Structure and Opportunity: Committee Jurisdiction and Issue Attention in Congress

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This article explores how the congressional committee system shapes the dynamics of issue attention. Consisting of what is referred to as a congressional opportunity structure, it describes how committee jurisdictions provide an important institutional context for the attention paid to new issues in congressional hearings. This is illustrated through an examination of congressional attention to biotechnology over a 30-year period. This article finds that committees with broader jurisdictions were more active in biotechnology than committees with a narrow policy remit. However, these institutional effects varied widely, even within a single policy domain. This variation suggests that issue attention depends on the degree of fit between issue characteristics and the congressional opportunity structure. More broadly, the findings here illustrate the virtues of public policy research in studies of Congress.

Institutions play an important role in the dynamics of issue attention. Although the rise of new issues may be sparked by a variety of factors including unforeseen crises or events, shifts in public opinion, pressures from organized groups, and spikes in media attention, the policy agenda will also reflect the institutional context in which policymakers operate. This institutional context includes, among other things, the allocation of resources necessary for the investigation of new issues, the rules that guide when and how new topics may be brought up for consideration, and the boundaries that demarcate authority over particular issue domains.

It is this last feature, the scope of jurisdictions and the clarity of institutional boundaries, that is the principal focus here. Building on recent work on agenda dynamics, this article explores how the multiple and overlapping structures of authority of the congressional committee system shape issue attention. Specifically, it examines how the character of committee jurisdictions creates a congressional opportunity structure that provides an important institutional context for the attention paid to new issues in congressional proceedings. This is illustrated through an examination of congressional hearings on biotechnology issues over a 30-year period. After accounting for a number of factors that might influence congressional attention, this article finds that committees with broader jurisdictions were more active in biotechnology issues than were committees with a narrow policy remit. However, these effects varied widely, with the most pronounced effects in the area of biomedical research, such as stem cells, cloning, and access to genetic information. By contrast, hearings on nonmedical applications of biotechnology, such as genetically modified foods and crops, appears concentrated in committees with narrower jurisdictions where the formal content of committee authority is more important than its scope in explaining congressional attention.

Several implications follow from these findings. First, this article highlights the importance of policy domains as a unit of analysis for understanding the relationship between institutions and issue attention. Indeed, the findings here reveal significant variation within a single policy domain. Consequently, general theories about the effects of congressional structures on politics or policies should be approached with some caution. As an alternative, the concept of a congressional opportunity structure endeavors to capture the complexity of congressional institutions and their effects on the policy agenda. Issue attention in

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Congress will depend, in part, on the fit between issue characteristics and committee jurisdictions. In the case of biotechnology, medical issues engage committees in which the competitive dynamics of jurisdictional control fuel attention to new issues. This appears not to be the case in nonmedical biotechnology issues where the most active committees enjoy formal authority over the issue.

Although the focus on a single policy area renders broad generalizations more difficult, it also makes possible a more fine-grained investigation into the dynamics of issue attention. Moreover, explaining the politics of public policy and the mechanisms that underlie policy outcomes remains an important, if sometimes neglected, external competence of political science. My examination of biotechnology, for example, sheds light on an interesting puzzle; namely, why some biotechnology applications generate more political controversy than others. The findings here suggest that institutional features of the committee system in Congress crucially shape the politics of biotechnology in the United States.

Finally, although the focus here is squarely on structures, the evidence suggests how institutions provide a dynamic environment for the entrepreneurial pursuit of political goals. Institutions can constrain actors, but they also empower them. As the term *congressional opportunity structure* implies, a committee system with multiple and overlapping jurisdictions presents varied opportunities for entrepreneurial politicians. Whereas some committees provide an institutional context favorable for the introduction of new issues, other committees offer a less hospitable environment. In this way, the complexity of the committee system shapes the dynamics of issue attention. More broadly, the concept of a congressional opportunity structure illustrates how characteristics of complex institutions help generate the conditions that make political change possible.

The Congressional Opportunity Structure

In their seminal work on agenda dynamics, Baumgartner and Jones (1993) note how the committee system in Congress is one of multiple jurisdictions, a system of overlapping authority that establishes competing venues for the introduction of new issues. In their formulation, astute issue entrepreneurs manipulate policy images in ways that successfully exploit the often-ambiguous boundaries that separate committee responsibilities from one another. In so doing, entrepreneurs can shift the locus of authority for an issue toward a committee most amenable to the expansion of attention. The entrepreneurial promotion of new issues also figures prominently in King's (1997) account of congressional committee jurisdictions. According to King, congressional entrepreneurs promote new issues as a means to expand the scope of a committee's authority over a new domain and establish a precedent that will shape future legislative referrals in that area when they arise. Like Baumgartner and Jones, King sees the structure of committee jurisdictions as providing an important institutional context for the entrepreneurial pursuit of individual political goals.

More broadly, these two studies share a dynamic vision of committee jurisdictions as a complex array of overlapping authority that steadily evolves in response to a mix of external stimuli and internal competitive pressures. Such a view is at odds with a notion of committee jurisdictions as a relatively static arrangement of rules and procedures exclusively designed to further individual, collective, or partisan interests (for a review, see Groseclose and King 2001). This is not to say that these considerations are unimportant or that Congress is a jurisdictional free-for-all. Rather, as Baumgartner and Jones demonstrate through their exhaustive collection of data on congressional hearings, committee jurisdictions range widely, with pockets of clarity interspersed amidst varying degrees of jurisdictional ambiguity (Baumgartner, Jones, and MacLeod 2000). Whereas the boundaries of some committees' responsibilities clearly demarcate property rights over a narrow set of issues, many others display considerable heterogeneity and overlap with one another.

This variation in the character and scope of committee jurisdictions is important because it suggests how congressional institutions structure opportunities for the entrepreneurial introduction of new issues. Borrowing from the sociological literature on social movements, we can think of the effects of this variation as creating a congressional opportunity structure. Just as the success of social movements will reflect the structure of opportunities generated by the political context in which they operate, the successful promotion of new issues will depend on the structure of opportunities within Congress (Meyer and Staggenborg 1996; Tarrow 1996). In both contexts, jurisdictional boundaries designate units of analysis for the cross-sectional study of institutional effects. In the case of social movements, opportunities will vary across political jurisdictions, where the unit of analysis is states or nations; in the case of issue attention in Congress, we can explore how opportunities vary across committee jurisdictions.

We can think of these institutional effects in two related ways. On the one hand, institutions may erect varying barriers to entry by individuals or groups; access is

a function of the permeability of jurisdictional boundaries. In the case of social movements, political institutions may be "open" or "closed," grant access to some groups and exclude others, and incorporate dissidents or repress them (Eisinger 1973; Tilly 1978). Similarly, we can conceive of committee jurisdictions as either "open" or "closed" to the introduction of new issues, pluralistic in the representation of interests or biased toward a particular point of view (Jones, Baumgartner, and Talbert 1993). Such a view of committee jurisdictions closely resembles the contrast between an "iron triangle" and an "issue network." In the case of the former, the boundaries that demarcate membership in a policy community are clearly defined; in the case of the latter, participation is more fluid (Heclo 1978; Peterson 1993).

In addition to regulating access, institutions also generate resources for actors to pursue their goals. To understand how, it is helpful to consider the nature of political innovation within complex institutional environments. Echoing a view articulated most clearly by Schumpeter (1942), Kingdon writes that innovation is "usually recombination of old elements more than fresh invention of new ones . . . change turns out to be recombination more than mutation" ([1984] 1995, 124; for a similar view, see Polsby 1984, 171). In fact, such combinatorial acts of innovation are made possible by the complex characteristics of institutions themselves, or what March and Olsen describe as "a complicated intertwining of institutions, individuals, and events . . . nested within others with multiple overlapping connections" (1984, 734–49).

