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Salience, Scientific Uncertainty, and the Agenda-Setting Power of Science

Rebecca Bromley-Trujillo and Andrew Karch

Discussions of science and its relevance to public policy have recently taken center stage in political discourse, illustrating the values-based nature of scientific policy decisions. This article uses an original data set of media coverage to examine the ways in which salience and media portrayals of scientific uncertainty affect the agenda-setting process for scientific policy issues. We build upon two scholarly literatures by incorporating research on the use of science in the policy process into the study of policy diffusion among the American states. In doing so, we develop a framework for how media portrayals of scientific information can affect agenda setting. We test this framework on three scientific issues: Genetically modified food labeling, human papillomavirus vaccinations, and indoor tanning. Our results indicate that lawmakers introduce more legislation on salient issues, while higher reported levels of scientific uncertainty reduce the likelihood of bill introductions. This finding illustrates the potential impact of national media coverage as an information transmission mechanism and the necessity of treating policy characteristics as subject to change over time.

KEY WORDS: policy diffusion, media coverage, science policy, state politics

关于科学及科学与公共政策的相关性的学术辩论近期已在政治话语中占据中心位置，这阐明了科学政策决策基于价值的性质。本文使用有关媒体报道的原创数据组，检验科学不确定性的重要性、和媒体对科学不确定性的报道、二者如何影响科学政策议题的议程设定过程。我们通过将有关“政策过程中的科学使用”的研究融入有关“美国各州的政策扩散”的研究，对两项学术文献加以发展。为此，我们提出一个框架，研究媒体对科学信息的报道如何能影响议程设置。我们就三个议题测试了该框架，转基因食品标签、*HPV*疫苗和室内美黑。研究发现表明，立法者会更多地通过有关重要议题的法案，而更高程度的科学不确定性报道会减少法案通过性。这一研究发现阐明了国家媒体报道作为信息传输机制的潜在影响，以及对待“政策特征随时间推移而发生变化”的必要性。

关键词: 政策扩散, 媒体报道, 科学政策

Las discusiones sobre la ciencia y su relevancia para las políticas públicas han tomado recientemente un lugar central en el discurso político, ilustrando la naturaleza basada en valores de las decisiones de política científica. Este artículo utiliza un conjunto original de datos de cobertura mediática para examinar las formas en que la notoriedad y las representaciones mediáticas de la incertidumbre científica afectan el proceso de establecimiento de la agenda para cuestiones de política científica. Nos basamos en dos publicaciones académicas al

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incorporar la investigación sobre el uso de la ciencia en el proceso de políticas en el estudio de la difusión de políticas entre los estados estadounidenses. Al hacerlo, desarrollamos un marco sobre cómo las representaciones de los medios de información científica pueden afectar la configuración de la agenda. Probamos este marco en tres cuestiones científicas: etiquetado de alimentos modificados genéticamente, vacunas contra el VPH y bronceado artificial. Nuestros resultados indican que los legisladores introducen más legislación sobre cuestiones destacadas, mientras que los niveles más altos de incertidumbre científica reportados reducen la probabilidad de presentación de proyectos de ley. Este hallazgo ilustra el impacto potencial de la cobertura de los medios nacionales como mecanismo de transmisión de información y la necesidad de tratar las características de las políticas como sujetas a cambios a lo largo del tiempo.

PALABRAS CLAVE: difusión de políticas, cobertura de medios, política científica

In an era of partisan polarization, it is tempting to describe "science" as another area where Republicans and Democrats are sharply divided. For instance, there is ample evidence that conservative lawmakers and voters distrust the science behind climate change, evolution, and other scientific issues (Gauchat, 2012; Nisbet, Cooper, & Garrett, 2015). However, liberals and conservatives express similar levels of scientific distrust in the context of issues like genetically modified (GM) foods (Pew Research Center, 2015).[1] Indeed, a simple partisan frame fails to capture the complex role of science in the policy process. Although some political actors express an interest in developing evidence-based policies, elected officials frequently make value-based judgments that do not align with scientific findings (Weible, 2008). This selective application of science implies that scholars should strive to identify the conditions under which scientific research is most likely to influence policy debates and decisions rather than focusing on partisan differences.

In response to this challenge, this article develops a framework that explains how national media reports on scientific information affect the issues to which state lawmakers are drawn. Science has the potential to affect which policy options are considered and which ones gain enactment, but the focus here is on the agenda-setting process. Our framework is motivated by two scholarly literatures that share a core interest in the impact of information but have largely evolved along separate tracks. The first line of research—on the diffusion of innovations among the American states—examines the effect of external developments on the political agenda and the adoption decision (Graham, Shipan, & Volden, 2013; Karch, 2007b). The second scholarly literature—on the role of science in the policy process—emphasizes the integration of scientific knowledge into governmental decision making (Mason, 2016; Sabatier, 2005; Weible, 2008; Weible et al., 2007). Building on the insights of these two lines of research, we argue that time-pressed officials from across the ideological spectrum rely on centralized sources of information, such as national media coverage, in deciding which issues to address. As a result, both the level of coverage that scientific issues receive and the content of those media portrayals—specifically, the extent to which they emphasize scientific uncertainty—influence state legislative agendas.

Based on a systematic investigation of national media coverage and bill introduction patterns in the American states for three science-related issues, this article shows how an issue's salience and reported level of scientific uncertainty affect the agenda-setting process. When media coverage of a policy is high, state lawmakers introduce more bills on the topic. When this coverage suggests that the science surrounding the topic is unsettled, however, state legislators introduce fewer bills on the topic. These findings and our empirical approach make important conceptual and empirical contributions to each of the scholarly literatures described earlier. For diffusion scholars, they imply that national media coverage serves as an information transmission mechanism that can facilitate the spread of policy ideas. Media coverage has played a surprisingly limited role in studies of policy diffusion, and future diffusion research should address this important oversight. Our analysis also offers lessons for scholars of science and policymaking. In line with existing theories of the policy process, it suggests that media portrayals of scientific uncertainty act as a brake on policy change by preventing the accumulation of policy-oriented knowledge and the redefinition of scientific issues. It also implies that salience and scientific uncertainty are policy characteristics that can change over time and should be treated as such.

Policy Diffusion and the Agenda-Setting Process

At its core, the expansive scholarly literature on policy diffusion attempts to identify the conditions under which external developments influence lawmakers' actions. Interest in diffusion cuts across virtually every subfield of political science (Graham et al., 2013) and the American states have been a vibrant setting for diffusion research dating back to the seminal work of Jack Walker (1969) and Virginia Gray (1973). These studies often examine whether there is an interactive relationship among states in which developments in other jurisdictions influence the policy agenda or policy-makers' decisions. One long-standing focus of existing research is the potential importance of geographic proximity; in other words, events in neighboring or nearby states can affect state officials' actions (Berry & Berry, 1990; Bromley-Trujillo, Butler, Poe, & Davis, 2016; Daley & Garand, 2005; Kreitzer, 2015; Pacheco, 2012). Diffusion scholars have also identified several "mechanisms" of diffusion such as learning from early adopters, economic competition among jurisdictions, and imitation or emulation (Shipan & Volden, 2008). For example, state officials might imitate policies that exist in states that are similar ideologically, that face similar problems, or that have comparable levels of fiscal capacity (Grossback, Nicholson-Crotty, & Peterson, 2004; Volden, 2006).

Studying interactions among jurisdictions is a valuable enterprise, but it is also important to acknowledge that many other external forces can serve as drivers of the diffusion process. Interest groups, professional associations, and policy entrepreneurs frequently operate in multiple jurisdictions and their geographic reach makes them capable of actually transporting innovative public policies across state lines (Balla, 2001; Haider-Markel, 2001; Hays & Glick, 1997; Skocpol, Abend-Wein, Howard, & Goodrich, 1993). Many national organizations view the dissemination of policy-relevant information as a critical part of their organizational missions,

meaning that they can facilitate the "learning" that has been identified as a key diffusion mechanism. This learning can take various forms. It can facilitate general awareness of new policy ideas that have not previously been considered and it can also provide policymakers with critical information about the programmatic or political impact of these policies. Developments in other jurisdictions influence the policy process, in part, because external actors of various sorts publicize and interpret them. These actors transmit information that helps explain why certain innovations receive widespread consideration and, potentially, adoption.

