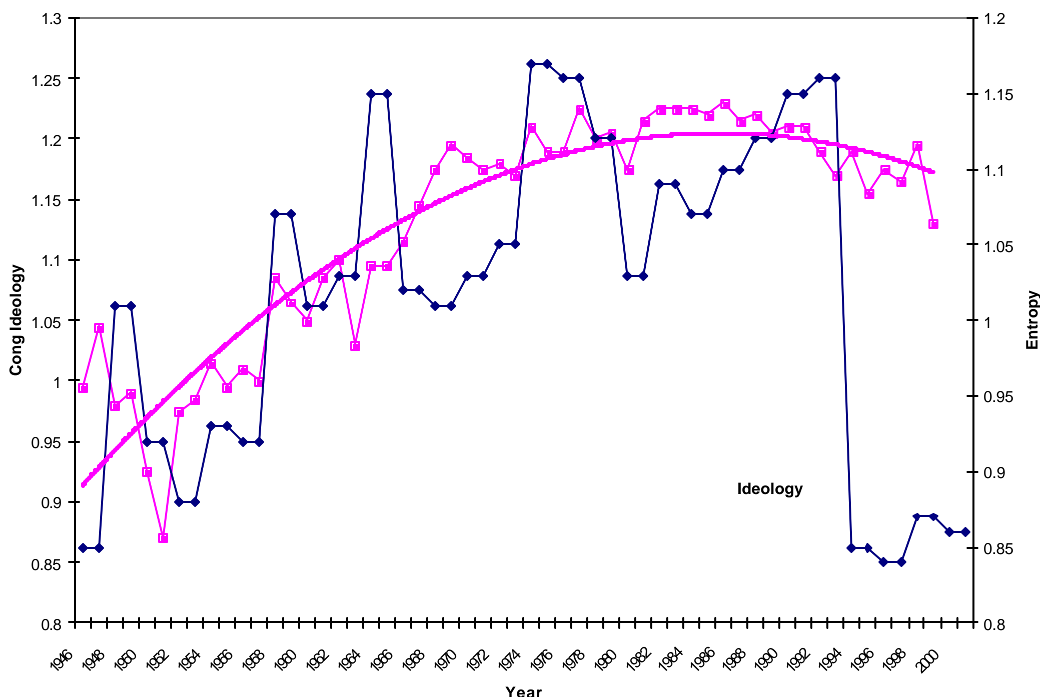


Determinants of Entropy

One would suppose that the supply of information to congress is affected by social, economic, and political trends. Indeed, there is a correspondence between ideological voting members of congress and polarization (DWNominate 1st and 2nd dimension scores), as indicated by Figure 3. There we graph congressional entropy versus the average DW Nominate score for the two chambers (reversed in polarity).

[Figure 3 about here]

Figure 3: Entropy and Ideology



We tested several other independent variables in attempting to explain congressional entropy, including ideology, polarization (the differences between the parties in ideological voting), the proportion of Democrats in congress, the party holding the presidency, and several economic and social variables, including Gross Domestic Product and income distribution (Gini index for families). We developed a model that included as significant predictors of House Entropy (used because certain of our measures, such as polarization, are chamber-specific) income distribution (with more equal distribution leading to more information), ideology (with more liberal congresses leading to more information), and polarization (with less polarization leading to more information). The model seemed satisfactory on the face of it (with an R2 of .874, adjusted to .863, a Durbin-Watson statistic of 2.6), and all coefficients statistically significant. Income distribution was only marginally significant, however, and removing this variable left polarization insignificant; dropping polarization left ideology insignificant, with lagged entropy the only variable in the equation. Finally, we entered an institutional component into the model, in which Senate Entropy could influence House entropy, and developed a similar

model for Senate Entropy.   There are clear cross-institutional connections, as indicated in Table 2.