Three features of complexity are particularly important for understanding innovation. First, actors within complex systems confront multiple and heterogeneous components that can be combined and recombined in various ways. In this way, institutional complexity contributes the raw materials that make political innovation possible. Second, the manifold connections between system components make it difficult to predict ex ante how change in one component will affect other parts of the system. This uncertainty creates speculative opportunities. As the economist Israel Kirzner put it, "The scope for entrepreneurship is provided by the uncertainty of the future" (1985, 65). Third, as complexity increases, it becomes more difficult to differentiate where the boundaries of system components end and others begin. Because boundaries normally demarcate the scope of formal authority, the ambiguity characteristic of complex systems enables actors to stretch, transform, or otherwise redefine boundaries in ways that create new understandings of political authority. In this way, the heterogeneity, uncertainty, and ambiguity of complex institutions provide actors with resources for creative recombination, speculative opportunities for innovation, and the ability to redefine institutional boundaries.

We see this complexity at work in the case of Congress, and especially in the way the committee system generates resources for entrepreneurial innovations. Committees that sit at the intersection of multiple and overlapping policy domains afford entrepreneurial politicians the ability to combine existing responsibilities into new and expanded definitions of committee authority or exploit ambiguous jurisdictional boundaries in order to justify attention to a previously unexplored area of public policy. Because committees vary in the complexity of their jurisdictions, the opportunities for this kind of entrepreneurship vary as well. As King examined in his study of "turf wars," the battle over the emergent issue of magnetically levitated trains was ultimately "won" by the three committees whose jurisdiction simultaneously engaged the commercial, technological, and regulatory implications of the issue (1997, 126–36). Significantly, one of those committees was House Energy and Commerce, whose entrepreneurial chairman, John Dingell, exemplifies for King the way members exploit the complex characteristics of the committee system—heterogeneous and ambiguous jurisdictions—in their competition over turf (42–45).

To sum up, the concept of a congressional opportunity structure points to two features of committee jurisdictions that might shape the entrepreneurial promotion of new issues. First, committee jurisdictions erect barriers to the entry of new issues in congressional proceedings. Just as the entry of a new firm or product will be more difficult in a concentrated market, concentrated committee jurisdictions will erect higher barriers to the introduction of new issues than committee jurisdictions that are broadly dispersed. Second, the complex character of committee jurisdictions enables congressional entrepreneurs to introduce new issues that expand or redefine committee authority. Committees whose jurisdictions are clearly defined around a narrow band of issues will afford fewer resources and opportunities for this kind of political innovation than committees whose jurisdictions engage multiple issues and where the boundaries of authority are far from clear.

These features of the congressional opportunity structure become clearer when we put them into an operational form that lends itself to empirical analysis. One way to assess the concentration and complexity of jurisdictions is by examining the diversity of topics addressed through committee hearings. Baumgartner, Jones, and MacLeod refer to this as jurisdictional span, "the extent to which a single committee has responsibility for more than one issue" (2000, 326). We can measure this span or diversity of committee hearings with an entropy score. Based on

Shannon's (1948) path-breaking work in communication theory, entropy is calculated from the sum of the probabilities of discrete events weighted by the log of its inverse. Entropy increases along with the number of possible outcomes and as the probabilities of events become more evenly distributed. Applied to congressional committees, the diversity of jurisdiction within a given committee is expressed by the formula

$$\Sigma_i p_{ij} \times \log(1/p_{ij})$$

where p is the share of hearings held on topic i by committee j.

Measuring the entropy of committee jurisdictions captures key features of the congressional opportunity structure discussed above. First, entropy offers a statistically discerning measure of jurisdictional concentration: like the widely used Herfindahl-Hirschman Index, entropy is calculated from the proportion or share of hearings devoted to various topics.[1] Second, the entropy score taps those elements of complexity discussed above: heterogeneous jurisdictions, uncertain outcomes, and ambiguous boundaries. In terms of heterogeneity, entropy measures the diversity of system components—the raw materials for creative recombination. Because entropy increases with the range of possible outcomes, it also measures the opportunity for speculation that accompanies rising uncertainty. As Shannon put it, "There is more choice, or uncertainty, when there are more possible events" (1948, 389). Finally, as entropy increases, the clarity of a system's internal structure diminishes, and it becomes harder to differentiate among discrete components, for example, distinguishing words from a sequence of letters. This generates ambiguity and novelty, just as the apparent randomness of Joyce's language and its unique vocabulary makes possible multiple interpretations of its meaning (on entropy in language, see Shannon 1951). In sum, Shannon's entropy score offers a useful way to characterize the congressional opportunity structure for the introduction of new issues. Put simply, as committee entropy increases, jurisdictions become less concentrated and more complex, facilitating issue expansion. In this way, each committee is conceived as a unit of analysis, a venue or "space" that structures opportunities for issue attention.

Conceiving of congressional institutions in this manner has implications for how we understand the effects of structure on politics and public policy. Central to the concept of a congressional opportunity structure is the notion that committee jurisdictions are not uniform. Whereas some committees maintain relatively homogeneous jurisdictions and a degree of redundancy in issue attention, others have more complex jurisdictions characterized by a diversity of issue attention. Because of these manifold qualities, issue attention will be contingent upon the characteristics of specific policy domains and the manner in which they engage particular committee jurisdictions. Whereas some issues will touch upon multiple jurisdictions, sparking entrepreneurial "turf wars" as King (1997) described, others will not, instead falling within the purview of well-defined committee jurisdictions that offer few opportunities for issue entrepreneurship.

Therefore, to understand the relationship between congressional politics and policy agendas, we should remain sensitive to the degree of fit between issues and opportunity structures. However, with few exceptions, students of American politics generally do not consider how institutional effects might vary from issue to issue.[2] This problem is particularly acute in the study of Congress, where debates tend to focus on general theories of legislative organization supposed to hold across all domains of congressional activity. However, as one congressional scholar cautions, "The complex environment [in Congress] cannot be captured by any single-motivation [or] universal perspective" (Rohde 1995, quoted in Hurwitz, Moiles, and Rohde 2001). Moreover, scholars who adopt a more catholic approach to the study of Congress have found that key features of the institution vary across specific issue contexts (see, for example, Hurwitz, Moiles, and Rohde 2001 and Whitby and Krause 2001).

This article adopts a similar strategy by examining the pattern of hearing activity to biotechnology issues over a 30-year period. By focusing on a single policy area, it is possible to conduct a fine-grained analysis into the dynamics of issue attention that is sensitive to the complexities of congressional institutions and the varying opportunities for issue entrepreneurship generated by the committee system. As the next section describes, biotechnology offers a particularly useful case to probe the effects

[1] As a measure of market concentration, the Herfindahl Index is calculated from the sum of the squares of each firm's market share. Political scientists have employed a similar measure to evaluate committee jurisdictions (Baumgartner, Jones, and MacLeod 2000; Hardin 1998). Jones and Baumgartner (2005) point out that both an entropy score and Herfindahl Index are based on similar aspects of concentration, but the entropy score is a more sensitive measure, particularly at lower levels of concentration. Talbert and Potoski (2002) have also employed an entropy score to measure the diversity of the legislative agenda.

[2] An important exception is the scholarship on the two presidencies that examines differences across foreign and domestic policy domains in presidential relations with Congress. For a recent discussion, see Marshall and Pacelle (2005).

of the congressional opportunity structure on the dynamics of issue attention.