National media coverage, the focus of this article, can play an analogous role in the diffusion process. By stimulating awareness of specific policies and disseminating programmatic or political information about them, it can affect the likelihood that they will spread. Several studies emphasize the potential link between national media coverage and the adoption decision. Nicholson-Crotty (2009) uses a count of articles in the *New York Times* to predict the speed of a policy's diffusion, finding that greater coverage leads to a more rapid process. National print media coverage also served as "an important determinant" of the adoption of state anti-bullying policies (Winburn, Winburn, & Niemeyer, 2014, p. 515). National coverage appears to influence both the speed of the diffusion process and the adoption decision itself (Lax & Phillips, 2009, 2012). It is a proxy for salience and an indicator of levels of public concern and attention; the heightened salience of particular issues is associated with a greater likelihood that related policies will gain enactment (Bromley-Trujillo & Poe, 2018).

Although most research to date has emphasized the potential impact of national media coverage on the adoption decision, we posit that it can also be a powerful force during the agenda-setting stage of the policy process. The agenda-setting stage determines which issues become the focus of lawmakers' attention, making it a critical step toward policy change (Kingdon, 1995). It is simply not possible for a policy to gain enactment without first moving onto the agenda. Information transmission is an important element of agenda setting and national media coverage can prompt the widespread consideration of certain policies by raising their profile. Government decision makers are responsible for so many different tasks that typically it is impossible for them to perform a comprehensive search for potential solutions to pressing societal problems. Rather than analyzing every possible option, time-pressed officials tend to gravitate toward policies that have achieved some degree of salience (Bromley-Trujillo & Poe, 2018; Karch, 2012; Weyland, 2007). Visible examples serve as information shortcuts and encourage decision makers to consider certain options over others. Centralized information resources, like national media coverage, can raise the public profile of a policy and thereby facilitate its diffusion.[2]

Thus, national media coverage represents, and shapes, the larger information environment in which state officials operate. It can affect the political agenda in several direct and indirect ways. State officials might read and respond directly to it, allowing coverage in national outlets to shape their perceptions of which issues deserve legislative attention. Even state officials who rely exclusively on regional and local news sources will find themselves indirectly affected by national reporting, however, since these state and local outlets often follow the example set by

publications like the *New York Times*, *Washington Post*, and *Wall Street Journal* (Boykoff & Boykoff, 2007). Similarly, national reporting can raise the salience of particular issues among the broader public (Mazur, 2009), making it more likely that state officials will hear from their constituents on those topics. Thus, there are several potential links between national media coverage and individual state officials, and these links make it exceedingly plausible that heightened attention from national media outlets will significantly influence state political agendas.

In summary, some diffusion scholars have examined the potential impact of national media coverage and others have looked beyond the adoption decision to consider the agenda setting. With rare exceptions (Hays & Glick, 1997), however, the agenda-setting influence of national media coverage has been overlooked. Treating national media coverage as an information transmission mechanism, both an indicator of issue salience and a facilitator of learning about developments in other jurisdictions therefore moves diffusion research in a constructive direction. Based on the preceding discussion, we expect heightened national coverage of a public policy to lead state legislators to introduce more bills on it. By raising an issue's salience and prominence, national media outlets can facilitate its widespread consideration. However, the valence and content of this coverage may be just as impactful as its volume. While existing diffusion research does not address this possibility, theories of the policy process bring it to the fore.

Science, Salience, and Uncertainty

Theories of the policy process suggest that scholars must be attentive not only to an issue's general visibility, but also to the level and type of controversy that appears in its media coverage. Their emphasis on information resonates especially strongly in the context of issues with scientific content, which is the substantive focus of this article. For instance, scientific developments play a significant role in the advocacy coalition framework (ACF), which grew in part out of an "interest in understanding the role that technical information plays in the policy process" (Sabatier & Weible, 2007, p. 189). Advances in scientific knowledge can lead to policy-oriented learning or gradual shifts in beliefs that reshape the political agenda (Sabatier & Jenkins-Smith, 1993). Sometimes lawmakers use science instrumentally, making decisions that flow naturally from scientific research and are wholly unaffected by partisan or ideological concerns (Amara, Ouimet, & Landry, 2004). In many cases, however, the obstacles to instrumental change are formidable. The ACF identifies several "dynamic external factors," such as changes in partisan control or socioeconomic conditions, that affect whether and how scientific knowledge influences the policy process. The potential influence of these factors highlights how public officials can use science either instrumentally or politically (Ingram, Schneider, & McDonald, 2004; Pelz, 1978; Weible, 2008).

Indeed, the ACF emphasizes the importance of the political context in which scientific discussions occur. When a scientific issue is politicized, the accumulation of scientific knowledge will not necessarily spur lawmakers to act in a way that is consistent with existing research. Instead, they may make decisions that are values-based rather than science-based (Mazur, 1981; Sabatier & Jenkins-Smith, 1999;

Weible, 2008), using scientific studies or media coverage of these studies to justify a policy choice to which they were already committed. Although the ACF places researchers among the central players in the policy process, the "capacity of scientists to provide credible advice is affected by the harshness of the political debates dividing the subsystem" (Montpetit, 2011, p. 513). Information is a political tool and the ACF "assumes that information is a resource utilized by policy participants to win political battles against opponents" (Sabatier & Weible, 2007, p. 203). Scientific uncertainty, or perceptions thereof, may exacerbate existing political cleavages, with each side pointing to the evidence that supports their views. The increased salience of a scientific issue might make public officials more likely to discuss it, but the ACF seems to suggest that competing coalitions will take advantage of scientific uncertainty to advance their own cause.

Similarly, punctuated equilibrium (PE) theory suggests that scientific knowledge can contribute to policy change. PE "is at base a theory of organizational information processing" that offers a long-term perspective on agenda change and the policy process (True, Jones, & Baumgartner, 2007, p. 177). It focuses on patterns of stability and change in the making of public policy, emphasizing how issues are defined in public discourse and how they rise and fall on the public agenda. Periods of stability are associated with policy monopolies that combine dominant political understandings with institutional arrangements that reinforce those understandings (Baumgartner & Jones, 1993). Scientific developments, and their portrayal in the media, can influence the supporting images that buttress these monopolies. Key actors can use scientific information to legitimize the status quo and keep certain issues off the policy agenda (Baumgartner & Jones, 1993; Jasonoff, 1990). For instance, they might highlight or exaggerate scientific uncertainty to argue that policy change is unwarranted. In contrast, supporters of policy change may attempt to utilize scientific information to support their cause and mobilize their allies. Policy images may change quickly thanks to the accumulation of previously neglected information, and the redefinition of an issue can facilitate the mobilization of quiescent actors and lead to a major shift (or punctuation) in policy. In sum, PE theory emphasizes how political actors respond to information flows. As an information transmission mechanism, media coverage can publicize and frame scientific issues in impactful ways.

