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Measuring the Media Agenda

MARY LAYTON ATKINSON, JOHN LOVETT,
and FRANK R. BAUMGARTNER

Measuring media attention to politically relevant topics is of interest to a broad array of political science and communications scholars. We provide a practical guide for the construction, validation, and evaluation of time series measures of media attention. We review the extant literature on the coherence of the media agenda, which provides evidence in support of and evidence against the emergence of a single, national news agenda. Drawing expectations from this literature, we show the conditions under which a single national news agenda is likely to be present and where it is likely to be absent. We create 90 different keyword searches covering a wide range of topics and gather counts of stories per month from 12 national and regional media sources with data going back to 1980 where possible. We show using factor analysis wide variance in the strength of the first factor. We then estimate a regression model to predict this value. The results show the conditions under which any national source will produce time series results consistent with any other. Key independent variables are the average number of stories, the variance in stories per month, and the presence of any “spike” in the data series. Our large-scale empirical assessment should provide guidance to scholars assessing the quality of time series data on media coverage of issues.

Keywords agenda-setting, news agenda, issue salience

Researchers are often interested in the amount of news coverage devoted to issues such as air pollution, poverty, domestic violence, international finance, mental health, and so on. The more attention such issues receive, the more likely members of the public are to be knowledgeable, concerned, and opinionated about them (Barabas & Jerit, 2009; Behr & Iyengar, 1985; Kellstedt, 2003; Walker, 1977; Wood & Anderson, 1993; Zaller, 1992), the more likely lawmakers are to take them up, and the more likely policy change is to occur (Baumgartner, De Boef, & Boydston, 2008; Baumgartner & Jones, 1993; Soroka, 2002). Reciprocally, the more attention political actors pay to such issues and the more concerned members of the public are about specific issues, the more likely the news media are to cover them (Boydston, 2013; Edwards & Wood, 1999; Peake & Eshbaugh-Soha, 2008; Soroka, 2002).

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Media attention is, therefore, an important element of the political system because it signals the priorities of lawmakers to members of the public, and the priorities of the public to lawmakers. Because it shapes both elite and public behavior, media attention is a variable of interest in many studies of politics and mass communication. Political science studies that include measures of media attention range from those on lobbying (see, for example, Kollman, 1998; Goldstein, 1999; Smith, 2000) to presidential behavior (see Brody, 1991; Edwards, Mitchell, & Welch, 1995; Edwards & Wood, 1999; Kernell, 1997), to public opinion and knowledge (Barabas & Jerit, 2009; Behr & Iyengar, 1985; Kellstedt, 2003; Zaller, 1992), to media agenda-setting and framing (Boydston, 2013; Cohen, 1963; Entman, 1989; Gans, 1979; Hamilton, 2004; Kosicki, 1993; McCombs & Shaw, 1972; Soroka, 2002; Vliegenthart & Walgrave, 2010), to policy change (Baumgartner & Jones, 1993; Baumgartner et al., 2008; Soroka, 2002). Within communication studies, of course, concern with media attention and its causes is at the core of the entire discipline.

Given the importance of measuring media attention to a broad array of political science and communications studies (see Wolfe, Jones, & Baumgartner, 2013), our aim is to provide a practical guide for researchers and reviewers who wish to construct, validate, and evaluate time series measures of media attention. It is common in the literature for researchers to rely upon a single prominent news source such as the *New York Times*, the *Readers' Guide to Periodical Literature*, or *Time Magazine* as a proxy for news attention to a given issue. Keyword searches or human annotation of these sources is used to generate daily, monthly, or annual counts of news articles on the topic of interest.

In a highly critical article, John Woolley (2000) suggests that the choice of a particular media source as opposed to the use of a range of sources is highly problematic. He notes that a news source such as the *Wall Street Journal* has a particular set of features that influence the issues and events the paper chooses to cover. Differences in the selection criteria employed by different news outlets can, therefore, result in differences in the amount of attention given to different issues. Researchers reliant on a single source may be unaware that the proxy they have chosen is not representative of the larger "news agenda." On the other hand, it is clear that certain events or topics are so clearly newsworthy that, if we track attention in a range of sources, all will show similar trends.

Our goal is to identify the conditions under which coverage of an issue will be highly correlated across multiple news sources.¹ In circumstances where such conditions are met, scholars can be confident in their ability to measure the "news agenda," as any relevant measure of news coverage is bound to be highly correlated with any other. In circumstances where such conditions are not met, scholars need to be more careful in justifying the use of one source rather than another, or in asserting the existence of a coherent news agenda at all. If coverage is idiosyncratic, then there can be no generalizations from news coverage in any single source.

We provide the most extensive test to date of the similarities and differences in news agendas across outlets and issues, using a new data set that consists of daily counts of articles on 90 different topics, from 12 different news outlets, spanning up to 30 years. We use factor analysis to assess the degree to which the 12 outlets demonstrate similar patterns of coverage for each of the 90 topics. Having recorded the eigenvalue—or strength of the first factor—produced by each of the 90 factor analyses with the individual media sources as the variables, we then estimate a regression model to predict this value across the 90 topics studied. The results show the conditions under which any national source will produce time series results consistent with any other. Our findings prove highly robust when we look at the data when aggregated by week, month, or quarter; whether we look only at newspapers or TV news abstracts; whether we look at regional or national newspapers; and

whether we look at the subset of sources where data are available back to 1980 or the larger set of sources with less time coverage.

Our findings are intuitive and instructive for researchers. For issues that experience either sustained or periodic episodes of high salience, a national news agenda is typically present. In such instances, a single prominent news source can be used with confidence as a proxy for national news attention. However, when issues consistently receive low levels of attention, the amount of coverage dedicated to the topic is more likely to be idiosyncratic. Researchers studying low-salience issues, such as school prayer or food safety, for instance, should be wary of creating time series measures of media attention. We offer practical guidance for researchers who find they have low-salience topics in the analysis and concluding sections of this article.

Factors Shaping Attention Across Sources

The collective body of literature on the news industry and media agendas offers conflicting expectations regarding the existence of a national news agenda. While some authors highlight factors that should encourage a single, cohesive media agenda—such as shared norms of newsworthiness and the propensity for “copycat” behavior among journalists—other authors share Woolley’s concern (2000) that differences in format, audience, and market will lead to differences in coverage across outlets.

The Case for a Single News Agenda

First and foremost among the factors that should lead to coherence in the national news agenda are the shared norms and procedures followed by journalists in gathering and reporting the news (e.g., Cook, 1998; Schudson, 2002; Tuchman, 1978). Most reporters are trained through an on-the-job apprenticeship, through college and graduate courses, or through some combination of experience and courses. Through this training, journalists learn industry conventions regarding what events are newsworthy (Tuchman, 1978). Those values include novelty, “importance or impact on the audience, timeliness, involvement of important people, relevance to the audience, as well as an element of drama or inherent interest” (Alger, 1966; Graber, 1980; Just, 2011, p. 106; McManus, 1994; Mencher, 1977). As a result of these shared news values, “there is a professional norm regarding major news stories from day to day” (McCombs & Shaw, 1972, p. 184).