Congressional Attention to Biotechnology

Biotechnology as a Case Study

In his elaboration of a frequently used mode-of-analysis, Gerring defines a case study as "an intensive study of a single unit for the purpose of understanding a larger class of (similar) units" (2004, 342). Following this definition, an intensive examination of biotechnology will help shed light on the relationship between the congressional opportunity structure and issue attention. An important consideration, as Gerring points out, is the degree to which a single unit is representative of a larger class of phenomenon (328). Therefore, as a preliminary step, it is important to consider just what biotechnology is an example of and what it potentially contributes to our understanding of issue attention in Congress. A brief narrative account of the biotechnology issue can help illuminate these questions.

Biotechnology includes a variety of techniques that make use of the growing knowledge and understanding of deoxyribonucleic acid (DNA), the genetic material for all living organisms. These techniques include the capacity to splice and transfer genes from one organism to another, to sequence and identify the genetic determinants of disease, and to create genetically identical organisms, or clones. There has been a broad range of applications of these techniques in agriculture, industry, and medicine. Some of these applications have reached the commercial stages, as with crops genetically modified for particular traits or medicines that switch "on" or "off" particular genes associated with disease; others remain at the frontier of research, such as regenerative therapies using stem cells to replace damaged tissues with new ones.

The wide variety of biotechnology applications has prompted a corresponding range of policy issues before Congress in areas such as regulation, civil rights, and federal research funding. In the 1970s, when scientists began to develop the capacity to manipulate genetic material and foresee its commercial use, congressional attention focused on the possible hazards biotechnology posed for human health or the environment. Early hearings, for example, addressed the potential risks of genetic modification and the adequacy of federal rules on laboratory containment and research oversight. Congressional concerns about environmental risks continued through the 1980s as the Reagan administration hammered out administrative procedures for the regulation of the first commercial biotechnology products. In the 1990s, however, congressional attention turned toward the ethical implications of biomedical research. The prospect of unlocking the genetic determinants of diseases such as cancer or Alzheimer's prompted a number of hearings about the misuse of genetic information and the potential for genetic discrimination in insurance or employment. Scientific breakthroughs in the late 1990s such as the successful cloning of a sheep in Scotland and the derivation of human embryonic stem cells in the United States raised new ethical issues, prompting a series of congressional hearings on cloning and stem cells. The 2001 decision by the Bush administration to limit federal funding for embryonic stem cell research helped to fuel the controversy and prompted continued debate on the role of federal funding in human genetics research (see Sheingate 2006 for a more detailed discussion).

Three elements of this brief narrative bear upon the utility of biotechnology as a case study of issue attention. First, it is possible to identify the emergence of biotechnology as a topic of congressional hearings in the 1970s. Second, this attention was driven, at least in part, by events external to Congress, such as the development of laboratory techniques for recombinant DNA research, the appearance of the first commercial biotechnology products, and the discovery of human embryonic stem cells. Third, the content of the congressional agenda has varied over time, often punctuated by these external events as Congress shifted its focus from laboratory safety in the 1970s to environmental risks and commercial regulation in the 1980s and, more recently, the ethical implications of biomedical research and federal funding in the 1990s.

These features make biotechnology a useful case study to explore the dynamics of issue attention. Recalling our discussion of political innovation above, biotechnology displays characteristics that render the issue an attractive domain for congressional entrepreneurs. In particular, the multiple and varied applications of biotechnology in industry, agriculture, and medicine, as well as the uncertainty surrounding its risks and benefits, make possible numerous issue definitions along with competing claims to jurisdiction over biotechnology matters. In fact, punctuations in the congressional biotechnology agenda often display this kind of competition. For example, in the five years after the Dolly announcement in 1997, four House committees and two Senate committees held 15 hearings on human cloning and the related issue of stem cell research.[3] Moreover, changes in the biotechnology agenda

[3]Calculated from author's database of biotechnology hearings (see appendix).

provide an important source of variation with which to examine the pattern of congressional attention and the corresponding character of committee jurisdictions.

Analysis of Biotechnology Hearings: Data and Method

To examine the relationship between committee structure and issue attention, congressional hearings held on biotechnology subjects since the early 1970s were identified using the CIS Index on Lexus-Nexus. This search yielded 130 House and Senate hearings on biotechnology held over 179 days between 1972 and 2001. For congressional hearings up to 1999, a dataset using the Policy Agendas Project hearings data was created that included information such as the hearing date, the number of hearing days, and the committee holding each hearing.[4] With the help of a research assistant, each CIS hearing summary was coded using a coding scheme initially developed for a content analysis of print media that included a range of biotechnology-specific topics, such as genetic privacy or stem cell research (for details, see Gaskell and Bauer 2001, 321–24). As described in the appendix, this coding yielded hearings on six broad subject areas of biotechnology: genetically modified organisms, biomedical research, genetic information, economic development, general research and regulation, and cloning and stem cells. Following work by Bauer (2002), who found notable differences in the framing of medical and agricultural biotechnology in his study of British media coverage, each CIS hearing summary was also coded according to whether or not it was exclusively medical in focus (that is, human applications or implications of biotechnology). By dividing hearings in this manner, it is possible to assess how the dynamics of issue attention varies across medical and nonmedical biotechnology applications (further details are in the appendix).

The concept of a congressional opportunity structure sees each committee as a potential venue for the introduction of new issues. Consequently, the hearing data are arranged as a panel, or time-series cross-section, with 32 standing committees as cross-sectional units observed over 30 years, yielding an N of 960 (32 × 30) committee-years. Whether a committee will be a hospitable venue for the introduction of new issues will depend, in part, on the character of its jurisdiction. As described above, an entropy score measures the concentration and complexity of committee jurisdictions based on the share of hearings devoted to various issues. Accordingly, an entropy score (*Committee Entropy*) was calculated for each of the 32 committees in the House and Senate for each year between 1972 and 2001 using the Policy Agendas Project database of congressional hearings and its coding system of 21 different policy domains (see Baumgartner, Jones, and Wilkerson 2002 for a list of topics). In order to avoid reverse causation, the 130 biotechnology hearings were excluded from the nearly 29,000 hearings used to calculate the entropy for each committee-year. It is hypothesized that committees with jurisdictions that are less concentrated and more complex will hold more days of hearings on biotechnology (*Hearing Days*), other things being equal.

To test this hypothesis, other variables were included that might affect congressional attention, such as whether a particular committee is likely to hold a hearing on biotechnology. Obviously, not every committee will be active on these issues; in fact, 12 of the 32 committees never held a biotechnology hearing during the entire 30-year period. This is because the jurisdictions of some committees are simply too far removed from biotechnology issues to reasonably hold a hearing on the subject. Following work by King (1997, 127), the "proximity" of each committee to biotechnology issues was measured by reading the description of its jurisdiction published in Rule X of the *Rules of the House of Representatives* and Rule XXV of the *Standing Rules of the Senate*. Based on this reading of formal or "statutory" jurisdiction, each committee received one point if it had a plausible claim to any one of six biotechnology subject areas described above: genetically modified organisms, biomedical research, genetic information, economic development, general research and regulation, and cloning and stem cells.[5] This proximity score (*Biotech Proximity*) is expected to be positively associated with hearing activity: committees with a more proximate jurisdiction to biotechnology should hold more days of hearings, other things being equal.

[4]These data 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 from its website, http://www.policyagendas.org. Neither NSF nor the original collectors of the data bear any responsibility for the analysis reported here. For hearings after 1999, a research assistant manually entered this information from the CIS hearing summary.

[5]The same method is used to assess committee proximity to medical and nonmedical issues. For medical-only issues, committee proximity is based on whether a committee's statutory jurisdiction included biomedical research, genetic information, or stem cells and cloning. For proximity to nonmedical issues, it was determined if committee jurisdiction encompassed genetically modified organisms, economic development, or general research and regulation. Details on these biotechnology subject areas can be found in the appendix.