These well-established theories of the policy process imply that the relationship between media accounts and the political agenda is multifaceted. First, PE theory emphasizes how the amount of coverage addressing a specific issue tends to ebb and flow (see also Downs, 1972; Helbling & Tresch, 2011). Thus, salience is not an inherent characteristic of a policy issue; it can and does change over time. Both diffusion research and PE theory suggest that the heightened salience of a scientific issue increases the likelihood that state officials will devote their limited resources to it. Second, the ACF and PE theory imply that information flows shape how issues are defined and debated. As an information transmission mechanism and a key venue of scientific debate (Boykoff, 2008; Trumbo, 1996), media coverage therefore plays a central role in the policy process. It often emphasizes both political controversies and scientific uncertainty. Coverage of scientific advances often places equal weight on scientific knowledge and public opinion or emphasizes the political implications

of a scientific breakthrough (Hoban, 1995; Lewison, 2007). In addition to highlighting political arguments, media accounts may present scientific information in uncertain terms. Journalistic norms can result in coverage that strives for "balance," even when this results in overstating the uncertainty that exists in the scientific community (Antilla, 2005; Boykoff & Boykoff, 2007). The valence of scientific media coverage is especially important when competing coalitions use scientific information as a political resource. If a policy issue is salient and politically polarizing, for example, opponents of change are especially likely to emphasize scientific uncertainty regardless of how much is present (Weible, 2011). The tensions between policymakers and scientists in the area of climate change illustrate this dynamic (Corfee-Morlot, Maslin, & Burgess, 2007).

Although partisan conflict has important consequences for the political agenda and will be incorporated into our empirical models, we are most interested in the impact of perceived scientific uncertainty. Scientific uncertainty depends on how the mass public, government officials, and scientists perceive an issue; the perceptions of these groups may not align with each other. For instance, a 2015 poll conducted by the Pew Research Center found that 37 percent of the adult population in the United States agreed that GM foods are generally safe, compared to 88 percent of the scientists surveyed (Pew Research Center, 2015). Similarly, most scientists agree that humans have contributed significantly to rising global temperatures, but the American public expresses much more uncertainty (International Panel on Climate Change, 2013; Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Howe, 2013).

For time-pressed government officials who generally do not read widely in scientific outlets, media portrayals of scientific issues are likely to inform their views about how much scientific uncertainty exists. These reports might also have an indirect effect, altering the views of legislators' constituents and therefore the broader context in which public officials operate. Media accounts can convey the impression that the science around a topic is unsettled in several ways. They can emphasize the uncertainty implicit in the probabilistic nature of most scientific claims, highlight disagreements among professional scientists even when one side is in the minority, or provide a forum for science skeptics in the name of journalistic balance (Boykoff & Boykoff, 2007). The level of scientific uncertainty surrounding a specific policy, at least as media accounts portray it, is variable rather than constant. It can decrease as a scientific consensus emerges or some skeptics dial back their objections, and it can increase as new research casts doubt on previous claims.

Thus, the extent to which media accounts emphasize uncertainty within the scientific community might affect the political dynamics of an issue. Although both the ACF and PE theory highlight the potential impact of information flows on issue definition and agenda setting, they do not provide clear guidance on the directional impact of scientific uncertainty. Media accounts that portray science as unsettled may operate in one of two distinct ways. First, they might depress lawmakers' interest in placing a specific policy option on the political agenda. As presentations of science become more uncertain, policymakers may find it increasingly difficult to make a compelling case for policy action. As a result, changes in the policy image

become less likely, resulting in fewer bill introductions. In the language of PE theory, perceptions of scientific uncertainty might facilitate the preservation of an existing policy monopoly.

Alternatively, increases in perceived scientific uncertainty may amplify a policy issue and result in the introduction of more legislation, perhaps because opposing sides offer competing bills. Technical information can serve as a political resource and competing coalitions might attempt to exploit perceived scientific uncertainty by highlighting the studies that support their position. In that situation, partisans on both sides of the issue may use science politically rather than instrumentally, pointing to what they claim is research that backs their preferred alternative and using this scientific support to push their existing policy priorities more energetically. In other cases of scientific uncertainty, one side might introduce more legislation because they genuinely believe that the professional disagreement necessitates a specific course of action. For example, state legislators might introduce more bills because they believe that they are acting in the best interest of their constituents. Thus, media coverage of scientific uncertainty has the potential either to restrict or to expand the political agenda. The empirical analysis that follows evaluates these competing hypotheses in the context of three policies with a scientific component; the next section introduces these policies.

Policy Selection and Background

This article investigates the agenda-setting dynamics surrounding labeling requirements for GM foods, state legislative responses to the development and licensing of a vaccine for human papillomavirus (HPV), and bans on indoor tanning for youth under the age of 18. While one must be circumspect about making broad generalizations based on three policies, the ones featured here offer a solid foundation for evaluating the potential impact of salience and perceived scientific uncertainty because their partisan valences diverge. Whereas liberal politicians are more likely to reject scientists' assurance that GM foods are safe, calling them "Frankenfoods" and questioning the motivations of the corporations that developed them, conservatives have ethical and moral concerns that generally lead them to express more wariness of scientists' claims about the safety and necessity of HPV vaccination. Finally, indoor tanning generally lacks the visibility and the strong partisan valence of the two other policies featured here. Although the tanning industry lobbies strongly against such regulations, frequently questioning the science that links tanning to skin cancer, disagreements over this policy issue tend to be nonpartisan. This policy area therefore allows us to test our hypotheses on a less salient and less partisan policy issue. If analyses of the three policy areas produce similar results, this overlap will not be due to common ideological or partisan conflicts over scientific knowledge.

According to the World Health Organization (WHO, 2014), GM foods are foods "produced from or using" organisms "in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination." Producers turn to GM foods for reasons that include durability, crop protection, and nutritional value. Governments across the globe have debated the

appropriate way to treat foods that involve the transfer of genes from one organism into another. In the American states, bills that require the labeling of GM foods began to emerge in the early 1990s. Early bills tended to focus on milk products. However, the reach of these proposals has expanded to include GM seeds, genetically engineered fish, or any GM food. GM food labeling bills have been introduced widely, but they have gained enactment only in Vermont, Maine, Alaska (for salmon only), and Connecticut (for infant formula only). Most research on GM products suggests that they are safe to eat, leading most scientists to argue that the labels are unnecessary, but some biologists continue to question their safety (Freedman, 2013).

There are more than 100 types of HPV. Most public discussions of HPV center on the high-risk types that can lead to cervical and oral cancer. In June 2006, the Food and Drug Administration (FDA) licensed its first HPV vaccine and public health advocates hailed that development as a major breakthrough. State officials then found themselves enmeshed in heated debates over individual liberty, parental autonomy, sexuality, gender, and health care once the Center for Disease Control and Prevention (CDC) recommended routine HPV vaccination for girls aged 11 and 12. In 2011, the CDC expanded those guidelines by recommending HPV vaccination for boys of the same ages. The states' multifaceted response to the availability of the vaccine encompassed a range of ideas. Some states provided vaccine-related information through their school systems, others launched broad public awareness campaigns, and others mandated studies of the vaccine. Some states required that Medicaid or private insurers cover the cost of the vaccine or provided government funds for that purpose, and others attempted to expand vaccine access through private providers like pharmacists. The question of whether HPV vaccination should be required for public school attendance was also the subject of some legislation. State officials have introduced over 200 bills on the topic since 2006, but none of the aforementioned HPV-vaccine-related policies has gained widespread enactment.

State legislative bills that would ban the use of indoor tanning devices by minors (under 18) began to appear in 2009. In 2011, Vermont and California became the first states to adopt such a stringent ban. Skin cancer prevalence has continued to rise, particularly among young women. Scientists have attributed part of the increase to the growing popularity of indoor tanning. In 2009, the World Health Organization categorized indoor tanning as carcinogenic (Colantonio, Bracken, & Beecker, 2014). In addition, the Surgeon General produced a report calling for efforts to prevent skin cancer (U.S. Department of Health and Human Services, 2014) and the FDA shifted the risk of tanning devices from low to moderate risk. The scientific community largely supports these efforts, but the indoor tanning industry continues to argue that the practice is safe and even beneficial. Compared to HPV vaccination and GM food labeling, indoor tanning is both less salient and less partisan.