In addition to sharing news values, journalists from different news outlets often share information and workspace (sometimes sharing adjacent desks)—particularly if they work the same “beat” (Tuchman, 1978). A beat is an area of specialization, such as science, international news, local crime, or national politics. Reporters from competing news outlets who work the same beat usually know one another well—in fact, they sometimes have stronger relationships with one another than they do with reporters from their own paper or network who work different beats (Tuchman, 1978). Within the closely knit beat system, reporters from different outlets often rely on similar sources of information for leads on upcoming newsworthy events and for information on new developments in ongoing stories. These sources include press releases and news briefings from the organizations regularly covered by these reporters and the Associated Press Day Book (which provides a daily list of events by city) (Tuchman, 1978). By looking for news in the same places, using similar standards of newsworthiness, reporters increase the probability that the agendas of their respective news outlets will converge.

News organizations also look to each other for guidance on what issues are newsworthy, with wire services, the *New York Times*, and other major newspapers often serving as arbiters of “what is news.” When one of these news leaders runs a story, a growing body of literature shows that other news outlets are likely to follow suit through a process sometimes called “inter-media agenda setting” (e.g., Boyle, 2001; Golan, 2006; Reese & Danielian, 1989; Sweester, Golan, & Wanta, 2008; Vliegenthart & Walgrave, 2010).² Part of the reason for this “copycat” behavior stems from the costs associated with gathering national and international news, which includes the cost of maintaining bureaus in D.C. and foreign capitals across the globe. As stated by Graber and Holyk (2011, p. 96):

Because news gathering is expensive, only a few media companies actually do it. Most news providers rely on wire services for non-local stories or follow the lead of prestigious news organizations. . . . That explains why, despite mushrooming of broadcast enterprises, the news diet of most Americans has remained surprisingly uniform in the Internet age.

Note that because news sources look to one another for guidance when deciding what issues to cover, the generation of the news agenda is inherently an endogenous process. News coverage begets news coverage, sometimes snowballing dramatically into what authors have described as “media storms” and “media waves” (Boydston, Walgrave, & Hardy, 2011; Elmelund-Præstekær & Wien, 2008; Kepplinger & Habermeier, 1995; Vasterman, 2005). As a result, coverage of world events may not be in proportion to the size or frequency of those events (Boydston, 2013). In fact, Boydston (2013) stresses that the news media could not possibly cover all events and issues in a comprehensive way and that coverage “instead lurch[es] from one hot event . . . to the next at the exclusion of many other important issues” (p. 9). As long as the media lurch together from one story to the next, a consistent pattern of coverage will be observed across news sources.

The Case Against a Single News Agenda

While the factors above support the idea of a cohesive national news agenda, some characteristics of the news industry suggest differences in news coverage across outlets. For instance, print outlets have more space for news than do half-hour nightly newscasts and can, therefore, cover more topics than their televised counterparts (Just, 2011; McCombs & Shaw, 1972). The decision to air a televised news report also involves consideration of the visual images available to accompany the story. Unlike with print news, “stories with good video are more likely to make air than stories of similar consequence but only a talking head” on TV (Just, 2011, p. 108).

For both print and televised news outlets, regional salience may be important (e.g., Bruce, 1966; Gordon, 1966; Haider-Markel, Allen & Johansen, 2006; Robinson, 1981). Similarly, in an effort to target a particular audience and the advertisers who wish to reach that audience, news outlets may tailor their coverage to the interests and views of their target audience (Hamilton, 2004). To the extent that different outlets target different audiences, their agendas may differ. For example, business-oriented outlets such as the *Wall Street Journal* may have a different agenda than a general interest newspaper. Fox may focus on different topics than the *Washington Post*.

Finally, the selection criteria used to identify low-salience stories may differ from the criteria used to select major news items and may vary across news outlets. Shared news values and cue taking by journalists from different outlets lead reporters to identify a handful

of major news items each day. Attention to these issues may “fixate and explode,” meaning major issues are widely and heavily covered by the major news outlets, often to the exclusion of other issues (Boydston, 2013). The limited space that remains for smaller or less salient stories may simply be allocated in a less routinized, more idiosyncratic way. Alternatively, attention to less salient topics may be allocated using a set of standards that differs from those applied to the selection of major news items (focusing more on topics with regional salience, for instance). While high salience issues are likely to exhibit similar patterns of coverage across outlets, differences in the routines and selection standards that govern the coverage of minor news items may lead to variance in the coverage of such issues across outlets.

Prior Comparisons of Issue Attention Across News Outlets

Given the potential for variations in issue attention across news outlets, several studies have attempted to assess empirically the degree to which a single national news agenda can be said to exist. The collective evidence they provide is mixed. Studies that find support for the national news agenda include Baumgartner and Jones (1993), Baumgartner et al. (2008), and Barabas and Jerit (2009). Baumgartner and Jones (1993) devoted an appendix showing the correlations between coverage of several issues in the *New York Times* and the *Readers' Guide* and found high degrees of correlation between the two. In a more recent book, Baumgartner and colleagues (2008) assessed the reliability of their use of the *New York Times* coverage of capital punishment. They used electronic searches of death penalty coverage in multiple sources and found a high correlation in amounts of coverage over time and a similar surge in attention to the concept of “innocence” in all newspapers they investigated, including the *Houston Chronicle*. Barabas and Jerit (2009) provide a study of the relationship between policy information in the news and public policy knowledge. These scholars assessed the reliability of their findings (originally based on data from the Associated Press) using article counts from a range of news sources, including both print and network news reports. The authors found no differences related to the sources used.

Several additional studies found that correlations in issue attention across news outlets were highest for high salience issues. McCombs and Shaw (1972) provided a seminal study that compared presidential campaign coverage across print and network news outlets (including both local and national sources). These authors found that the campaign issues covered by the respective sources were highly correlated, particularly with respect to “major issues” (defined by article/story length and the placement in the publication or newscast). With lower salience issues, however, correlations across news outlets were lower, leading the authors to conclude: “As we move from major events of the campaign, upon which nearly everyone agrees, there is more room for individual interpretation, reflected in the lower correlations for minor item agreement among media” (McCombs & Shaw, 1972, p. 184).

Vliegthart and Walgrave (2010), in one of the most comprehensive comparisons of media attention to date, echoed the findings of McCombs and Shaw. Their study examined attention to 25 issues in nine Belgian news sources over a period of 8 years. They found that media coverage of salient, exogenous, real-world events (such as crime and natural disasters) was highly correlated across news outlets. Coverage of lower salience, government-related topics (such as issues related to finance, science, and government institutions) was less highly correlated across news outlets but exhibited more evidence of inter-media agenda setting.