[Table 2 about here]

Table 2: Explaining Chamber Entropy

Model:	**House Entropy as dependent variable**	**Senate Entropy as dependent variable**
House Entropy	--	.469*** (.115)
House Entropy Lag 1	.676*** (.089)	--
Senate Entropy	.323*** (.105)	--
Senate Entropy Lag 1	--	.365*** (.131)
R-sq Adj R-sq DW N Standard Errors in Parentheses. * p < 0.10 ** p < 0.05 *** p < 0.01	.876 .871 2.67 52	.770 .761 1.96 52

The difficulty in developing a satisfactory model suggests difficult underlying dynamics suggests both complexity and underlying multicollinearity in the system of variables we used. Several things are clear, however. First, there is no simple relationship between increasing social complexity and the supply of information. As the United States became more socially complex over time, the supply of policy-relevant information filtered through congressional committees first rose and then stabilized and declined. Second, it is highly probable that political dynamics account for changes in the supply of information, and that those dynamics involve institutions, parties, and ideologies—the usual suspects.   Just how these interact, however, must await further work.

Congressional Dynamics and the Size of US Government

One limitation of current congressional studies is the difficulty of linking the internal dynamics of congress to broader questions of policymaking. Much good work has examined

inputs into these dynamics—questions such as representation and the linkage of constituencies to committee composition and hence behavior, and there are many studies of specific policy results of legislative action, but there are virtually no studies of how internal dynamics influence external trends. In this section we study empirically the linkage between the supply of information on policy matters by congressional committees and certain aspects of government growth.

The literature on the growth of government is voluminous and not infrequently driven by ideological and normative considerations. Theories abound, findings are rich and varied, and many studies of more limited aspects of policymaking bear directly on the issue—as, for example, the determinants of expenditure and the state-building literatures. Some things are clear: external challenges can generate 'ratchets' that lead to bigger government even when the crisis is alleviated (Higgs 1987; Peacock and Wiseman 1974; Sparrow 1996), but internal dynamics are critical as well (Berry and Lowery 1987; Jones, Baumgartner, and True 1998).

We measure two aspects of changes in the size of the US national government. First, we used as executive branch civilian employment in civilian agencies. We excluded an examination of employment in the armed forces and of civilian employment in defense agencies. This assesses the size of government in terms of the people in employs, but it may fall prey to the problem of contracting out (Light 1999). So we supplemented this analysis with a study of Congressional Budget Authority, which assesses the spending authorized by Congress to government programs.

As candidates for independent variables, we considered Stimson's Public Mood score, media attention (New York Times entropy), income inequality (measured by the Gini index for families), Gross Domestic Product, the party affiliation of the president, the median ideology of the Congress (measured using Poole and Rosenthal's DW-NOMINATE scores on the economic (first) dimension), the number of Policy Agendas Project subtopics being considered in

Congress, and the amount information available in Congress—measured as the entropy of committee hearings.

We conducted a linear regression for these variables for executive branch civilian employment in civilian agencies, controlling for employment in the previous year. For variables related to the House and Senate, we conducted separate regressions for the House and the Senate. Then we conducted a combined regression for the House and Senate (taking the average entropy and the average median ideology for the House and Senate, for example). The results show that a one-year lag in entropy and ideology are the best variables to predict growth in government employment, controlling for government employment in the previous year and employment two years prior. Government employment increases when the previous years' entropy (spread of information) increases and when ideology becomes more liberal. Table 3 presents the results.

These models control for a one-year lag in government employment and a two-year lag in government employment. The one-year lag significantly impacts the model in all three models, while the two-year lag does not significantly impact the models. However, without the two-year lag for government employment, auto-correlation becomes a problem (the Durbin-Watson score is less than 2). Models 2 and 3 in Table 3 indicate model robustness by displaying results for dropping the second lag and ideology. In sum, the size of government, measured as civilian employment in civilian agencies, is influenced by the flow of information in Congress and the ideology of members (the latter of course highly correlated with party).

[Table 3 about here]

Table 3: Explaining Government Employment

Dependent Variable: Executive Branch Civilian Employment in Civilian Agencies (1,000s)

	Model 1: All variables	Model 2: Drop ideology	Model 3: Drop 2-yr lag govt. employment
(Constant)	-117.83 * (63.19)	-166.30 *** (61.63)	-132.34 ** (66.70)
House-Senate Median Entropy, Lag 1	237.45 *** (81.72)	279.11 *** (82.69)	257.86 *** (86.82)
House-Senate Median Ideology, Lag 1 (Median DWNOMINATE Score, Dimension 1)	-97.32 ** (43.98)		-136.85 *** (40.35)
Government Employment, Lag 1 (Executive Branch Civilian Employment in Civilian Agencies) (1,000s)	0.97 *** (0.13)	1.11 *** (0.12)	0.84 *** (0.04)
Government Employment, Lag 2 (Executive Branch Civilian Employment in Civilian Agencies) (1,000s)	-0.12 (0.12)	-0.26 ** (0.11)	
R2	0.988	0.987	0.986
Adjusted R2	0.987	0.986	0.986
Durbin-Watson	2.103	2.252	1.659
N	51	51	52

Standard Errors in Parentheses.