Analysis

Measuring Agenda Intensity

To understand the dynamics of the agenda-setting process, including the potential role of salience and scientific uncertainty, we develop a measure that indicates

whether an issue has moved onto the political agenda. It is an annual count of the number of bills introduced on that issue in a particular state.[3] Scholars have used counts of this sort to assess the agenda-setting impact of several factors (Bratton & Haynie, 1999; Karch, 2012; Thomas & Welch, 1991). We build three original data sets of bill introductions across all 50 states—one for each policy area. We rely on various resources, such as documents produced by professional associations like the NCSL, online databases like LegiScan or OpenStates.org, and state legislative websites.

Figure 1 displays the total number of bills introduced across all states over time for each issue. This aggregate overview reveals several key differences. GM food labeling legislation has a long history at the state level, with the first bill introductions occurring in the early 1990s. The number of bills on the topic gradually increased through the end of that decade before falling slightly in the mid-2000s. It then increased sharply beginning in 2011. Bill introductions related to the HPV vaccine have followed a different trajectory. They spiked immediately after the vaccine received FDA approval, then dropped dramatically in 2009 and have remained at that more modest level since. Finally, state legislative activity on indoor tanning began with a handful of bills in 2009 and 2010 before increasing to between 15 and 25 bill introductions annually from 2011 to 2015. This aggregate variation suggests that general patterns of bill introduction cannot account for any similarities across the three policies in terms of which factors are influential.

In the empirical analysis that follows, the outcome of interest is the number of bills introduced in a given state during a particular year. The number of bills introduced is a good proxy for agenda status because it suggests that state lawmakers, advocacy organizations, and other actors possess high levels of interest in a topic. Moreover, it is desirable to use a count rather than a dichotomous measure that indicates whether any legislative activity has occurred because a count recognizes state-level differences in elite interest. The goal of the empirical analysis that follows is to ascertain which factors influence the intensity of the legislative agenda. It uses a negative binomial model since the outcome of interest is a nonnegative and integer-valued variable and it is necessary to account for overdispersion.[4] Recognizing that bill introductions at one point of time do not preclude the introduction of legislation in future years, every state remains in the analysis through the entire period under study.[5]

Measuring Salience and Scientific Controversy in Media Coverage

Several factors might influence the agenda-setting process. Building on the preceding discussion of diffusion research, the ACF, and PE theory, the models include two measures that capture the salience of the underlying issue and the level of scientific controversy surrounding it. To capture issue salience, the first variable is a count of the number of articles that appeared on the topic in the *New York Times* during the year of measurement.[6] It relies on a national news outlet given that time-pressed state lawmakers are likely to rely on easily accessible information sources. Furthermore, previous state politics work has used similar measures of issue salience when examining gay rights policy (Lax & Phillips, 2009), anti-bullying laws (Winburn et al.,

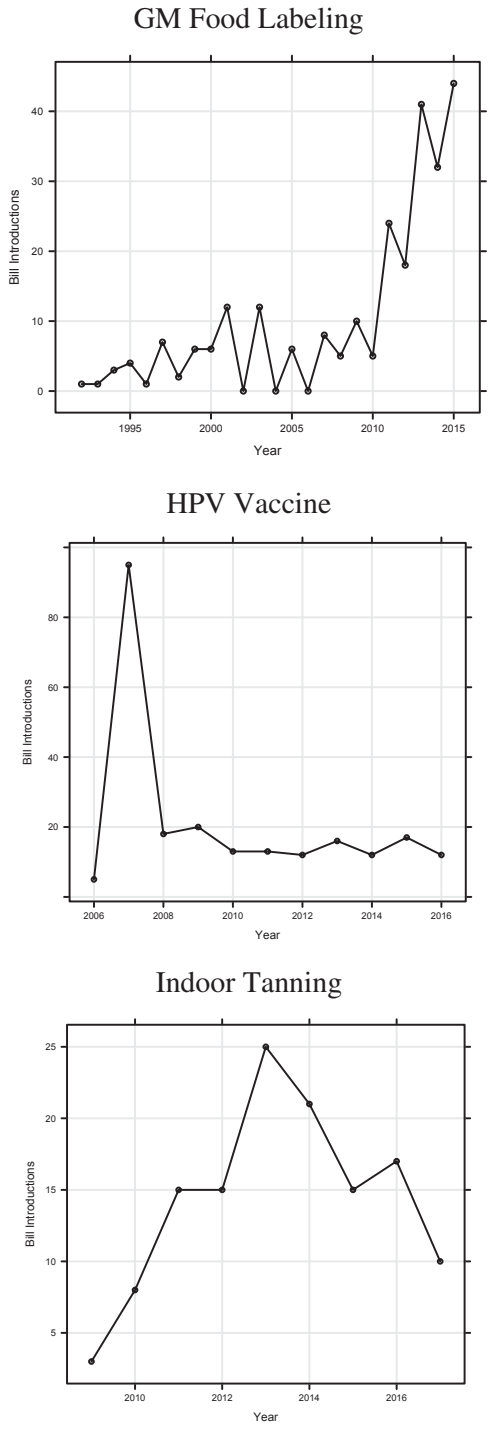

Figure 1. Bill Introductions by Year.

2014), living-will laws (Hays & Glick, 1997), and policy responsiveness more broadly (Lax & Phillips, 2012).[7] In particular, there is ample precedent for relying on the *New York Times* (Lax & Phillips, 2012; Nicholson-Crotty, 2009). While we acknowledge that the level and content of media coverage may vary by state, our conceptual framework emphasizes the broader informational environment in which state officials operate and the availability of centralized information sources. Moreover, measures of state-level media coverage run the risk of being endogenous to policy activity within the state (Lax & Phillips, 2009), making them an especially poor fit for an analysis of the agenda-setting process.

In addition, the models include a second media-related variable that represents the level of reported scientific uncertainty for the relevant topic. We coded each article to indicate whether it referred to disagreements or uncertainty among scientists in the relevant field of study. This close reading focused on science, not on political or partisan debates about how to proceed. To qualify as invoking scientific uncertainty, an article had to mention competing views among those engaged in scientific research or describe the state of scientific knowledge as ambiguous.

The language used in three articles on GM foods illustrates our measure of scientific uncertainty. The first one explains how "critics say the foods have not been tested adequately. And they say labeling would give consumers a choice to avoid them. Food companies oppose mandatory labeling, saying it would scare consumers away" (Pollack, 2000a, p. C6). Although these sentences capture stakeholders' competing claims about the desirability of GM foods, these claims neither center on scientific issues nor invoke uncertainty among scientists themselves. A second article includes the sentence, "An E.P.A. official has said the agency will have to make an assessment based on science" (Pollack, 2000b, p. C4). Even though this sentence brings scientific concerns to the fore, it does not highlight disagreements among scientists or scientific uncertainty. The third article describes the challenges involved in determining whether a GM product might cause allergies: "Since the StarLink bacterial protein, known as Cry9C, has not been in the human diet before, there are no people with known allergies from whom to obtain blood for an allergy test. So scientists were left to use indirect methods that usually cannot provide a clear answer" (Pollack, 2000c, p. C1). Since this passage emphasizes the unsettled nature of a specific scientific debate, this article is only one of the three articles featured in this paragraph that we classified as invoking scientific uncertainty. For each year, we calculated the proportion of articles on a given topic that mentioned for competing scientific views or described the state of scientific knowledge as ambiguous.[8] Figure 2 displays these annual measures for each of our three policies.