Stuart Soroka (2002) compared eight different Canadian newspapers in their coverage of eight issues over 5 years. For several issues, including taxes, environmental issues, and inflation, correlations in coverage were high. More variability was seen in attention to issues like the national deficit and unemployment. Like McCombs and Shaw (1972) and Vliegenthart and Walgrave (2010), Soroka (2002) found that coverage was most consistent across papers for any given issue during periods of high issue salience (that is, during periods when the issue produced the largest number of stories). Significant differences were also found between the agendas of French- and English-language sources. Notably, however, regional differences in news coverage were not observed.

Finally, Woolley (2000) used keyword searches of the UC Melvyl electronic database, which contains records for five print news sources, to create annual counts of articles related to child abuse (arguably a low salience issue). He found low levels of correlation in coverage across the news outlets studied.

Expectations Drawn From the Literature

Based on the studies reviewed above, there are many reasons to expect a single national agenda to emerge. However, the literature also provides examples of variance in coverage across outlets. Our goal is to explain this variance, and therefore to suggest when an analyst can expect high inter-correlations across all outlets versus idiosyncratic behaviors. Accordingly, we develop two very simple expectations for empirical testing.

Expectation 1 (Salience): Correlations in news coverage across outlets will be higher for highly salient issues.

Expectation 2 (Attention Spike): A single agenda is more likely on those topics that generate large surges in attention.

Coverage of low salience issues, and particularly those without attention spikes, will be more variable across news outlets. Here, inter-media agenda setting is less likely to be at work. Further, the story is not big enough to be of clear importance (based on shared news value) to multiple news outlets. For smaller stories, the selection criterion employed will vary from outlet to outlet. Regional salience may influence the outlet's decision to pick up the story, or a particular element of the story (such as a captivating visual image) may lend itself more to coverage by one type of media (television or print) versus another. Thus, we expect low correlations, or no single national agenda, when attention is low and when there are no spikes in attention associated with significant but unusual events.

Empirical Approach

Our approach is very straightforward. We want to gather a great deal of data about media coverage of a very wide range of policy topics (and indeed some non-policy topics as well). We seek to maximize variance on several dimensions: (a) time coverage, so that we have as long an historical period under review as possible; (b) media sources, so that we can create the broadest possible index and see if there are common trends across different types of media; and (c) policy topics, so that we are not conducting another case study, as have been common in the literature, but can make some generalizations about media coverage across the full range of issues that might appear on the media agenda.

We explain our data collection process in detail in the appendix. The essentials are as follows. First, we developed a set of keyword searches that covers a wide range of

policy- and non-policy-related topics. We did this by going systematically through the topic codebook of the Policy Agendas Project and identifying topics that could be searched successfully with electronic keywords, with several examples coming from each of the major topic domains as defined in the Agendas Project classification system. Our goal was not to replicate the coding done in the Agendas Project, but rather to use the codebook as a guide in covering an extremely broad range of topics. We have several searches in each of the 19 major topics of the Agendas Project codebook, ensuring that we cover all domains of U.S. politics and international affairs. Further, we use the extended codes of the Agendas Project media database to include some “non-policy” items such as sports, weather, fires, and other items unrelated to public policy so that we can assess if there are differences in how policy- and non-policy-related topics are covered in various media sources. We conducted 90 searches across the full range of topics available, as explained in more detail below. We are not aware of any published work in political science that has used more than 10 such searches of American news sources. Our goal here is to provide a broad platform for assessing the characteristics of media coverage series.

Our second goal was to include many media sources. We used LexisNexis Academic Universe through our university library’s electronic database collection and identified 12 national and regional sources for study. Table 1 shows the networks and newspapers searched and the dates for which archives are available through LexisNexis. Our goals in selecting particular sources were to include a mixture of print and television news outlets, to include a mixture of national and regional sources, and to maximize the length of the time series examined.

We searched four national newspapers (the *New York Times*, the *Wall Street Journal*, the *Washington Post*, and *USA Today*), three regional newspapers (the *Houston Chronicle*, the *Philadelphia Inquirer*, and the *St. Louis Post-Dispatch*), and five national television networks (ABC, CBS, CNN, Fox, NBC). We began the searches on the date the source

Table 1
Media sources used

Source	Start date	Months available	Average number of articles per month
Fox	November 26, 1997	151	2.82
NBC	January 1, 1997	162	2.63
<i>Philadelphia Inquirer</i>	January 1, 1994	197	6.33
<i>Houston Chronicle</i>	September 15, 1991	225	11.36
CBS	February 1, 1990	244	2.80
CNN	January 1, 1990	245	12.77
<i>USA Today</i>	January 3, 1989	257	4.97
<i>St. Louis Post-Dispatch</i>	January 1, 1989	257	8.74
ABC	June 1, 1980	361	2.49
<i>Wall Street Journal</i>	June 1, 1980	361	2.26
<i>New York Times</i>	June 1, 1980	361	18.19
<i>Washington Post</i>	June 1, 1980	361	18.96

Note. Searches were conducted from the first date available through June 30, 2010. The last column shows the average number of articles found for each source across the 90 keyword searches conducted. Standard deviations are highly correlated to the means.

became available (June 1, 1980, for the longest running sources) and searched through June 30, 2010. As [Table 1](#) shows, we have 30 years of data for four sources: ABC, the *New York Times*, the *Washington Post*, and the *Wall Street Journal*. Four other sources, CBS, CNN, *USA Today*, and the *St. Louis Post-Dispatch*, have data going back to at least 1990. The shortest series in the data set is Fox, which begins in December of 1997.

These sources met our criteria in terms of providing both regional and nation sources, as well as print and television news sources. They also offer the longest time series available via the LexisNexis archives. As [Table 1](#) indicates, we have from 14 to 30 years of data for each of the series.

We aggregate all of our data for each keyword-source combination to get a monthly count. It is then a simple matter to compare the patterns of attention across all of the sources available for each topic. The empirical question of interest is: When do the different sources show the same pattern in their coverage over time and when do they follow unrelated patterns? In our results section below, we show data aggregated by month, and we use all 12 data sources, which limits our time coverage to the period covered by all 12 sources (see [Table 1](#)). But in our supplemental materials, we show that our results are virtually identical when we limit ourselves to the four media sources where we can conduct our analysis for over 30 years, and when we aggregate the data by week or quarter rather than month. Our results, therefore, are extremely robust. This is not surprising as we are looking at some very simple questions: How much coverage is there, and are there any spikes?