Another structural feature considered is whether issue attention reflects any chamber-specific characteristics of the House or Senate. Although chamber rules and procedures likely structure the opportunities for the promotion of new issues, theoretical expectations about the effects of chamber differences are far from clear. For example, although the smaller size of the Senate means that nearly every senator enjoys an institutional power base to call hearings as the chair or ranking minority member of a committee or subcommittee, the individualistic character of the chamber allows senators to shape the dynamics of issue attention whether they sit on a particular committee of jurisdiction or not. As an empirical matter, the Policy Agendas Project data reveal that more hearings take place in the House than in the Senate, and it is also the case that nearly two-thirds of all biotechnology hearings were held in the House, a ratio that is very close to the overall pattern of hearing activity during this period. Consequently, the dummy variable *House Committee* is included. For similar reasons the variable *Election Year* is also included in order to control for the tendency of greater hearing activity in odd-numbered years.[6] It is expected that the variable House Committee will be positively associated and the variable Election Year negatively associated with the number of biotechnology hearing days.

A fourth factor that will likely shape issue attention is partisan context. Although biotechnology itself is not necessarily a partisan issue, various biotechnology applications certainly engage party cleavages in different ways. Consequently, changes in attention to biotechnology over time may reflect the fit between particular issues and the changing partisan context in Congress. For instance, hearings on the environmental risks of genetically modified organisms may be more frequent when there are more Democrats in Congress. Conversely, attention to the ethical implications of cloning and other medical biotechnology applications may be greater when Republicans are in control. To capture these partisan effects, the median ideological position in each chamber was calculated using DW-Nominate scores for each Congress between 1972 and 2001, standardized so each chamber median has a mean of 0 and a standard deviation of 1 (Poole and Rosenthal 1997). It is expected that the standardized Nominate score (*Median Ideology*) will be positively associated with hearings on medical biotechnology and negatively associated with hearings on nonmedical applications. However, the strength of this association may be rather weak due to the mixture of issues that fall within the medical and nonmedical categories.[7]

Finally, as noted above, scientific breakthroughs and other technological developments have frequently prompted congressional attention to biotechnology. In order to capture the effects of these external events, the annual number of *New York Times* articles with a substantive focus on biotechnology for the years between 1972 and 2001 is included. Because the data for *Times* coverage are also coded according to biotechnology topics, it is possible to distinguish between stories on medical and nonmedical applications using the same subject areas for hearings and jurisdictional proximity.[8] Although the question of media influence on the congressional agenda is an important one, my interest here is mainly as a control (for more on the press/policy connection, see Nisbet and Huge 2006). Nevertheless, a positive relation is expected between news coverage (*NYT Stories*) and hearing activity. Period fixed effects are also included to absorb any other time-varying influences on the congressional agenda.[9]

Table 1 lists summary statistics for all committee-years, broken down by issue area. As indicated by the reported means for Hearing Days, congressional activity in biotechnology is rather infrequent. In most years, only one or two committees will hold hearings on biotechnology, and even less when divided into medical and nonmedical issue areas. Consequently, zeroes make up more than 90% of the observations, an important feature of the data that will be addressed in detail below.

To gain a clearer picture of biotechnology hearings themselves, Table 2 presents summary statistics for only those observations in which biotechnology hearings took place (that is, $y > 0$). In particular, Table 2 points toward several significant differences between medical and nonmedical hearings. For example, committees that were active in medical biotechnology had more complex jurisdictions (higher entropy scores) than committees holding hearings on nonmedical issues. By contrast, the formal or statutory authority of committees engaged in nonmedical hearings was closer to biotechnology issues (higher

[6]Between 1972 and 2001, 60% of all congressional hearings took place in the House, and 55% of all hearings took place in nonelection years (calculated from hearing data downloaded at http://www.policyagendas.org).

[7]As indicated in the appendix, both medical and nonmedical biotechnology issues are rather heterogeneous. Although more hearings on stem cells or cloning are expected in a conservative Congress, the effect of partisan context on issues such as genetic privacy or human genome research is less clear. Similarly, Democrats may be more likely to hold hearings on genetically modified organisms, but the partisan implications for other nonmedical issues such as general DNA research are less clear.

[8]See Ten Eyck and Williment (2005) for details on data collection and coding of media coverage. The original collectors of the data bear no responsibility for the analysis reported here.

[9]These are dummy variables for each five-year period between 1972 and 2001, excluding the 1997–2001 period as the base category.

TABLE 1 Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
All Hearings				
Hearing Days	0.19	0.76	0	12
Committee Entropy	0.69	0.22	0.08	1.20
Biotech Proximity	2.03	1.74	0	6
NYT Stories	170.73	144.87	12	499
Median Ideology	−0.14	0.92	−1.26	1.64
Election Year	0.50	0.50	0	1
House Committee	0.53	0.50	0	1
Nonmedical				
Hearing Days	0.10	0.58	0	12
Biotech Proximity	1.44	1.00	0	3
NYT Stories	93.37	89.73	0	329
Medical Only				
Hearing Days	0.09	0.43	0	5
Biotech Proximity	0.59	0.93	0	3
NYT Stories	77.37	67.02	5	239

Note: Summary Statistics for Committee Entropy, Median Ideology, Election Year, and House Committee do not vary across topics; N = 960.

TABLE 2 Characteristics of Biotech Hearings (Nonzero Observations)

Variables	All	Medical Only	Nonmedical
Hearing Days	1.92	1.62	1.79
Committee Entropy[a]	0.78	0.82	0.75
Biotech Proximity[a]	3.97	1.79	2.60
NYT Stories	232.55	121.75	105.57
Median Ideology[a]	−0.03	0.24	−0.24
House Committee	0.65	0.62	0.72
Election Year	0.46	0.46	0.43
Observations	93	52	53

Note: Committees that held hearings on both medical and nonmedical issues are treated as separate observations in columns two and three. As a result, the sum of these observations is greater than the number of observations in column one. All cell entries are means.

[a]Two sample t test comparison of means of medical and nonmedical hearings significant at $p < .05$.

proximity scores) than the counterpart committees holding medical hearings. Finally, Table 2 also indicates differences in the partisan context of hearing activity, with attention to nonmedical issues concentrated in years of Democratic control and attention to medical issues in years of Republican control of Congress.

To analyze these differences more closely, a generalized (GEE) negative binomial regression was estimated on the number of hearing days devoted to biotechnology by each standing committee in the House and Senate between 1972 and 2001.[10] The generalized model estimates the marginal or population-averaged effect of the covariates on the dependent variable, that is, the effect of changes in covariates averaged across units, in this case committees. Substantively, this models the overall effect of the congressional opportunity structure on hearing activity: whether committees with high entropy scores hold more hearings than committees with low entropy scores. If the question was instead whether changes in jurisdictional complexity *within* a particular committee had an effect on hearing activity, then a cluster-specific (i.e., random or fixed-effects) approach would be more appropriate (Zorn 2001, 474–75). Finally, the estimation includes an AR (1) autocorrelation structure to account for serial correlation within each unit and robust standard errors clustered on individual committees.[11]

Table 3 contains results for all hearings, medical-only hearings, and nonmedical hearings. The coefficients for Committee Entropy are the expected sign and, in the case of medical hearings, statistically significant. In other words, committees with less concentrated, more complex jurisdictions held more hearings on biotechnology. In addition, the coefficients for Biotech Proximity are positive and statistically significant in all three models. That is, formal or statutory authority over biotechnology issues is also positively associated with hearing activity. The coefficients for Median Ideology, a standardized Nominate score, are negative, suggesting that attention to biotechnology decreases as the House and Senate become more conservative. This is in line with expectations for nonmedical issues, the coefficient for which approaches conventional significance levels, but is contrary to expectations for medical-only hearings. Media coverage (NYT Stories) is positively associated with hearing activity for all hearings, but the sign is negative when hearings are broken down by subject area. One possible explanation is that

[10]The negative binomial was chosen rather than a Poisson distribution for two reasons. First, Table 1 indicates overdispersion (variance greater than the mean) of the dependent variable, Hearing Days, a feature of the data confirmed by a likelihood ratio test comparing the negative binomial and Poisson models. Second, due to the nature of biomedical breakthroughs and jurisdictional competition, it is unlikely that the probability of a biotechnology hearing is identical for every year, or that the occurrence of a hearing has no effect on the probability of another hearing taking place, either in another committee or in the same committee in a subsequent year. This overdispersion, heterogeneity, and contagion of biotechnology events violate assumptions of Poisson distributions (King 1988, 1989).