Descriptively, the media coverage data demonstrate the utility of treating issue salience and scientific uncertainty as subject to change rather than as inherent attributes of certain policies or issue areas. This variability is clearest in the context of GM foods, where the debate over labeling requirements has lasted over two decades. The number of relevant articles appearing in the *New York Times* ranges from a low of 11 to a high of 133 during the period under examination (1992–2014), with a mean of 45.77 and a standard deviation of 28.81. The percentage of articles in a particular year that mentions scientific uncertainty ranges from 5.56 to 26.30, with a mean of

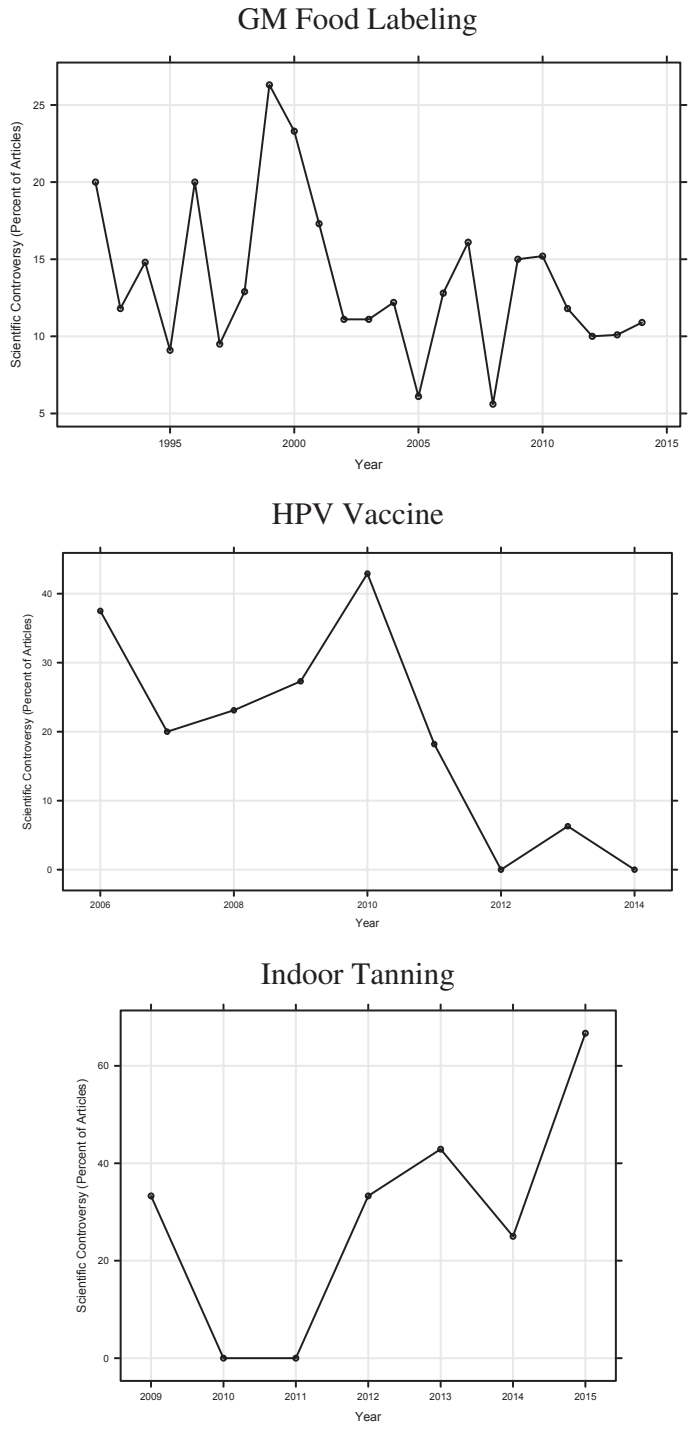

Figure 2. Scientific Uncertainty Reporting in the *New York Times* by Year.

13.60 and a standard deviation of 4.99. Even though the debate over the HPV vaccine covers a shorter timeframe (2006–14), the number of relevant articles still varies from 7 to 33 and the percentage mentioning scientific uncertainty ranges from 0 to 42.90. Indoor tanning received less media coverage, as the number of relevant articles ranged from 3 to 7 from 2009 to 2015, while the percentage invoking scientific uncertainty ranged from 0 to 66.7. The scientific uncertainty measure does not increase or decrease monotonically over time for any of the three issues; instead, it fluctuates in a seemingly unpredictable way. This variation suggests that reported scientific uncertainty is not an intrinsic feature of a policy issue; instead, it is subject to change.

Control Variables

While salience and perceived scientific uncertainty are the central independent variables in the analysis that follows, it is necessary to consider other correlates of state policymaking. The ACF emphasizes the importance of dynamic external features of the political context and existing diffusion research identifies several factors that might affect agenda setting. One potential influence is "state scientific capacity" (Mintrom, 2009). The states promote science and technology to varying degrees and those with stronger research infrastructures might be more likely to consider scientific legislation. The models therefore include a proxy for state scientific capacity—an inflation-adjusted per capita measure of research funds received from the National Institutes of Health.[9] Policy-specific factors also might drive the consideration of policies. For example, GM food labeling is an issue of particular concern to farmers and the food industry, who often contend that the labels will reduce consumer demand for the products on which their livelihoods depend. The GM-food-labeling model therefore includes a proxy for the potential political importance of this constituency: The proportion of the state's gross domestic product based on agriculture. We expect fewer GM labeling bill introductions in states where agriculture makes up a larger proportion of their economic output. For bills related to the HPV vaccine, the policy-specific measure is the annual cervical cancer rate. One can think of public policies as efforts to address pressing societal conditions (Nice, 1994) and the cervical cancer rate indicates the pervasiveness of the "problem" that access to the HPV vaccine might resolve.[10] A similar logic underlies the inclusion of the annual melanoma rate in the indoor tanning model. As state disease rates increase, all else being equal, we expect legislators to introduce more bills on the relevant policy.

The models include additional factors that might influence patterns of bill introduction. Two of these state attributes are proxies for resource availability. Urbanization is associated with the availability of slack resources and multiple studies have found that states with higher urbanization levels tend to be more innovative (Boehmke & Skinner, 2012; Boushey, 2010; Walker, 1969). The models therefore include the percentage of the state population living in urban areas. The models also include an inflation-adjusted logged measure of state per capita income because existing research has consistently found that fiscal capacity facilitates the early adoption of innovations (Boehmke & Skinner, 2012; Gray, 1973; Walker, 1969).

The ACF and state politics research imply that the political context is likely to influence the adoption of policy innovations. States possess distinct ideological environments and policies are more likely to gain enactment when they reflect those fundamental political proclivities. The models therefore include the annual measure of government ideology that first appeared in Berry, Ringquist, Fording, and Hanson (1998). Existing research also highlights the potential impact of partisanship, which is an especially important consideration in an era of polarization. State officials' reactions to innovative policies can depend on their partisan affiliation, so the models include variables that account for the partisanship of the governor and the state legislature.[11]

Policy diffusion scholarship assesses the effect of developments in other jurisdictions, and the models include two measures that grow out of this research tradition. The first is a proxy for geographic proximity. Existing studies posit that the existence of a policy in neighboring or nearby states may spur officials to act based on their belief that nearby states are demographically or culturally similar to their own or because they have strong communications networks with their nearby counterparts (Berry & Berry, 1990; Daley & Garand, 2005). During the agenda-setting stage of the policy process, lawmakers might become aware of a policy that is under review in a neighboring state, leading to additional bill introductions. The models therefore include the percentage of a state's neighbors in which at least one bill was introduced during the previous year.[12] The second diffusion-related variable is a measure of ideological proximity. Lawmakers might be more inclined to place a policy option on the political agenda when states with similar political leanings already have considered it. The models therefore include a measure of ideological proximity: The absolute value of the difference between a state's government ideology score and the average scores of all the states in which lawmakers introduced bills during the prior year.[13]

Finally, the models include two variables that represent the legislative context in which state officials operate. First, they include a dichotomous "previous adopter" variable that indicates whether the policy in question has already gained enactment. For obvious reasons we expect fewer bill introductions to occur in those states. Second, the models include a measure of legislative professionalism, which is generally associated with higher salaries, longer sessions, and greater staff resources (Squire, 2012). Legislators in highly professionalized chambers may be better able to identify and evaluate new policy options (Boushey, 2010).[14] Moreover, the chambers might process more legislation during the typical year due to their lengthier sessions and other institutional resources.[15]

Results

This section describes the results of three event count models of agenda intensity. We present both the coefficients of the initial analysis and expected values that provide a better sense of the substantive impact of particular variables. The "first differences" displayed in the tables were derived by manipulating the quantity of interest and setting all continuous variables to their means and all dichotomous

variables (and legislative partisanship) to their modes. For continuous variables, the tables display the change in the expected number of bills introduced when the quantity of interest shifts from one standard deviation below its mean to one standard deviation above its mean. For dichotomous variables, the tables display the change in the expected number of bills introduced when the quantity of interest shifts from zero to one (or zero to two in the case of legislative partisanship). The values were derived using the statistical simulation technique and computer software described in King, Tomz, and Wittenberg (2000), and the "confidence intervals" in the tables are 2.5 and 97.5 percent of the posterior distributions.