Once we compiled the data across time for identical keyword searches across the different media sources, we conducted a factor analysis to see if, for each keyword, a single factor emerged. Very simply put, factor analysis is an assessment of covariance, and the creation of a variance-covariance matrix is the starting point of any factor analysis. Based on the variance-covariance matrix for a set of observed variables, factor analysis involves the calculation of factor *loadings*, which are the parameters of these linear functions, and the *communality* of each variable, which is the “the part of its variance that is explained by the common factors” (Tryfos, 1997, p. 16).³ An eigenvalue—a calculation of the amount of variance explained by a given factor—is typically reported as a means of summarizing a factor analysis. Mathematically, the eigenvalue equals the proportional reduction of error (PRE) times the number of variables. Therefore, we can report the eigenvalue or, equivalently, the PRE in the results below.

Once we calculate the factor loadings for each media source, separately for each of the 90 keyword searches, we create a new database where the 90 keyword searches, not the 12 monthly time series, are the units of analysis. In this analysis, we seek to understand the conditions under which we observe a strong or a weak first factor. Here, we use simple regressions (with robust standard errors) to understand what predicts the presence or absence of a single statistical factor (measured as the eigenvalue or PRE of the first factor) representing the national media agenda. As we will see below, this number is highly predicted by a very simple statistical model. Therefore, we can understand the conditions under which a single national media agenda is likely to be present or absent.

Results

[Table 2](#) shows our set of 90 keywords as well as the number of hits each generated. The average number of articles per month (across all sources) ranges from 1.7 to 687, with a median of about 60 stories per month. Among the 30 topics with the lowest average number of articles per month, the maximum number of articles per month observed in any of the 12 sources was 23. Some of the topics in this low-coverage group are relatively trivial, such

Table 2
The 90 keyword searches

Agendas Project code	Agendas Project codebook description	Search term used	Mean number of articles	Rank
1926	International Organizations Other Than Finance: United Nations	“United Nations”	687.7	1
1507	Bankruptcy	Bankruptcy	528.0	2
1303	Elderly Issues and Elderly Assistance Programs (Including Social Security)	“social security” OR SSA	468.9	3
104	Monetary Supply	“fiscal policy” OR “monetary policy” OR “Federal Reserve”	465.5	4
1603	Military Intelligence, CIA, Espionage	CIA	438.6	5
1602	U.S. and Other Defense Alliances, U.S Security Assistance	NATO	329.1	6
1701	NASA, U.S. Government Use of Space, Space Exploration Agreements	NASA	301.6	7
1502	Securities and Commodities Regulation	“Securities Exchange Commission”	279.6	8
803	Natural Gas	“natural gas”	278.4	9
2602	Weather and Natural Disasters	“earthquake”	257.1	10
2902	Sports and Recreation	“world cup”	254.5	11
2101	National Parks, Memorials, Historic Sites, and Recreation	“national park” or “national memorial”	250.2	12
2009	IRS Administration	IRS	219.4	13
1409	Housing Assistance for Homeless and Homeless Issues	homeless! AND (U.S. or United States)	210.6	14
333	Mental Health	“mental!” w/5 (health OR retardation OR ill) AND (U.S. OR United States OR America!)	192.4	15
1906	International Finance and Economic Development	IMF OR “world bank”	180.7	16

(Continued)

Table 2
(Continued)

Agendas Project code	Agendas Project codebook description	Search term used	Mean number of articles	Rank
1207	Child Abuse and Child Pornography	“abuse” w/5 (child!)	165.3	17
2803	Arts and Entertainment	“Michael Jackson”	145.1	18
707	Recycling	recycl!	136.2	19
301	Comprehensive Health Care Reform	reform w/5 (“health care” OR “Medicare”)	132.1	20
2003	Postal Service Issues (Including Mail Fraud)	“postal service”	119.3	21
1201	Executive Branch Agencies Dealing With Law and Crime	DOJ OR FBI	118.4	22
2601	Weather and Natural Disasters	“hurricane” w/15 (damage OR disaster)	112.3	23
1208	Family Issues	“domestic violence”	111.2	24
2013	Census	census w/5 (bureau or U.S.)	108.4	25
1003	Airports, Airlines, Air Traffic Control and Safety	“Federal Aviation Administration” OR “Civil Aeronautics Board”	102.1	26
606	Special Education	“special education”	98.7	27
2903	Sports and Recreation	“LPGA”	96.3	28
1202	White Collar Crime and Organized Crime	crime w/5 (“white collar” OR organized)	94.6	29
806	Alternative and Renewable Energy	energy w/5 (solar OR wind OR alternative)	90.1	30
302	HMOs	“HMO”	89.6	31
400	General Agriculture	“Department of Agriculture” OR DOA	88.6	32
1800	General Foreign Trade	“Federal Trade Commission”	87.0	33
601	Higher Education	student! w/5 (loan! OR grant!)	86.4	34
1500	General Commerce	“Department of Commerce” OR “National Bureau of Standards”	84.7	35
1523	Domestic Disaster Relief	“Federal Emergency Management Agency”	79.6	36

1401	Housing and Community Development	HUD	77.4	37
1005	Railroad Transportation and Safety	AMTRAK	77.1	38
1807	Tariff and Import Restrictions, Import Regulation	tariff! or "import quota!"	71.7	39
1609	VA Issues	"veterans affairs"	68.1	40
709	Species and Forest Protection	"endangered species"	66.3	41
335	Prescription Drug Costs and Coverage	"prescription drug!" w/5 (cost! OR price! OR coverage)	66.0	42
343	Controlled and Illegal Drug Abuse, Treatment, and Education	"drug abuse"	64.1	43
1001	Mass Transit	"mass transit"	63.7	44
2802	Arts and Entertainment	"Brad Pitt"	61.9	45
1301	Food Stamps, Food Assistance, and Nutrition Monitoring Programs	"Food stamps" OR "WIC"	56.4	46
1802	Trade Negotiations, Disputes, and Agreements	NAFTA OR GATT OR "most favored nation"	45.1	47
1808	Exchange Rates and Related Issues	"exchange rate"	43.5	48
1006	Highway Construction, Maintenance, and Safety, Auto Safety	"National Highway Traffic Safety Administration" OR NHTSA	42.4	49
1403	Urban Economic Development and General Urban Issues	urban w/5 (revitalization OR renewal OR sprawl OR "economic development")	41.5	50
2804	Arts and Entertainment	"book review"	39.2	51
705	Air Pollution	"air pollution" AND (U.S. OR United States OR America!)	38.5	52
704	Hazardous Waste	waste w/5 (hazardous OR toxic)	38.2	53
202	Gender and Sexual Orientation Discrimination	("women" OR "sex" OR "sexual orientation") w/5 "discrimination" AND (U.S. OR United States OR America!)	36.5	54
1605	Arms Control and Nuclear Nonproliferation	nonproliferation OR "Arms Control and Disarmament Agency"	33.2	55