[11]A Wooldridge test indicated a possibility of first-order autocorrelation. All equations in Table 3 were estimated using Stata 8.2 command *xtnbreg*.

TABLE 3 Congressional Attention to Biotechnology (GEE Negative Binomial Regression Results)

	Dependent Variable: Hearing Days		
	All Hearings	Medical Only	Nonmedical
Committee Entropy	1.749	4.305	1.073
	(1.251)	(1.532)***	(1.202)
Biotech Proximity	0.644	0.773	1.856
	(0.151)***	(0.188)***	(0.272)***
NYT Stories	0.002	−0.001	−0.000
	(0.001)	(0.007)	(0.002)
Median Ideology	−0.493	−0.229	−0.666
	(0.210)**	(0.212)	(0.373)*
Election Year	−0.307	0.017	−0.508
	(0.190)	(0.379)	(0.270)*
House Committee	1.009	0.253	1.949
	(0.502)**	(0.550)	(0.316)***
Constant	−4.824	−5.027	−7.452
	(0.912)***	(1.436)***	(1.375)***
Wald test ($x^2(11)$)	275.36***	242.93***	1163.39***
LR test ($\alpha = 0$)	90.19***	42.18***	44.49***
Observations	960	960	960

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; estimated with AR(1) autocorrelation structure and standard errors clustered on individual committees. All models include five-year period fixed effects.

the inclusion of period fixed effects soaks up most of the effects of exogenous events on hearing activity. The Wald statistic at the bottom of Table 3 provides some measure of overall model fit; a significant test statistic rejects the null hypothesis that all 11 coefficients are simultaneously equal to zero.[12] Finally, the likelihood-ratio test provides strong evidence for the negative binomial regression over a standard Poisson model.[13]

Table 3 also reveals notable differences across biotechnology applications, especially in terms of the magnitude of effects. For example, for a one standard deviation increase in Committee Entropy, overall hearing activity increases by a factor of 1.5, medical hearing days by a factor of 2.6, and nonmedical hearing days by a factor of 1.3, holding all other variables at their mean. In other words, the predicted effect of increasing jurisdictional complexity on hearing activity is about twice as great for medical than it is for nonmedical biotechnology issues. The pattern is quite different for Biotech Proximity. The predicted effect of a one-unit change, or one additional biotechnology subject area falling within a committee's statutory jurisdiction, is almost three times greater for nonmedical hearings than it is for medical biotechnology issues (an increase by a factor of 6.4 for nonmedical issues versus a factor of 2.2 for medical issues).[14] One interpretation of these results is that for nonmedical issues the content of formal or "statutory" committee authority is much more important for hearing activity than jurisdictional complexity. Meanwhile, for medical issues it is the scope as well as the content of committee jurisdiction that apparently matters.

Holding all variables at their mean, the predicted average rate of hearing activity for each committee year is .059 days for all hearings, .021 days for medical-only hearings, and .013 days for nonmedical hearings. These low values reflect the relatively infrequent occurrence of

[12]A Wald test is asymptotically equivalent to a likelihood-ratio test for model fit. See Zorn (2001, 476–77) for a discussion of the limitations on summary goodness-of-fit statistics for GEE models.

[13]Specifically, a statistically significant test statistic rejects the null hypothesis that the data conform to a Poisson distribution in which the dispersion parameter $\alpha = 0$. For details, see Long and Freese (2006, 376–77, 407–8).

[14]The formula for a standardized factor change, or a standard deviation change in variable x_k, is $\exp(\beta_k \times s_k)$. The formula for a factor change, or a unit change in variable x_k, is $\exp(\beta k)$. On interpreting results for event count models, see Long and Freese (2006, 359–61).

biotechnology hearings: as mentioned above, zeroes make up over 90% of the observations. As Zorn (1998, 388) points out, the low predicted rate needed to account for data with large numbers of zeroes makes substantive interpretations more difficult.

One way to address data problems of this kind is with a zero-inflated model in which nonevents (the zeroes) are generated by two distinct processes (Zorn 1998). First, the model estimates the probability that the event count is always zero, in this case that a committee *never* holds a hearing on biotechnology. In the second stage, the model estimates the event count once this threshold has been crossed, that is, a committee *may* hold a hearing. The first phase, or transition stage, is modeled as a binary outcome using a logit model and the second phase, or event stage, is modeled using a Poisson or negative binomial regression. In terms of understanding congressional attention to biotechnology, a zero-inflated model can help distinguish the committees that never hold a hearing from the committees that sometimes hold a hearing, and, more importantly, the variables associated with membership in each group. More broadly, it offers a particularly intuitive approach to study issue attention in Congress. Whereas the transition stage approximates an agenda-setting phase in which new issues may cross the threshold on to the congressional agenda, the events stage approximates an attention phase in which issues that reach the agenda receive varying levels of consideration.

Table 4 contains the results of a zero-inflated model for all hearings, medical-only hearings, and nonmedical hearings. The top half of Table 4 lists coefficients for the event stage; the bottom half lists coefficients for the transition stage.[15] As indicated, many of the coefficients for the same variables in the top and bottom of Table 4 have the opposite sign. In fact, this makes substantive sense (Long and Freese 2006, 398–400). Because the transitional logit is modeling the likelihood that a committee never holds a hearing, a positive coefficient indicates that a variable is associated with membership in this group. Conversely, a negative coefficient suggests a decreased likelihood that the dependent variable is always zero (in other words, an *increased* likelihood that some hearings may occur). As a result, variables associated with greater hearing activity (positive coefficients in the count model) will often have a negative coefficient in the logit model, and vice versa, although this is not always the case.

For example, the logit coefficients for Biotech Proximity are negative and statistically significant in all three models. Interpreted as a change in the odds, this means that for a one-unit increase in proximity, the likelihood of never holding a hearing decreases dramatically: 67% for all hearings combined, 84% for medical-only hearings, and 94% for nonmedical hearings, holding all other variables constant.[16] However, the effects of Committee Entropy at the transition stage are less clear. None of the logit coefficients in the bottom half of Table 4 achieves statistical significance, and the coefficient for all hearings is positive rather than negative as expected. Finally, the transitional logit coefficient for NYT Stories approaches statistical significance for overall hearing activity, as does the coefficient for Median Ideology for nonmedical hearings. For media coverage, the results suggest that an increase in *New York Times* stories does raise the overall likelihood that some hearings will occur. Conversely, the positive coefficient for Median Ideology suggests that a rightward shift in the chamber median diminishes the likelihood that any hearings will take place, especially those on nonmedical subjects.