Table 1 displays the results for the model of GM labeling bills.[16] It contains six notable patterns. First, as expected there is a significant positive relationship between salience and bill introductions. All else being equal, moving from a low-salience year to a high-salience year is associated with the introduction of 0.080 additional bills. This may seem like a small substantive effect, but it is important to recall that 204 bills were introduced during the timeframe covered by our analysis and that the mean of our dependent variable is only 0.180. Second, there is a significant negative relationship between the agricultural proportion of a state's economy and the introduction of GM labeling bills. Farmers and others associated with the food

Table 1. Introduction of GM Food Labeling Legislation, 1992–2014

Variable	Results	First Differences
Salience	0.009**	0.080**
	(0.004)	(0.012, 0.199)
Scientific uncertainty	−1.175	−0.012
	(1.843)	(−0.068, 0.047)
NIH grants per capita	−0.004	−0.051
	(0.003)	(−0.192, 0.027)
Agricultural economy	−25.151**	−0.161**
	(10.450)	(−0.456, −0.025)
Urbanization	−1.820**	−0.078**
	(0.911)	(−0.215, −0.006)
Per capita income	4.321	0.098
	(2.695)	(−0.025, 0.300)
Government ideology	0.023*	0.261*
	(0.012)	(−0.008, 0.921)
Gubernatorial partisanship	−0.634	−0.072
	(0.465)	(−0.221, 0.020)
Legislative partisanship	−0.188	−0.051
	(0.270)	(−0.212, 0.056)
Previous adopter	−1.231**	−0.105**
	(0.494)	(−0.259, −0.013)
Neighboring state effect	−0.150	−0.003
	(0.574)	(−0.044, 0.042)
Ideological distance	−0.010	−0.001
	(0.007)	(−0.002, 0.0001)
Legislative professionalism	2.966**	0.105**
	(1.229)	(0.025, 0.230)
Number of observations	1,133	1,133
Log pseudolikelihood	−456.66	−456.66
Prob > χ^2	0.0000	0.0000

Note: All tests of statistical significance are two-tailed, with standard errors clustered by state.
*Significant at 0.10 level; **Significant at 0.05 level.

industry often argue that products with such a label will experience reduced consumer demand, so this negative relationship is expected. All else being equal, moving from a less agricultural to a more agricultural state leads to the introduction of 0.161 fewer bills. Third, the significant negative relationship between urbanization and bill introduction suggests that, all else being equal, moving from a less urban to a more urban state is associated with the introduction of 0.078 fewer bills. Fourth, the marginally significant positive relationship between government ideology and bill introduction suggests that more bills appear in liberal states. Liberal politicians are more likely to express reservations about GM foods and the corporate entities that produce them, and they often portray the labels as a way of allowing consumers to decide for themselves whether to consume the products. All else being equal, moving from a more conservative to a more liberal state results in the introduction of 0.261 additional bills. Fifth, less legislative activity occurs in states where a GM labeling law already exists. All else being equal, moving from a state without a law to a state with a law is associated with 0.105 fewer bill introductions. Sixth, there is a significant positive relationship between legislative professionalism and bill introductions. All else being equal, moving from a less to a more professional state legislature is associated with the introduction of 0.105 additional bills.

The results for the model of HPV-vaccine-related legislation are shown in Table 2.[17] Several notable patterns appear. Once again, there is a significant positive relationship between salience and bill introductions; all else being equal, moving from a low-salience year to a high-salience year is associated with the introduction of 0.151 additional bills. Lawmakers introduced 201 bills during the timeframe covered by our analysis, so the mean of our dependent variable is 0.457. The valence of this media coverage also has a significant effect on patterns of bill introduction. As a larger proportion of HPV-related articles mention scientific uncertainty, state officials introduce fewer bills. Moving from low to high levels of reported scientific uncertainty is associated, all else being equal, with the introduction of 0.327 fewer bills. There also is a marginally significant positive relationship between a state's cervical cancer rate and agenda intensity, suggesting that problem severity might drive interest in this policy issue (Nice, 1994). Moving from a state with a low cervical cancer rate to a state with a higher rate leads to the introduction of 0.162 additional bills. Finally, there is suggestive evidence that a diffusion-related imitation process influences the introduction of HPV-related legislation. As the ideological distance increases between a state and the states in which HPV-related legislation appeared during the previous year, legislators introduce fewer bills. All else being equal, moving from a state that is ideologically proximate to one that is not is associated with the introduction of 0.164 fewer bills.[18]

Table 3 displays the results for the model of indoor tanning regulations. The significant positive relationship between salience and bill introduction suggests that, all else being equal, moving from a low-salience to a high-salience year is associated with the introduction of 0.053 additional bills. The mean of our dependent variable is 0.291, so this is a substantively meaningful effect. In contrast, the valence of this media coverage has a significant negative impact. All else being equal, moving from low to high levels of reported scientific uncertainty is associated with 0.061 fewer bill

Table 2. Introduction of HPV Vaccine Legislation, 2006–14

Variable	Results	First Differences
Salience	0.040***	0.151***
	(0.008)	(0.047, 0.355)
Scientific uncertainty	−4.886**	−0.327**
	(2.196)	(−0.681, −0.073)
NIH grants per capita	−0.002	−0.034
	(0.003)	(−0.214, 0.185)
Cervical cancer rate	0.200*	0.162*
	(0.105)	(−0.002, 0.578)
Urbanization	1.563	0.133
	(1.257)	(−0.038, 0.533)
Per capita income	1.099	0.015
	(2.938)	(−0.241, 0.209)
Government ideology	−0.005	0.001
	(0.010)	(−0.203, 0.505)
Gubernatorial partisanship	0.285	0.078
	(0.313)	(−0.096, 0.309)
Legislative partisanship	0.171	0.063
	(0.310)	(−0.388, 0.368)
Previous adopter	0.088	0.014
	(0.388)	(−0.210, 0.230)
Neighboring state effect	0.148	0.021
	(0.335)	(−0.062, 0.148)
Ideological distance	−0.018**	−0.164**
	(0.007)	(−0.623, −0.014)
Legislative professionalism	2.195	0.111
	(1.531)	(−0.068, 0.310)
Number of observations	439	439
Log pseudolikelihood	−344.98	−344.98
Prob > χ^2	0.0000	0.0000

Note: All tests of statistical significance are two-tailed, with standard errors clustered by state.
*Significant at 0.10 level; **Significant at 0.05 level; ***Significant at 0.01 level.

introductions. There also is a marginally significant positive relationship between a state's melanoma rate and agenda intensity; all else being equal, moving from a state with a low rate to a state with a high rate is associated with 0.065 additional bill introductions. Partisan control of the state legislature also influences agenda intensity. Moving from unified Republican control to unified Democratic control is associated with the introduction of 0.218 additional bills on indoor tanning, all else being equal. Less legislative activity occurs in states where an indoor tanning ban already exists. All else being equal, moving from a state without a ban to a state with a ban is associated with 0.141 fewer bill introductions. Indoor tanning is the only policy examined in this article where developments in neighboring states affect agenda intensity; they are associated with fewer bill introductions. All else being equal, moving from a state with inactive neighbors to a state with active neighbors leads to the introduction of 0.060 fewer bills. This pattern is mildly surprising since most analyses posit that the existence of a policy in nearby states has a positive impact on the likelihood of adoption. However, drawing broader conclusions about the impact of geographic proximity seems unwarranted absent similar results for the other models. Finally, there is a significant positive relationship between legislative professionalism and