(Continued)

Table 2
(Continued)

Agendas Project code	Agendas Project codebook description	Search term used	Mean number of articles	Rank
1203	Illegal Drug Production, Trafficking, and Control	“Drug Enforcement Administration”	32.7	56
2702	Fires	“house fire”	28.4	57
1798	Research and Development	“National Science Foundation”	27.2	58
2603	Weather and Natural Disasters	“drought” w/15 “rain”	26.0	59
603	Education of Underprivileged Students	education AND (“Head Start” OR NHSA)	23.3	60
1708	Weather Forecasting and Related Issues, NOAA, Oceanography	NOAA	22.9	61
501	Workplace Safety	OSHA	22.2	62
1915	Panama Canal Issues and Other International Canal Issues	“Panama Canal”	21.2	63
206	Voting Rights and Issues	“Voting Rights Act”	21.0	64
508	Parental Leave and Child Care	leave w/5 (paternity OR maternity OR parental)	21.0	65
2100	General Interior	“Department of Interior”	16.9	66
504	Employee Relations and Labor Unions	NLRB	16.3	67

201	Ethnic Group Discrimination	("race" OR "ethnicity" OR "ethnic group") w/5 "discrimination") AND (U.S. OR United States OR America!) "beach volleyball"	16.0	68
2904	Sports and Recreation		15.7	69
103	Unemployment Rate	("unemployment rate" OR "joblessness" OR "jobless rate") w/5 (United States OR U.S. OR America!)	12.9	70
1205	Prisons	prison! w/5 (construction OR contracts OR overcrowding)	12.6	71
405	Animal and Crop Disease and Pest Control	"pest control"	12.3	72
701	Drinking Water Safety	"water pollution"	12.3	73
802	Electricity and Hydroelectricity	hydroelectric AND (U.S. OR United States)	11.4	74
204	Age Discrimination	age w/5 "discrimination" AND (U.S. OR United States OR America!)	11.2	75
2801	Arts and Entertainment	"Opera" w/5 (opening)	11.1	76
207	Freedom of Speech and Religion	"school prayer"	10.5	77
1408	Elderly and Handicapped Housing	housing w/5 (elderly OR handicapped)	9.1	78
402	Farm Subsidies	(farm! OR agriculture) w/5 (subsidy! OR "price support") w/15 (U.S. OR United States OR America!)	8.9	79

(Continued)

Table 2
(Continued)

Agendas Project code	Agendas Project codebook description	Search term used	Mean number of articles	Rank
1707	Broadcast Industry Regulation (TV, Cable, Radio)	“Federal Communication Commission”	8.2	80
108	Industrial Policy	(“industry” or “industrial”) w/15 (“productivity”)	7.5	81
2102	Native American Affairs	“Native American” OR “American Indian” w/5 (education OR court! OR health OR casino)	7.2	82
604	Vocational Education	vocational w/5 education AND (U.S. OR United States OR America!)	5.7	83
2105	U.S. Dependencies and Territorial Issues	“Puerto Rico” OR Guam OR “American Samoa” w/10 (statehood OR policy!)	4.6	84

401	Food Inspection and Safety (Inspection of Domestic and Imported Food)	food w/5 (inspection OR regulation) w/15 (U.S. OR United States OR America!)	4.4	85
1900	General State Department	“US Department of State”	3.0	86
2701	Fires	“forest fire” w/15 (damage OR disaster OR fight)	2.6	87
205	Handicap or Disease Discrimination	handicap! OR disabled OR “chronic illness” w/5 “discrimination” AND (U.S. OR United States OR America!)	2.2	88
505	Fair Labor Standards	“minimum wage” w/5 (rate OR regulation)	2.2	89
1302	Poverty and Assistance for Low-Income Families	“Aid to Families with Dependent Children” OR AFDC OR “Temporary Assistance for Needy Families”	1.7	90

Note. Agendas codes were used to ensure that we covered the full range of possible topics. The keywords do not, however, cover the full range of issues associated with each subtopic listed. The table lists the average number of articles found per month across all 12 sources. Keywords are listed in descending order of media salience. Data included here incorporate only those searches where all 12 sources are available, or from November 1997 through June 2010.

as articles related to opera and those related to beach volleyball, but others are of more consequence, such as water pollution, farm subsidies, the unemployment rate, and racial discrimination. As we will see below, a key first distinction in the likelihood that a single national media agenda will emerge from the data is a simple count of stories per month. For topics that receive the least amount of news coverage, much of the coverage we observe is noise.

For each of the 90 searches listed in Table 2, we performed identical factor analyses to assess the degree to which a national news agenda is evident across this diverse collection of topics. Figure 1 gives a sense of some of the patterns we observed—sequentially displaying examples of issues with high, medium, and low amounts of news coverage. Each part of the figure presents monthly counts of articles from each of the 12 news sources as separate gray lines and the first factor that resulted from the factor analysis as a thick black line. The factor, or index, is measured on the left scale in each part of the figure and is standardized to have a mean of zero and standard deviation of one. The right axis shows the number of stories per month, separately for each media source. As anticipated, these graphs suggest that attention across news outlets is most consistent for high salience topics.

Recall that our task is to identify the conditions under which a single national media agenda emerges, and Figure 1 allows us to go some distance in understanding these conditions. Figure 1A shows monthly counts of articles that mention “NATO,” a high-coverage topic (the mean number of articles is 391; see Table 2). In addition to high average levels of