Turning to the event stage reported in the top half of Table 4, similar contrasts are also evident. None of the coefficients for Biotech Proximity reaches conventional significance levels and the direction for medical-only hearings is negative, suggesting that committees with formal jurisdictions further removed from medical biotechnology are more active than those with a statutory claim to the issue. Turning to the effects of Committee Entropy, however, the coefficient for medical hearings is significant, and it approaches conventional significance for all hearings combined. The resulting effect of a one standard deviation increase in Committee Entropy is a 42% rise in the number of overall hearing days and an 82% increase in the number of medical hearing days.[17] However, the results also predict a 17% *decrease* in nonmedical hearing activity for a similar change in Committee Entropy. In other words, whereas in medical issues greater hearing activity takes place in committees with broad jurisdictions, committees with narrower jurisdictions appear to be more active in nonmedical issues.

Two important conclusions can be drawn from these findings. First, different processes appear to be at work in the agenda setting and issue attention phases of congressional hearing activity. Indeed, one of the benefits of the zero-inflated model is that it distinguishes between factors

[15] All equations in Table 4 used the Stata command *zinb*, included a lagged dependent variable to address serial correlation and used robust standard errors clustered on individual committees to address spatial correlation. The Vuong test indicates that the fit of the zero-inflated model was significantly better than a standard negative binomial (see Long and Freese 2006, 408).

[16] The percent change in the odds of a unit change in variable k is $100[\exp(\beta_k) - 1]$.

[17] The percent change of a standard deviation change in variable k is $100[\exp(\beta_k \times s_k) - 1]$.

TABLE 4 Congressional Attention to Biotechnology (Zero-inflated Negative Binomial Regression Results)

	Dependent Variable: Hearing Days		
	All Hearings	Medical Only	Nonmedical
	Event Stage (Negative Binomial Model)		
Committee Entropy	1.604	2.736	−0.877
	(0.904)*	(1.343)**	(1.379)
Biotech Proximity	0.002	−0.152	0.462
	(0.109)	(0.100)	(0.328)
NYT Stories	−0.001	0.007	−0.001
	(0.002)	(0.008)	(0.002)
Median Ideology	0.074	0.066	−0.323
	(0.203)	(0.291)	(0.416)
Election Year	−0.283	−0.069	−0.227
	(0.212)	(0.406)	(0.264)
House Committee	0.765	0.196	2.078
	(0.346)**	(0.317)	(0.363)***
Lag Days	−0.061	−0.155	−0.173
	(0.053)	(0.199)	(0.034)***
Constant	−0.943	−2.913	−1.837
	(0.672)	(2.280)	(0.944)*
Wald test ($x^2(12)$)	284.94***	1557.70***	2342.03***
	Transition Stage (Logit Model)		
Committee Entropy	0.620	−0.484	−2.395
	(1.258)	(2.363)	(2.038)
Biotech Proximity	−1.100	−1.858	−2.799
	(0.199)***	(0.430)***	(0.825)***
NYT Stories	−0.007	0.018	−0.003
	(0.004)*	(0.017)	(0.006)
Median Ideology	1.149	0.465	1.159
	(0.707)	(0.692)	(0.699)*
Election Year	−0.035	−0.126	0.292
	(0.531)	(0.618)	(0.558)
House Committee	−0.442	−0.708	0.165
	(0.417)	(0.796)	(0.767)
Lag Days	−1.779	−13.917	−1.138
	(0.385)***	(31.156)	(0.820)
Constant	5.165	0.594	7.744
	(1.764)***	(3.878)	(4.024)*
Vuong statistic	5.20***	3.93***	3.47***
Log likelihood	−307.48	−178.90	−181.03
Observations	960	960	960

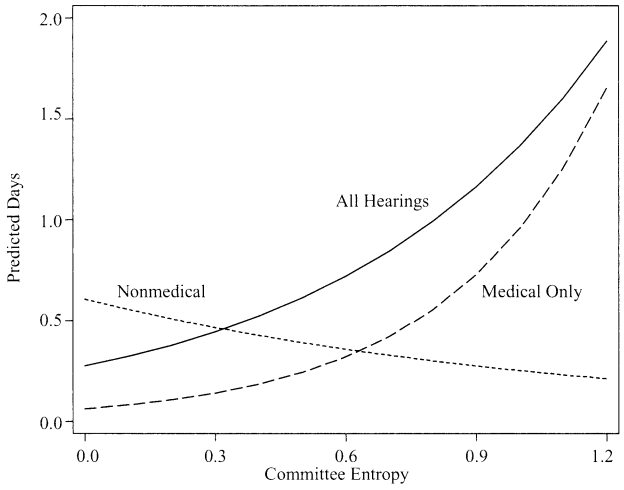
Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; standard errors clustered on individual committees. All models include five-year period fixed effects.

associated with whether a committee becomes active in biotechnology at all (the transition stage) from the factors that shape the level of attention paid to biotechnology once this threshold has been crossed (the event stage). As one might expect, the likelihood that a committee ever becomes involved in a particular issue depends on the statutory or formal content of its jurisdiction. The findings for the transition stage provide strong evidence that the

committees with formal jurisdictions far removed from the issues (low proximity scores) were much less likely to ever hold a hearing on biotechnology. However, for those committees likely to hold at least some hearings on the subject, the event stage results suggest that the complexity of jurisdiction (Committee Entropy) was an important factor shaping the amount of attention paid to biotechnology, especially for medical applications. Put differently, formal authority may influence whether a committee becomes involved in an issue at all, but once this threshold is crossed, committees with complex jurisdictions apparently afford a more hospitable environment for the expansion of attention to new issues.

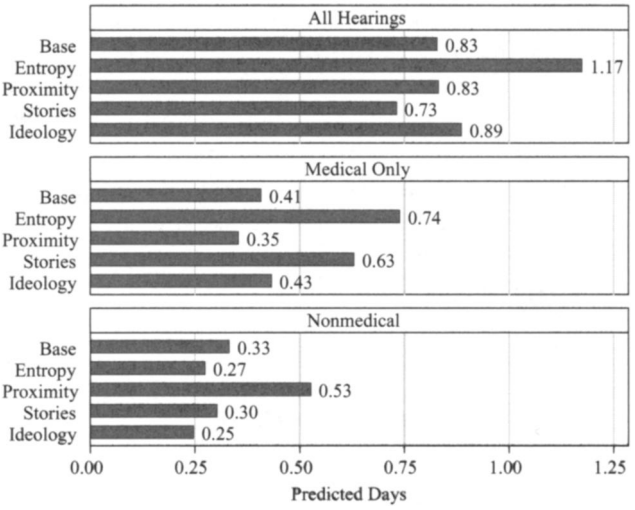
Second, the results in Table 4 indicate that these effects vary considerably across issue areas, even within a single policy domain like biotechnology. Figure 1 illustrates this by looking at the effect of Committee Entropy on the predicted number of hearing days. Again, the event stage of the model generates results for those committees likely to hold at least some hearings on biotechnology. Overall, and in the case of medical hearings more specifically, a committee with higher entropy scores held an average of 1.5 more days of hearings each year than did committees with lower entropy scores, with all other variables held at their mean. In the case of nonmedical hearings, however, the relationship between jurisdictional complexity and hearing activity is a slightly negative one. Committees with higher entropy scores held an average of .4 fewer days of hearings per year than did committees with lower scores.

FIGURE 1 Predicted Effect of Committee Entropy on Hearing Days



Note: Results from event stage of zero-inflated model. Base values calculated with all variables held at their mean.

FIGURE 2 Effect of One Standard Deviation Change on Hearing Days



Note: Results from event stage of zero-inflated model. Base values calculated with all variables held at their mean.