* p < 0.10 ** p < 0.05 *** p < 0.01

Government Growth measured as Budget Authority (in 2003 dollars)

We now turn to patterns of spending. We concentrate on domestic discretionary spending (total congressional budget authority less defense and domestic entitlements). We conducted a linear regression on the log of Congressional Budget Authority in 2003 dollars for the following independent variables: Congressional ideology, Congressional ideological polarization, Stimson public mood, spread of media attention, income inequality [Gini coefficient], Democratic president, and entropy in the House and Senate, and combined), lagged one year. For variables related to the House and Senate, we conducted separate regressions for the House and the Senate. Then we conducted a combined regression for the House and Senate. The results show that a one-year lag in entropy and a one-year lag in congressional ideology is predict growth in congressional budget authority, controlling for the

budget authority in the previous year. Table 4 displays the results. Again, the supply of information is the keystone to explaining changes in patterns of government expenditure.

[Table 4 about here]

Table 4: Explaining Domestic Discretionary Budgeting

Dependent Variable: Log (Budget Authority in 2003 Dollars (millions), minus authorizations for Defense, Social Security, Medicare, Net Interest, Undistributed Receipts.

Models	Model 1: 1947-1995	Model 2: 1947-2001
Constant	1.92*** (.493)	.936** (.382)
Log(Budget Authority), Lag 1†	.762*** (.063)	.862*** (.057)
House-Senate Median Entropy, Lag 1	.993** (.404)	.765* (.409)
House-Senate Median Ideology on 1st DWNOMINATE Dimension, Lag 1	-.551** (.243)	-.007 (.175)
R2	.969	.968
Adj. R2	.967	.966
DW	2.43	2.30
N	47	53

Standard Errors in Parentheses.
* p < 0.10 ** p < 0.05 *** p < 0.01
† Total Budget Authority in 2003 Dollars (millions) minus authorizations for Defense, Social Security, Medicare, Net Interest, Undistributed Receipts

Can government growth simply be propelling increases in information-gathering on the part of congress, rather than the other way around? After all, adding government programs and the agencies that administer them adds to the oversight responsibility of congressional committees. We can address this issue by examining congressional entropy as a function of the size of government (assessed by our civilian employment and discretionary domestic budget variables), and including the standard political and economic variables that we included in the above regressions. The answer is that causal flow is primarily from information to programs, and the feedback from government programs to information flow is weak. The only variable that can be remotely seen as influencing congressional entropy is government civilian

employment the year before, and that is weak indeed, with a t-value of but 1.93 (df = 52), when a lag for entropy is included.

Summary and Concluding Comments

In this paper we have introduced a new way of thinking about policy change in government. Government responds not simply to the preferences of actors, but to events and information. The supply of information is enhanced when numerous non-overlapping sources independently produce messages on policy topics. In the case of congress, supply is enhanced when the committee system is composed of committees with overlapping jurisdictions on diverse policy matters. This can, of course, cause problems in the prioritization of messages, and often analysts put forward reforms that will coordinate the activities of congressional committees (or, for that matter, government agencies). The most recent example of this kind of thinking is the 911 Report, which called for more hierarchy and control among intelligence agencies and among congressional committees overseeing those agencies. Problems of prioritization are not best solved thorough a reduction in supply, however; these are best treated as separate issues.

We measure information supplied via the congressional committee system by Shannon's entropy coefficient. The more diverse the sources supplying information, the greater the supply of information. From our analysis, we conclude the following.

1. Information supply has waxed and waned over time, neither driven by increasing societal complexity, or press agenda-setting, or ideological changes in national government. Press coverage on policy matters, however, is driven by congress.
2. Changes in the supply of information has consequences. It is clearly related to changes in the size of government, and it is the most important variable in accounting for both civilian national government employment and domestic discretionary spending.

3. While these trends are robust through 1996, after then the US entered a period of government growth without the corresponding increases in information supply that had characterized earlier eras.

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