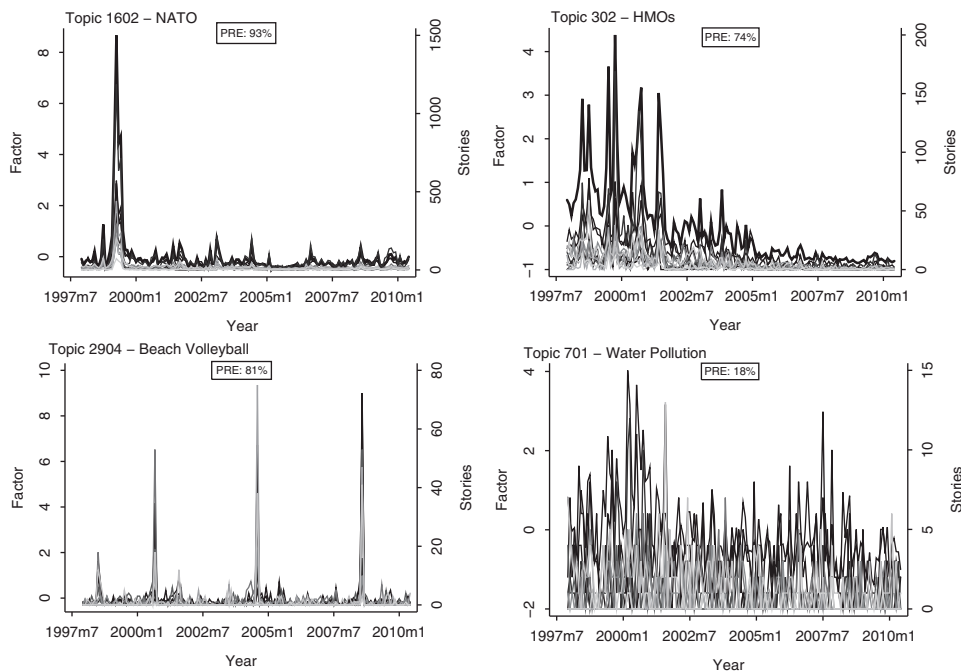


Figure 1. Four examples of media coverage. The four parts of the figure illustrate patterns observed in the 90 cases. Upper left (A): high media coverage, spikes, and a single national agenda (NATO); upper right (B): moderate levels of coverage and a single national agenda (HMOs); lower left (C): low media coverage, spikes, and a single national agenda (beach volleyball); lower right (D): no single national agenda (water pollution).

Table 3
Factor loadings and eigenvalues for the first factor: Four selected topics

	NATO	HMOs	Beach volleyball	Water pollution
ABC	.98	.84	.97	.42
CBS	.99	.85	.95	.16
CNN	.98	.87	.94	.69
Fox	.91	.78	.73	.45
<i>Houston Chronicle</i>	.98	.83	.87	.23
NBC	.99	.86	.90	.41
<i>New York Times</i>	.98	.95	.92	.44
<i>Philadelphia Inquirer</i>	.93	.87	.85	.64
<i>St. Louis Post-Dispatch</i>	.95	.86	.95	.38
<i>USA Today</i>	.99	.88	.97	.47
<i>Washington Post</i>	.98	.89	.96	.23
<i>Wall Street Journal</i>	.95	.80	.75	.22
Eigenvalue	11.21	8.85	9.72	2.19
Variance explained	.93	.74	.81	.18

Note. Data correspond to the searches shown in [Figure 1](#).

coverage, the series is also marked by an extreme spike in attention associated with military action by NATO in 1999 and by multiple smaller spikes occurring later in the series. For this high-coverage, high-variance issue, we see that coverage by each of the 12 news sources covaries to a high degree, and we observe the emergence of a single factor. [Table 3](#) provides further information about the first factor observed in coverage of NATO—it shows the factor loadings for each of the 12 news sources and the eigenvalue for the first factor. Notice that all of the factor loadings are high (the *lowest* factor loading, Fox, is .91). Also notice the high eigenvalue of 11.21 and PRE of .93, meaning that the first factor—the national news agenda—explains 93% of the variance in attention to NATO.

[Figure 1B](#) shows the monthly count of articles that mention HMOs, a topic that received a moderate amount of coverage (on average, 89.6 articles per month). Like coverage of NATO, this series is marked by peaks and valleys; however, none of the spikes in attention to HMOs reach the magnitude of the 1999 spike in attention to NATO. Further, attention to HMOs appears to trend over time, with the highest levels of coverage being observed from 1998 to 2002 and articles mentioning the topic almost disappearing from news coverage by 2007. Looking at [Table 3](#), we see that the factor loadings and the eigenvalue are somewhat lower than were those for HMOs, although they still indicate the presence of a single factor to which all of the news sources contribute heavily. Overall, the first factor explains 74% of the variance in coverage of HMOs.

[Figure 1C](#) shows attention to a low-coverage topic, beach volleyball (15.7 articles per month, on average). This topic is characterized by a distinctive pattern of news coverage: that of cyclical coverage or recurrent spikes in attention (in this case, associated with the summer Olympics). These spikes in attention are found in each of the 12 news sources. This pattern is of interest because of the cyclical rhythm of attention to a number of government actions such as elections, passage of the federal budget, and other events. Further, whether the spikes are cyclical or in response to stochastic events coming once or at random

intervals, their presence renders a single statistical factor to be much more likely. Turning to [Table 3](#), we see that even though beach volleyball is a low-salience issue, the eigenvalue for the first factor is still quite high (9.72), and although there is variability across the factor loadings, all of the news sources contribute significantly to the factor. Overall, 81% of the variance in beach volleyball coverage is explained by the first factor. We will return to the implications of these spikes in attention in the discussion section. Analysts must determine if their research question relates to “high attention” versus “normal” periods or if they are interested in the variability in attention outside of the periods of the spikes.

[Figure 1D](#) shows the pattern of attention to another low-coverage issue: water pollution (12.3 articles per month, on average). Unlike attention to beach volleyball, news coverage of water pollution is relatively flat over time. Absent a galvanizing event or major spike in attention to this low-salience topic, it appears that coverage of the issue across news outlets is idiosyncratic. [Table 3](#) shows that the eigenvalue for the first factor is just 2.19, meaning the first factor explains only 18% of the variation in news coverage. The individual factor loadings are also low by conventional standards. In the case of water pollution, we find no evidence of a cohesive national news agenda. Explaining the strength of the first factor is our task in the next section. The results show that our four-case illustration from [Figure 1](#) is indeed quite generalizable.

A Statistical Model of the Emergence of a National News Agenda

Across our 90 searches, the proportion of variance in news coverage explained by the first factor ranges between 0.12 and 0.93, with a mean value of 0.40 and a median of 0.36. [Table 4](#) gives summary statistics of three key variables in the analysis to follow.

Both the extant literature and our visual assessment of patterns of news coverage provided in [Figure 1](#) suggest that issue salience is a key determinant of the emergence of a national news agenda. As our figures reveal, salience can be relatively stable over time or can vary widely as focusing events galvanize attention to a particular issue. For this reason, we construct two separate measures of issue salience that serve as the key explanatory variables in our model: the average number of monthly news articles and a variable we refer to as “attention spike.” The latter variable is defined as the difference between the maximum value and the mean, divided by the mean: $[(\text{max} - \text{mean})/\text{mean}]$. Better than the standard deviation, this variable captures not just the variance but in particular the degree to which there is a high spike in the data relative to the average. [Table 4](#) shows that this variable has a minimum of 0.74 and a maximum of more than 20. Both measures of salience are logged in the models presented below because they have declining marginal effects at very high levels.

Table 4
Summary statistics

Variables	Mean	Median	Minimum	Maximum
Factor 1 variance explained	.40	.36	.12	.93
Salience	100.90	62.83	1.71	687.74
Attention spike	4.16	2.70	.74	21.42

Note. The table refers to all 12 media sources. The “attention spike” variable is defined as the difference between the maximum and the mean, divided by the mean.