Figure 2 examines these differences further by illustrating the predicted effects of a one standard deviation change in several independent variables compared to a base level when all variables are at their mean. These results are also from the event stage of the model, and the standard errors of some variables should temper our confidence in their predicted effects. As mentioned above, a one standard deviation increase in Committee Entropy has a sizeable positive effect overall and for medical-only hearings especially, but a moderate negative effect for nonmedical hearings. Conversely, Biotech Proximity has a negligible effect on overall hearing activity, a moderately negative effect for medical hearings, but a sizeable positive effect for nonmedical hearings. Figure 2 also indicates notable differences in the predicted effects of media coverage and chamber ideology. A one standard deviation increase in NYT Stories has a small negative effect overall and for nonmedical issues, but a sizeable positive effect for medical-only hearings. Finally, whereas a one standard deviation shift to the right in Median Ideology has a small positive effect overall and in medical issues, it has a large negative effect in nonmedical hearings.

Together, Figures 1 and 2 suggest that different political and institutional dynamics are indeed at work in shaping congressional attention to medical and nonmedical biotechnology. For nonmedical issues like GM foods, intellectual property rights, or general biotechnology research, the statutory authority or formal content of committee jurisdiction appears to be more important than its

scope in shaping issue attention. In addition, the effects of media coverage are rather muted and increasing conservatism has had a dampening effect on hearing activity. By contrast, for medical biotechnology issues like stem cells, cloning, or genetic privacy, the complexity of committee jurisdiction is more important than its content, media coverage apparently fuels the competitive dynamics of issue attention, and partisan context has had only a modest positive effect on hearing activity. In sum, the congressional opportunity structure for issue attention varies considerably between medical and nonmedical biotechnology applications.

Conclusion

Attention to new issues within Congress will depend, in part, on the character of committee jurisdictions. As one might expect, the proximity of a committee's jurisdiction to a potential issue will increase the likelihood of hearing activity, other things being equal. In addition, however, the scope of committee jurisdiction also matters. Just as it may be easier to introduce a new product in a less concentrated market, so it seems it is easier to promote a new issue within a committee with a less concentrated jurisdiction. Put differently, committees with complex jurisdictions appear to offer would-be entrepreneurs with greater resources and opportunities to introduce new issues that further stretch the boundaries of committee authority.

Critically, however, the effects of jurisdictional proximity and scope varied considerably between medical and nonmedical issues. Recalling Jones, Baumgartner, and Talbert's (1993) discussion of issue monopolies in Congress, these findings suggest that whereas medical issues are subject to the competitive dynamics of multiple jurisdictions, nonmedical issues are more tightly controlled within well-defined committee domains. These differences, in turn, help explain why medical biotechnology is also sensitive to media coverage, or why partisan context is important in nonmedical biotechnology issues where committees with formal jurisdiction exert tight control over congressional proceedings. In sum, differences between medical and nonmedical hearings reflect the influence of the congressional opportunity structure on issue attention in Congress.

Given the exclusive focus here on biotechnology, it is important to consider whether this analysis can be profitably extended to other policy areas. Although this awaits future research, there are two reasons to believe that the method employed here can be applied fruitfully elsewhere. First, one of the signal contributions of the work by Baumgartner and Jones is the collection of detailed data on the entire postwar congressional policy agenda. As a result, it is possible to construct unique datasets for particular policy areas of interest to the analyst. Second, the availability of statistical techniques that can address data of this kind helps considerably with the analysis of issue attention in Congress. Specifically, zero-inflated models offer a particularly intuitive approach as they allow one to distinguish between those factors that shape agenda setting, whether an issue is considered at all, from those factors related to the level of attention, or how much consideration an issue is accorded in congressional hearings.

In proceeding in this direction, it is important that due consideration be given to the issue chosen for study. Indeed, the concept of a congressional opportunity structure implies that institutional effects will vary across issue domains. And, as examined here, notable variation may be evident within single policy domains. Consequently, general theories of legislative organization should be approached with some caution since the effects of structure on outcomes may vary considerably from issue to issue. In the case of biotechnology, the issue is relatively novel, it engages multiple policy dimensions, and forces policymakers to grapple with a high degree of uncertainty in addressing risks and benefits. In this regard, other science and technology issues might follow a similar pattern of issue attention. On the other hand, issues of low dimensionality and/or uncertainty might exhibit more immunity to entrepreneurial issue promotion. However, the findings here suggest that it is the degree of fit between these kinds of issue characteristics and the congressional opportunity structure that matters since hearing activity will be greater when issues engage committees with complex jurisdictions.

Although such extensions are possible, and desirable, we should not dismiss the benefits of single-issue studies for their own sake. Just as political scientists aspire to apply the knowledge of voting behavior to particular elections, we should attempt to apply our knowledge of politics to particular policies. In the case of biotechnology, the findings here shed light on an intriguing puzzle. In the United States, medical biotechnology issues, such as stem cell research or access to genetic information, have generated far more political controversy than nonmedical issues, notably those related to genetically modified foods and crops. These differences cannot be attributed to media salience or partisan context alone. In addition, the analysis here points toward the importance of the institutional context in which different biotechnology debates take place. Whereas medical issues

fell within the ambit of committees with complex jurisdictions, nonmedical issues engaged committees where the formal or statutory content of committee authority weighed heavily on hearing activity. This may explain why medical biotechnology issues appear highly politicized, or why opponents of some applications, such as genetically modified food, have failed to gain much traction on these issues.

Finally, attention to the role of opportunity structure in shaping issue attention highlights the interaction between actors and institutions in the process of political change. Admittedly, the emphasis here on the effects of committee jurisdiction reveals more about structures than agents. Further research is needed to bring our understanding of institutions closer together with the study of individuals, to see, for example, whether members of committees with broad jurisdictions engage in entrepreneurial activities more frequently than their colleagues on other committees. However, it is the overall character of the committee system that affords entrepreneurs varying opportunities for the introduction of new issues. As scholars rightly point out, institutions are designed to impose order. It is also worth remembering that the manifold connections and overlapping institutions of the American political system are far from orderly. It is this distinct lack of orderliness, the aggregate effects of complex authority, which make political innovation possible.

Appendix

Data Sources and Coding

To identify hearings, a keyword search of the CIS Index on Lexus-Nexus (http://web.lexis-nexis.com/congcomp/form/cong/s_subject.html) was performed using the following keywords: biotechnology or genetic* or DNA or genome. This search yielded 191 House and Senate hearings between 1970 and 2002. Because keyword searches of this kind often include hearings that do not directly relate to the intended subject, hearings not directly related to biotechnology policy, such as general NIH appropriations hearings that did not address biotechnology explicitly, were discarded (for a discussion of problems of this kind, see Baumgartner, Jones, and Wilkerson 2002, 41).

Biotechnology Topics

To identify biotechnology topics, a coding scheme developed by the Life Sciences in European Society (LSES) project, a research program funded by the European Commission to examine public perceptions of biotechnology, was used (see Gaskell and Bauer 2001, 321–24). Together with a research assistant, all hearings were coded using 39 different possible themes. After this initial coding yielded 55% agreement, discrepancies were examined and then a final coding resulted in 22 biotechnology topics. Subsequently, the 22 topics in the dataset were aggregated into six different biotechnology groups listed below.

Following the work of Bauer (2002), biotechnology hearings were divided between medical and nonmedical subjects by rereading the CIS summary. Medical hearings include exclusively human applications or implications of biotechnology. Nonmedical hearings include agricultural applications and general biotechnology issues. If it was clear that the topic was medical in nature, it was coded accordingly. If a clear determination could not be made, it was considered nonmedical. The breakdown, by topic, is as follows.