Table 3. Introduction of Indoor Tanning Legislation, 2009–15

Variable	Results	First Differences
Salience	0.120***	0.053***
	(0.044)	(0.013, 0.117)
Scientific uncertainty	−0.850**	−0.061**
	(0.349)	(−0.193, −0.006)
NIH grants per capita	0.001	0.020
	(0.002)	(−0.043, 0.100)
Melanoma rate	0.036*	0.065*
	(0.20)	(−0.0002, 0.203)
Urbanization	−0.733	−0.035
	(1.356)	(−0.198, 0.094)
Per capita income	2.479	0.047
	(2.296)	(−0.041, 0.183)
Government ideology	−0.015	−0.119
	(0.011)	(−0.247, 0.112)
Gubernatorial partisanship	0.424	0.071
	(0.461)	(−0.114, 0.227)
Legislative partisanship	0.470*	0.218*
	(0.248)	(−0.017, 0.463)
Previous adopter	−3.315***	−0.141***
	(1.091)	(−0.297, −0.058)
Neighboring state effect	−0.798**	−0.060**
	(0.402)	(−0.170, −0.002)
Ideological distance	−0.003	−0.018
	(0.006)	(−0.139, 0.045)
Legislative professionalism	3.453***	0.127***
	(0.930)	(0.053, 0.255)
Number of observations	350	350
Log pseudolikelihood	−194.92	−194.92
Prob > χ^2	0.0000	0.0000

Note: All tests of statistical significance are two-tailed, with standard errors clustered by state.
*Significant at 0.10 level; **Significant at 0.05 level; ***Significant at 0.01 level.

bill introductions. All else being equal, moving from a less to a more professional state legislature is associated with the introduction of 0.127 additional bills.

It is especially important to identify notable patterns across the three policies and the results of our empirical analysis suggest that media coverage of scientific issues significantly affects the agenda-setting stage of the policy process. In line with existing research, there is a significant positive relationship between issue salience and agenda intensity. This relationship is consistent with the hypothesis that national media coverage influences state legislative behavior as time-pressed state officials gravitate toward visible issues. It also resonates with the learning mechanism identified in other diffusion research (Shipan & Volden, 2008), even if the nature of this learning may be limited to a general awareness of a policy rather than detailed knowledge of its programmatic or political impact. In addition, the specific content of national media coverage seems influential. For two of our three cases, there is a significant negative relationship between agenda intensity and the proportion of articles in a given year that mention scientific uncertainty; for the third policy, the effect is in the same direction but does not attain conventional levels of statistical significance. Some might view these results as reassuring. They might suggest that

state officials are attentive to emerging scientific trends but are not inclined to act precipitously when they perceive the underlying science as unsettled.[19]

Looking across the three policies reveals four other notable patterns. First, policy-specific factors and societal conditions influence state political agendas. Legislators introduced fewer bills on GM labeling in states with powerful agricultural sectors, all else being equal, but more HPV-related bills and bills on indoor tanning in states with higher cervical cancer and melanoma rates. These results suggest a general relationship between state political agendas and the prevalence of the problem that a policy option purports to solve (Nice, 1994). Second, legislative professionalism has a significant positive effect on agenda intensity in two of our three cases; in the third case, the effect is in the same direction but does not attain conventional levels of statistical significance. This pattern suggests that lawmakers in highly professionalized chambers may be better able to identify and evaluate new policy options, perhaps due to institutional resources such as longer sessions and additional staff (Boushey, 2010; Squire, 2012). Third, ideology and partisan control seem to have a muted effect during the agenda-setting stage of the policy process. Although there are contexts in which these factors are influential, there are no consistent patterns across our three policies. That is not to say that the general political environment is unimportant to the policy process. However, its impact is more likely to influence whether and how state officials customize policies or the adoption decision (Karch, 2007a). Fourth, the adoption of a policy understandably leads to reduced legislative activity on that topic in subsequent years. This relationship affected agenda intensity for GM labeling bills and indoor tanning regulations; its insignificant effect on HPV-related legislation probably results from the several distinct policy options examined here.

Conclusion

The scholarly literatures on policy diffusion and the role of science in the policy process share an interest in whether and how officials use certain types of information. By bringing them together and considering the role of national media coverage as an information transmission mechanism, this article illuminates the dynamics of the agenda-setting process and identifies several fruitful avenues for future research. Its empirical analysis of GM food labeling legislation, policies related to the HPV vaccine, and indoor tanning bans for youth under age 18 suggests that state officials introduce additional bills on topics that receive heightened media coverage, but that they introduce fewer bills when that coverage highlights scientific uncertainty for those issues.

Our results reinforce and extend major theories of the policy process. Neither the ACF nor PE theory advances specific predictions about the impact of media portrayals of scientific uncertainty. However, the dampening effect identified here aligns well with each of them. With its emphasis on the ways that competing coalitions use technical information as a political resource, the ACF highlights the obstacles that prevent policy-oriented learning from stimulating policy change. When media coverage portrays scientific knowledge as unsettled, it appears to exacerbate

these challenges and prevent related policies from moving onto governmental policy agendas. Similarly, policy images represent one of the key concepts in PE theory. Media portrayals of scientific uncertainty in national outlets like the *New York Times* appear to act as a brake on policy change. By preventing the emergence of a new policy image, they seem to prevent the issue redefinition and activation of quiescent groups that can spark a policy punctuation. Future research can extend our findings by investigating these dynamics in other policy areas with a scientific component.

Our findings also open up a potential new line of research on policy diffusion. Diffusion scholars should be more attentive to the potential influence of media coverage. Time-pressed officials are likely to gravitate to centralized information sources like the *New York Times* and other outlets with a national profile. As part of the broader information environment in which state officials operate, these sources can facilitate learning about policy developments in other jurisdictions; this is a critical component of the diffusion process. Building on this insight, future research might investigate whether and how particular state characteristics affect information use (Gilardi, 2010); differences in legislative professionalism, partisan polarization, and other attributes might affect the relationships identified in this article.[20] Future research assessing the potential influence of media coverage also might turn to local outlets. Issues may be salient nationally but fail to register locally and the tone of local coverage may differ across geographical units. These differences may affect the specific options toward which state legislators are drawn as well as the later stages of the policy process.

The preceding analysis also implies that policy scholars should be careful about relying on broad issue typologies. Many analysts categorize policy innovations based on their substantive focus (Boushey, 2010; Nicholson-Crotty, 2009), effectively assuming that all health care or environmental policies share similar levels of visibility or complexity. Although typologies can be useful in analyzing large numbers of policies simultaneously, they depend on a consistency that might not exist. In addition to considering how policies in the same field differ from one another, it is essential to recognize that key features of a single policy or perceptions of where that policy falls along a particular dimension can and do change over time. The salience of and scientific uncertainty surrounding the issues examined in this article varied, and close readings of media accounts can illuminate these shifting perceptions. Other policy attributes, such as complexity, might be subject to similar variability.

Most fundamentally, however, this article suggests that the scholarly literatures on policy diffusion, agenda setting, and science should interact more frequently with one another. Technological advances can bring new items to state lawmakers' attention, encouraging the development of novel policy instruments. Scientific research can shape the political processes through which decision makers learn about new ideas, gather information about them, customize existing policy templates, and decide whether to make changes. Moreover, media presentations of science can influence the items placed on legislative agendas. Bringing together these overlapping fields of study that have largely, and unnecessarily, evolved in isolation from one another promises to illuminate each of these important steps in the policy process.