Table 5
Regression on the proportion of variance explained by the first factor:
12 sources

	Coefficient (<i>SE</i>)
Saliency	.25 (0.01)*
Attention spike	.46 (0.02)*
Intercept	-.24 (0.02)*
R^2	.89
N	90
F	294.63 (.00)

Note. Data are from an OLS regression; White's robust standard errors are used. Saliency is the mean number of articles per month. Attention spike is the difference between the maximum and the mean, divided by the mean. Both the attention spike and saliency variables are logged (base 10) to account for the large ranges of these variables. Running the model with the non-logged version of the variables reduces the fit of the model quite substantially, but does not alter the significance of the coefficients. The movement from 90 to 100 articles per month has less of an impact than the movement from 10 to 20 articles; the logged version of these variables accurately reflects this concept of diminishing marginal effects. We also tested the model with the addition of two dummy variables respectively indicating low-saliency and medium-saliency topics (based on the mean number of articles per topic). Neither threshold control was significant.

* $p < .05$ (two-tailed test).

Table 5 shows the results of a simple model explaining the strength of the national news agenda as a function of the two measures of issue saliency described above. Together, these two variables explain 89% of the variance in our dependent variable.

Note that our saliency and spike indicators show declining marginal impacts on the PRE; therefore, we transform the values by taking their common (base 10) log before conducting our regression as reported in Table 5. The results show that increasing the saliency, measured by the average number of stories per month, by a factor of 10 (e.g., from 1 to 10 or from 10 to 100) increases the PRE by .25. While this is a large impact, the spike variable has roughly double this effect.⁴ Table 6 shows the combined effect of our two key variables.

Table 6 addresses the substantive impact of our key independent variables on the strength of the national news agenda. It displays the predicted value of the strength of the first factor when we manipulate the mean number of articles as well as the magnitude of the spike variable. The values attached to the saliency and attention spike axes represent the 10th to 90th percentiles of the respective variables, with PRE increasing across the rows and moving down the columns. For example, with relatively low news coverage (37 articles per month, around the 40th percentile) and no particularly strong spike in coverage (a maximum of 115 articles, creating an attention spike of 2.1), the first factor is predicted to explain 31% of the variance in news coverage. Moving to high average coverage (141 articles) with a strong peak in the data (1,004 articles, an attention spike of 6.1) generates an expected value of 67% variance explained in news coverage. The data presented in Table 6 come from our full set of news sources; our supplemental materials include a discussion of how these predicted values would apply to the use of only a single source.

Table 6
 Predicted values of the first factor for a national news agenda

Saliience		Value	Attention spike								
			1.2	1.6	1.7	2.1	2.7	3.4	4.8	6.1	8.5
Value	Percentile	Percentile	10th	20th	30th	40th	50th	60th	70th	80th	90th
7	10th		.01	.07	.09	.13	.18	.23	.29	.34	.41
12	20th		.07	.12	.14	.19	.23	.28	.35	.40	.46
22	30th		.13	.19	.21	.25	.30	.34	.41	.46	.53
37	40th		.19	.24	.26	.31	.36	.40	.47	.52	.59
63	50th		.25	.30	.32	.36	.41	.46	.53	.58	.64
82	60th		.28	.33	.35	.39	.44	.49	.56	.61	.67
98	70th		.30	.35	.37	.41	.46	.51	.58	.63	.69
141	80th		.34	.39	.41	.45	.50	.55	.61	.67	.73
268	90th		.41	.46	.48	.52	.57	.62	.69	.74	.80

Note. Cell entries are predicted values for the strength of the first factor from Table 5. Reading across the rows shows how the predicted value increases as an attention spike moves from its 10th to 90th percentile (with the corresponding value shown). Going down the columns shows how the predicted value increases as saliience increases. Note that these results are based on an index with 12 sources. Analysts looking at only a single source would have fewer hits, so for example their measure of saliience would not be as high as here, even for a case where a single media agenda was highly likely. A series of 12 regressions, predicting the total number of stories per month based on each individual outlet's results, shows that we can predict this figure very accurately ($R^2 > .68$ for all cases but the *Wall Street Journal*, .51) and that the following coefficients should be used: ABC, .03; CBS, .04; CNN, .17; Fox, .05; *Houston Chronicle*, .13; NBC, .03; *New York Times*, .22; *Philadelphia Inquirer*, .06; *St. Louis Post-Dispatch*, .08; *USA Today*, .05; *Wall Street Journal*, .05; and *Washington Post*, .19. This means that the median level of saliience for the index, 63 stories, is equivalent to 63 times the coefficient for each individual source. Because the attention spike variable is calculated as a ratio, it should not be affected by the number of sources used.

Discussion

We have provided a simple but empirically the most extensive study to date of the degree to which a wide range of issues receive similar levels of coverage across numerous broadcast and print news sources. Using our new and expansive data set covering 90 policy and non-policy topic areas across 12 sources over as much as 30 years, we show that the presence or absence of a single national media agenda can be explained by two main factors: how much coverage a topic receives and whether an event producing a spike in attention occurs. Roughly 90% of the variation in the explanatory power of a national media factor score can be explained by these two variables.

There is no right answer about whether an analyst need or need not include many media sources in measuring the news agenda with respect to a specific issue. It depends on the theoretical question being investigated, of course. However, this study does offer guidance that can aid researchers in constructing valid measures of media attention. For high-saliience issues, a consistent pattern of coverage is often found across national news outlets. The same is true for issues that exhibit spikes in attention. For issues with consistently high levels of coverage or large attention spikes, a cohesive national agenda almost certainly exists, and virtually any major news source will show similar patterns in coverage. Therefore, in

such instances it may be a waste of resources to construct a complicated media index. (Of course, depending on how the data are collected, the difference in resources needed to construct an index as opposed to a single news series may be trivial, so there is no reason to limit oneself to a single source.)

For cases with low average coverage and no spikes in attention, a cohesive news agenda is far less likely to be present. In these cases, no single factor emerges, and differences in coverage both across news outlets and over time appear to be completely idiosyncratic. In such cases, an index of coverage across many sources may be no more useful than a count of articles from a particular source. Rather, the values of a data series for these issues simply indicate that the issue is of low salience and virtually absent from the national news agenda at all observed time points. For this reason, one should neither attempt to model the amount of coverage such an issue receives over time nor use the amount of such coverage as an explanatory variable. Rather, our analysis suggests that such series may be purely idiosyncratic based on source. While constructing an index or average across sources may smooth out some of this variance, no consumer of the news is likely to experience the news in the way suggested by such a measure. It should simply not be used.