TABLE A1 Biotechnology Subject Areas

Genetically Modified Organisms
Microorganisms
Plant breeding
Animal breeding
GMO release
GM food
Biomedical
Humans (general)
Human genome research
Gene therapy
Pharmaceuticals, vaccines
Genetic Information
Genetic "fingerprinting"
Diagnosis and testing
Insurance issues
Genetic privacy
Economic Issues
Patenting and intellectual property
Economic development
Research and Regulation
DNA research (general)
Legal regulation
Voluntary regulations
Science policy for genetics
Cloning and Stem Cells
Animal cloning
Reproductive cloning
Stem cell research

TABLE A2 Medical and Nonmedical Topics

	Number of Hearings
Medical	
Humans (general)	2
Human genome research	15
Gene therapy	5
Genetic "fingerprinting"	8
Genetic testing	6
Insurance issues	4
Patenting	3
Economic development	2
Genetic privacy	1
Pharmaceuticals	4
Reproductive cloning	4
DNA research	2
Science policy for genetics	5
Stem cell research	7
Nonmedical	
Microorganisms	1
GM plants	8
GM animals	4
GMO release	9
GM food	3
Patenting	6
Economic development	17
DNA research	2
Legal regulation	5
Voluntary regulation	2
Science policy for genetics	3
Animal cloning	2

References

Bauer, Martin W. 2002. "Controversial Medical and Agro-Food Biotechnology: A Cultivation Analysis." *Public Understanding of Science* 11(2):93–111.

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

Baumgartner, Frank R., Bryan D. Jones, and John D. Wilkerson. 2002. "Studying Policy Dynamics." In *Policy Dynamics*, ed. Frank R. Baumgartner and Bryan D. Jones. Chicago: University of Chicago Press.

Baumgartner, Frank R., Bryan D. Jones, and Michael C. MacLeod. 2000. "The Evolution of Legislative Jurisdictions." *Journal of Politics* 62(2):321–49.

Eisinger, Peter K. 1973. "The Conditions of Protest Behavior in American Cities." *American Political Science Review* 67(1):11–28.

Gaskell, George, and Martin W. Bauer. 2001. "Appendix 1: Coding Frame for Media Analysis." In *Biotechnology, 1996–2000: The Years of Controversy*, ed. George Gaskell and Martin W. Bauer. London: Science Museum.

Gerring, John. 2004. "What Is a Case Study and What Is It Good For?" *American Political Science Review* 98(2):341–54.

Groseclose, Tim, and David C. King. 2001. "Committee Theories Reconsidered." In *Congress Reconsidered*, 7th edition, ed. Lawrence C. Dodd and Bruce I. Oppenheimer. Washington, DC: CQ Press, pp. 191–216.

Hardin, John W. 1998. "Advocacy versus Certainty: The Dynamics of Committee Jurisdiction Concentration." *Journal of Politics* 60(2):374–97.

Heclo, Hugh. 1978. "Issue Networks and the Executive Establishment." In *The New American Political System*, ed. Anthony King. Washington, DC: American Enterprise Institute, pp. 87–124.

Hurwitz, Mark S., Roger J. Moiles, and David W. Rohde. 2001. "Distributive and Partisan Issues in Agricultural Policy in the 104th House." *American Political Science Review* 95(4):911–22.

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

Jones, Bryan D., Frank R. Baumgartner, and John C. Talbert. 1993. "The Destruction of Issue Monopolies in Congress." *American Political Science Review* 87(3):657–71.

King, David C. 1997. *Turf Wars: How Congressional Committees Claim Jurisdiction.* Chicago: University of Chicago Press.

King, Gary. 1988. "Statistical Models for Political Science Event Counts: Bias in Conventional Procedures and Evidence for the Exponential Poisson Regression Model." *American Journal of Political Science* 32(3):838–63.

King, Gary. 1989. "Variance Specification in Event Count Models: From Restrictive Assumptions to a Generalized Estimator." *American Journal of Political Science* 33(3):762–84.

Kingdon, John W. [1984] 1995. *Agendas, Alternatives, and Public Policies*, 2nd edition. New York: HarperCollins College Publishers.

Kirzner, Israel M. 1985. *Discovery and the Capitalist Process.* Chicago: The University of Chicago Press.

Long, Scott J., and Jeremy Freese. 2006. *Regression Models for Categorical Dependent Variables Using Stata.* College Station: Stata Press.

March, James G., and Johan P. Olson. 1984. "The New Institutionalism: Organizational Factors in Political Life." *American Political Science Review* 78(3):734–49.

Marshall, Bryan W., and Richard L. Pacelle Jr. 2005. "Revisiting the Two Presidencies: The Strategic Use of Executive Orders." *American Politics Research* 33(1):81–105.

Meyer, David S., and Suzanne Staggenborg. 1996. "Movements, Countermovements, and the Structure of Political Opportunity." *The American Journal of Sociology* 101(6):1628–60.

Nisbet, Michal C., and Mike Huge. 2006. "Attention Cycles and Frames in the Plant Biotechnology Debate: Managing Power and Participation through the Press/Policy Connection." *Harvard International Journal of Press/Politics* 11(2):3–40.

Peterson, Mark A. 1993. "Political Influence in the 1990s: From Iron Triangles to Policy Networks." *Journal of Health Policy, Politics, and Law* 18(2):395–438.

Polsby, Nelson W. 1984. *Political Innovation in America: The Politics of Policy Initiation.* New Haven: Yale University Press.

Poole, Keith, and Howard Rosenthal. 1997. *A Political Economic History of Roll-Call Voting*. New York: Oxford University Press.

Rohde, David W. 1995. "Consensus, Conflict, and the Domain of Partisanship in House Committees." Presented at the annual meeting of the Midwest Political Science Association.

Schumpeter, Joseph A. 1942. *Capitalism, Socialism, and Democracy*. New York: Harper.

Shannon, C. E. 1948. "A Mathematical Theory of Communication." *Bell Systems Technical Journal* 27(3):379–423.

Shannon, C. E. 1951. "Prediction and Entropy of Printed English." *Bell Systems Technical Journal* 30(1):50–64.

Sheingate, Adam D. 2006. "Promotion Versus Precaution: The Evolution of Biotechnology Policy in the United States." *British Journal of Political Science* 36(2):243–68.

Talbert, Jeffery C., and Matthew Potoski. 2002. "The Changing Public Agenda over the Postwar Period." In *Policy Dynamics*, ed. Frank R. Baumgartner and Bryan D. Jones. Chicago: University of Chicago Press, pp. 189–204.

Tarrow, Sidney. 1996. "States and Opportunities: The Political Structuring of Social Movements." In *Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures, and Cultural Framings*, ed. Doug McAdam, John D. McCarthy, and Meyer Zald. Cambridge: Cambridge University Press, pp. 41–61.

Ten Eyck, Toby A., and Melissa Williment. 2003. "The National Media and Things Genetic: Coverage in the *New York Times* (1971–2001) and the *Washington Post* (1977–2001)." *Science Communication* 25(2):129–52.

Tilly, Charles. 1978. *From Mobilization to Revolution.* Reading: Addison-Wesley.

Whitby, Kenny J., and George A. Krause. 2001. "Race, Issue Heterogeneity and Public Policy: The Republican Revolution in the 104th Congress and the Representation of African-American Policy Interests." *British Journal of Political Science* 31(3):555–72.

Zorn, Christopher J. W. 1998. "An Analytic and Empirical Investigation of Zero-Inflated and Hurdle Poisson Specifications." *Sociological Methods & Research* 26(3):368–400.

Zorn, Christopher J. W. 2001. "Generalized Estimating Equations for Correlated Data: A Review with Applications." *American Journal of Political Science* 45(2):470–90.