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Notes

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1. The Pew Research Center's 2015 poll indicates that 56 percent of Democratic respondents believe that GM foods are "unsafe to eat," which is comparable to the Republican percentage expressing that view (Pew Research Center, 2015).
2. Some scholars have speculated that media coverage helps explain the potential impact of geographic proximity on the diffusion process, hypothesizing that overlapping media markets can alert residents and officials to the existence of policies in neighboring or nearby jurisdictions (Karch, 2007b; Mitchell, 2016; Pacheco, 2012). This hypothesis has not been assessed systematically to date and it is a fruitful direction for future research.
3. Although this article focuses on bill introductions and the agenda-setting process, we also conducted preliminary analyses of the adoption decision. Neither salience nor perceived scientific uncertainty has a significant effect on the enactment of indoor tanning bans or the enactment of policies related to the HPV vaccine. HPV vaccination laws cover a broad range of policy choices, and the latter finding holds whether the dependent variable is the adoption of any HPV-related policy or a count of the number of policies adopted. These results suggest that the political dynamics of bill introduction differ systematically from those of policy adoption, a finding that is consistent with existing diffusion research (Haider-Markel, 2001; Karch, 2007a; Mintrom, 1997). The very small number of GMO labeling law adoptions during the time period under examination makes a quantitative analysis implausible. It also illustrates that "agenda status does not guarantee major change" (True, Jones, & Baumgartner, 2007, p. 159).
4. The negative binomial model is a more conservative estimator than the Poisson model since it tends to inflate the size of the standard errors. Moreover, most social science count data is (un)conditionally overdispersed. That seems to be the case for the count-based dependent variables in this study, since the variance exceeds the mean for all of them. However, the results for our key variables of interest (salience and perceived scientific uncertainty) are robust to a Poisson specification.
5. Appendix Table A includes descriptive statistics for these counts of bill introduction and for all the independent and control variables described in the rest of this section.
6. The search terms for GM food labeling are "genetically modified," "GMO," and "genetically engineered." The search terms for HPV vaccine policies include "human papilloma virus," "HPV," and "human papillomavirus." The search terms for indoor tanning are "indoor tanning" and "tanning." The broad reach of these search terms meant that they returned many articles that were irrelevant and therefore were not included in the counts.
7. Chermak and Weiss (1997) use a similar measure to assess media effects on national criminal justice policy.
8. Each relevant newspaper article was read by one of the authors or an undergraduate research assistant who had been trained to code for whether language indicating that scientific uncertainty was present. An initial pass through the articles suggested minimal ambiguity in coverage of indoor tanning but more uncertainty in coding the HPV- and GM food-related articles. As a result, two research assistants read each article on those topics. When disagreements emerged, which occurred in a small minority of the cases, the authors intervened to resolve them. The authors read approximately two dozen of the most ambiguous articles and never disagreed among themselves.

9. Research funds data come from the National Institute of Health's Research Portfolio Online Reporting Tools (http://report.nih.gov/award/trends/State_Congressional/StateOverview.cfm, accessed July 2016). Other studies have used this measure of state scientific capacity (Karch, 2012; Mintrom, 2009).
10. More HPV-associated cancers occur in the cervix than in any other site. Moreover, most of the original marketing of the HPV vaccine linked it to the prevention of cervical cancer. Our models include the state-level prevalence of cervical cancer for those reasons. However, the vaccine is also recommended to prevent other diseases, such as genital warts and cancers of the oral cavity and oropharynx.
11. Democratic governors are coded as 1, Republican governors are coded as 0, and governors who are unaffiliated or belong to a third party are coded as 0.5. The legislative measure is a three-point count of the number of legislative chambers under Democratic control (0, 1, or 2). Previous research suggests that individual measures for each branch are appropriate given the different strategic interests of governors and legislators (Callaghan & Jacobs, 2014; Miller & Blanding, 2012).
12. Alaska and Hawaii do not have any neighbors and therefore receive a value of "0" for this measure. Excluding them from the analysis does not alter the results for our key variables of interest (salience and perceived scientific uncertainty). Similarly, the results for our key variables of interest do not change if the models include an alternative measure of the neighboring state effect that calculates the average number of bills that were introduced during the previous year.
13. The salience or perceived scientific uncertainty of a policy might affect the impact of these conventional diffusion pathways. For instance, heightened salience might make state lawmakers more likely to imitate their neighbors or ideological fellow travelers. We assessed this possibility in 12 models that interacted our measures of salience and perceived scientific uncertainty with our proxies for diffusion. Each model included a single interaction term; none of the interaction terms attained conventional levels of statistical significance.
14. Shipan and Volden (2006) find that the diffusion process is contingent on the level of legislative professionalism in a state. We assessed this possibility by interacting our measures of salience and perceived scientific uncertainty with our measure of legislative professionalism. This interaction term did not attain conventional levels of statistical significance in five of our six models. The only exception occurred in the context of GM food labeling bills, where the interaction of salience and state legislative professionalism had a significant positive effect.
15. In addition to the substantive factors described in this section, the models include a year count variable. It is a simple linear measure that begins the first year that a bill on the relevant topic was introduced in any state. This is a common approach in existing diffusion research (e.g., Grossback, Nicholson-Crotty, & Peterson, 2004). Also, the models' standard errors are clustered by state.
16. Bill introduction data are unavailable for Massachusetts prior to 2009. Excluding that state from the analysis does not alter the results for our key variables of interest.
17. Cervical cancer incidence data are intermittently unavailable for Nevada, North Dakota, and Vermont. Excluding those three states from the analysis does not alter the results for our main variables of interest (salience and perceived scientific uncertainty).
18. Given the nature of the political debate over HPV vaccination, there are other possible influences on the agenda-setting process. For example, religious conservatives object to mandatory HPV vaccination for various reasons. Including the proportion of the state population identifying themselves as Catholic or as evangelicals does not affect the results for our main variables of interest (salience and perceived scientific uncertainty). There is a significant positive relationship between the proportion of self-identified evangelicals in a state and HPV-related bill introductions, but the Catholic variable does not attain conventional levels of statistical significance. Similarly, including the proportion of female legislators in a state does not affect our main results and the variable does not attain conventional levels of statistical significance.
19. We assessed whether there is an interactive relationship between salience and scientific uncertainty by interacting our measures; this interaction term did not attain conventional levels of statistical significance in any of our models.
20. Our preliminary analysis found limited evidence of these sorts of interactive effects; they nevertheless represent a constructive direction for future research.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's web site:

Appendix

Table A. Descriptive Statistics

Variable	GM Food Labeling Legislation	HPV Vaccine Legislation	Indoor Tanning Legislation
Bill introductions	0.18	0.46	0.29
	(0.64)	(1.09)	(0.46)
Salience	45.77	15.43	4.43
	(28.81)	(7.64)	(1.50)
Scientific uncertainty	0.136	0.196	0.287
	(0.050)	(0.145)	(0.219)
NIH grants per capita	52.02	64.57	61.33
	(47.02)	(62.33)	(60.24)
Agricultural economy	0.019		
	(0.021)		
Cervical cancer rate		7.46	
		(1.46)	
Melanoma rate			24.12
			(5.64)
Urbanization	0.717	0.737	0.736
	(0.146)	(0.141)	(0.144)
Per capita income	4.549	4.599	4.605
	(0.079)	(0.063)	(0.065)
Government ideology	48.08	50.56	46.49
	(28.24)	(31.58)	(32.54)
Gubernatorial partisanship	0.465	0.494	0.441
	(0.494)	(0.499)	(0.495)
Legislative partisanship	0.990	0.964	0.883
	(0.893)	(0.923)	(0.934)
Previous adopter	0.010	0.310	0.080
	(0.098)	(0.463)	(0.272)
Neighboring state effect	0.073	0.217	0.232
	(0.160)	(0.295)	(0.261)
Ideological distance	26.64	27.48	31.09
	(17.87)	(16.21)	(17.50)
Legislative professionalism	0.188	0.191	0.196
	(0.121)	(0.120)	(0.120)

Note: Values are means, with standard deviations in parentheses.