Woolley's (2000) admonitions about how many data sources to use may be misplaced. The larger issue may be how to construct a keyword search using electronic databases. A simple perusal of [Table 1](#) shows some surprises in that certain keywords, in spite of reflecting what one might imagine to be important or "salient" topics, simply generate too few hits to produce reliable data. The take-away lesson from our analysis is that large average numbers of hits produce consistent data series across many national news sources. Few hits per month generate unreliable data. The solution may best be sought in experimenting with the relevant search terms, ensuring that they produce robust results, rather than in eliminating or including individual news sources. Greater error likely creeps into any analysis based on poorly thought out or verified keyword searches than from the inclusion of any individual media source. For robust searches based on many hits, our analysis shows that a single media agenda is the rule.

In those issue areas where spikes are present in the data, our results show that almost any source will do if the goal is to distinguish between the moments associated with the spikes versus all other periods. Any media source will show increased attention to beach volleyball during the Olympics. No surprise there. However, the apparent single national media agenda may disappear completely when the spikes are removed from series that otherwise show very low salience. This has important implications for regression models using such series. Let us focus on two of these here. First, the spike variable is not likely to be distributed even close to normally. Therefore, the errors associated with its use in a regression model may not be normal, violating standard assumptions. Substantively, this means that estimates may be biased and standard errors artificially low unless analysts are careful, as we are, for example to use logged rather than raw counts in order to account for the skewed distribution of certain variables in the model. Of course, the skew does not automatically imply that errors will be non-normally distributed; however, analysts need to be mindful of the underlying distribution.

Second and more substantively, there is a qualitative difference between changes in the low "white noise" portion of the variable and the higher spike-related values. Movements within these portions of the variable may have no theoretical impact, but movements from one to the other may be of great import. Here, scholars might consider replacing a seemingly continuous attention measure with a simple dichotomy (spike present/spike absent). In any case, analysts working with series with such spikes should know how this relates to their theory and should treat the variable in the statistically appropriate manner.

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Supplemental Material

Supplemental data for this article including data aggregated by week, data aggregated by quarter, and an extended time series can be accessed on the publisher's website at: <http://dx.doi.org/10.1080/10584609.2013.828139>

Notes

1. Note that our question is not “how much news coverage will a given issue receive?” Nor is it “what issues will dominate the national news agenda?” Rather, our question is “for a given issue, how consistent will levels of coverage be across news sources?” For this reason, we do not examine the effects of exogenous events (such as natural disasters, terrorist attacks, stock market crashes, and so on) on the amount of coverage devoted to particular issues. Instead, we explore the conditions under which a national news agenda can be said to exist (and thus measured), based on correlations in the amount of coverage an issue receives across national news outlets.

2. But note that other inter-media dynamics have been documented. For instance, Mathes and Pfetsch (1991) document the spill-over of issues from the alternative press to major news outlets, and a growing body of literature demonstrates that paid media (that is, political ads) can influence the agendas of major news outlets (see Boyle, 2001; Roberts & McCombs, 2010; Sweester et al., 2008).

3. We will not go into the precise mathematics of factor analysis, but for excellent primers, we recommend Kim and Mueller (1978a, 1978b). Note that we use the principal component method for the calculation of factor loadings.

4. Our measure of salience is also a proxy for variance. Where the average number of stories per month is high, so too is the standard variation: The correlation between these two variables is .81. Multicollinearity between the two variables suggests we not include both in the same model. On the other hand, our spike variable captures something different than only the variance: This is the presence of a sudden but short-lived peak of attention at levels vastly different from the statistically normal ups and downs that are captured by the standard deviation. Of course, the degree of variance in our series is strongly related to the likelihood of a high PRE in a factor analysis. And this is exactly our point: A single factor will indeed emerge when there is high variance in the underlying series and is very unlikely in other circumstances.

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Appendix: Constructing our keyword database

We sought to create a large list of keywords that would cover the full range of topics related to public policy and some that were unrelated to government. We used the topic codebook of the Policy Agendas Project (www.policyagendas.org) to provide a list of topics. Within each major topic, we sought more particular subtopics that could reasonably be searched with keywords. However, we sought to avoid false hits more than we sought to cover the full range of issues included in that subtopic. Therefore, the keyword searches listed here should not be understood to replicate the associated Agendas Project subtopic; they are almost always much more narrow in scope. To ensure clean searches, we followed an iterative process. We first ran a set of simple search terms and read the results. If there were many false hits, we revised the search terms in order to eliminate them while still producing a clean set of hits related to the topic of interest. By false hits, we mean instances in which the search terms were used outside the context we intended. For instance, if we sought to capture stories about racial discrimination but instead got stories about foot races or electoral races, those irrelevant stories would represent false hits. Conversely, all instances in which the search terms are employed in the intended context are considered “true hits.” In this way, the search terms are highly inclusive. In an effort to minimize the number of potentially relevant articles that are missed by our searches, we cast a very broad net, scooping up every article that contains our keywords regardless of their frequency of use or placement in the article. (We cannot calculate the rate at which we may be missing relevant stories. However, as our focus in this article is purely on the issue of when repeated searches across multiple news sources will lead to similar versus diverse results, we can ignore this important element of keyword validity.)

Each time we revised the keywords, we read a portion of the results to assess the number of true and false hits. We continued this process until fewer than 15% of the articles sampled were false hits. In cases where we could not achieve this level of accuracy, we abandoned that search. Thus, our 90 searches can all be understood as having been vetted until they produced at least 85% positive hits. We chose this threshold because of experience suggesting that it is sufficient to produce reliable counts over time; ultimately we are interested in how many stories appear in each month. [Table 2](#) lists the terms and associated Agendas Project subtopic codes.

We hired students to conduct the searches for each of the keywords listed in [Table 2](#) through Lexis. This generated a large number of full-text files consisting of the text of the story as well as a variety of identifying variables such as the date, source, byline, and embedded keywords. These text files were then run through a data parser to convert the text-based results into a database that we could more easily analyze. For this article, we focus on just two pieces of information: the date and the source. We then used Stata’s “collapse” command to create counts of numbers of stories for each keyword and each source by week, month, or quarter, or 361 monthly observations for the longest series, as indicated in [Table 1](#).

With a database that listed the number of hits in each of our 12 sources for each month available from 1980 through 2010, we then used Stata’s “factor” command to extract the factors present for each of the 90 monthly series; note that in these analyses each source is a variable, and we ran them separately for each of the 90 keyword searches. The results of the factor analysis (e.g., the eigenvalue associated with the first extracted factor) then became a variable in another data set with 90 observations, used for the regressions reported in this article.

We performed a variety of robustness checks on our factor analyses designed to test potential variations due to time and sources, including testing for variations when adding in or leaving out CNN or the *Wall Street Journal*, to see whether removing or adding in the two would result in different factor loadings (CNN because of its larger article space and ability to update throughout the day, the *Wall Street Journal* because of its specific business focus and because Lexis-Nexis only provides abstracts for the articles). The tests of variation removing and adding both to the factor analysis showed no significant or systematic differences in the pattern of the data when using the two sources in the analysis.