Mass Media as a Source of Public Responsiveness

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Abstract

A sizable literature finds evidence of public responsiveness to policy change, across a range of salient policy domains and countries. We have a very limited sense for what drives this aggregate-level responsiveness, however. One possibility is that individuals learn at least part of what they need to know from mass media. Work tends to emphasize failures in both media coverage and citizens, but little research explores the prevalence of relevant, accurate information in media content, or citizens' abilities to identify and respond to that information. Using the case of defense spending in the United States, we examine both, through an automated content analysis of thirty-five years of reporting, validated by a coding exercise fielded to survey respondents. Results prompt analyses of the American National Election Study (ANES), tracing both individual-level perceptions of and preferences for defense spending change over time. These results, supplemented by aggregate analyses of the General Social Survey (GSS), illustrate how media might facilitate—but also confuse—public responsiveness.

There have been real concerns about governments' willingness to respond to citizens, and whether this even makes sense given questions about citizens' ability to provide useful input to government. Converse's (1964) work has been particularly influential, and there is now a vast literature chronicling the political ignorance of the average

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citizen (e.g., Berelson et al. 1954; Converse 1964; Delli Carpini and Keeter 1996; Page and Shapiro 1992; Popkin and Dimock 1999).

At the same time, there is a growing body of work suggesting that citizens can and often do respond to changes in the "real world" environment, and to changes in policy itself. Stimson's (1991) account of shifts in "policy mood" stands as one early account of public responsiveness to policy change; he argues that when governments move outside the public's "zone of acquiescence," public opinion offers strong negative feedback. Durr's (1993) subsequent exploration of "What Moves Policy Sentiment?" reveals a systematic pro-cyclical impact of macroeconomic conditions on aggregate-level policy preferences. Page and Shapiro's (1992) influential work identifies "rational" trends in aggregate-level public opinion, in reaction to economic and policy change, across a wide range of policy domains. Similar dynamics are reflected in subsequent work on "thermostatic" policy responsiveness (e.g., Wlezien 1995); and in a growing body of related research (e.g., Bartle et al. 2011; Ellis and Faricy 2011; Enns and Kellstedt 2008; Erikson et al. 2002; Jennings 2009; Kellstedt 2003; Ura and Ellis 2012). All of this scholarship finds evidence that aggregate publics respond in understandable ways to the changing policy environment, including policy itself. There is not always such public responsiveness, of course—just as there is variation in policy responsiveness across issues, time, and space (Monroe 1998; Soroka and Wlezien 2010), there is variation in public responsiveness, and in some domains (and contexts), there is no responsiveness at all (Soroka and Wlezien 2010; Wlezien 1995; Wlezien and Soroka 2012).[1] That said, in salient policy domains, there is considerable aggregate-level evidence, in the United States and elsewhere, suggesting that people can and do adjust their preferences for more (or less) policy thermostatically in response to actual policy.

How can we reconcile evidence of systematic public responsiveness with evidence of uninformed publics? Past work has focused on the advantages of aggregation (see especially Page and Shapiro 1992).[2] Yet, it is important to recognize that this explanation alone cannot account for public responsiveness. While aggregation might explain how there can be a sensible signal even where there is considerable noise, it cannot explain the underlying trend. *How then does public opinion react to policy change?*

We regard this as a crucial, and largely unanswered, question in current research on representative democracy. It is interesting unto itself but crucial because of the considerable body of work suggesting that, in some domains at least, public preferences drive policy change (see, for example, Bartels 1991; Eichenberg and Stoll 2003; Soroka and Wlezien 2010). Although there is good reason to think that mass media matter here—and previous work points in this direction—the empirical evidence is incomplete. The apparent gap in the literature has also been on the minds of scholars of opinion-policy relationships for some time. Consider Barabas's (2011) review of Soroka and Wlezien's (2010) *Degrees of Democracy*:

> At a more micro-level, there is an assumption throughout the book that people get the
> signal on policy change and then update their preferences accordingly. However, there is

no direct examination of media messages or other ways of documenting these linkages. (p. 194)

Consider also Hakhverdian's (2012) assessment of the same book:

. . . the public has to possess knowledge on whether appropriations in defense and domestic domains have gone up or down. The mass media assumedly plays a large mediating role in conveying this message, and with spending data one can perhaps picture people adjusting their preferences for "more" or "less" spending based on media information they receive. (p. 1391-92)

"Assumedly" and "perhaps" are accurate reflections of the state of the field. Although previous research is suggestive, it does not provide direct evidence.

To redress this imbalance, we propose a simple media-centered account based on the following theoretical propositions: (1) public responsiveness to policy requires only basic levels of knowledge about policy and policy change, (2) this basic information is readily available in media content, and (3) citizens can recognize and respond to these informational media cues.

There are, we suspect, two different kinds of objections to our account. The first is that we already *know* that media matter to public attitudes about policy. This, however, is not the case. As discussed earlier, we certainly suspect it based on a vast literature focused on media effects on issues of relevance for policy (see, for example, Druckman 2005a; Jerit et al. 2006). Indeed, one very recent article does find that the total amount of coverage in a policy area influences public responsiveness to policy (Williams and Schoonvelde 2018). But there is no work demonstrating both that media content contains an adequate number of informational policy cues (about the ongoing state of public policy), and that people are able to respond to those policy cues.

The other kind of objection is driven by the opposite view, namely, that we know that media coverage is noisy, and there is, thus, no reason to expect it to facilitate public responsiveness to policy. There certainly is no lack of work detailing the failures of modern media coverage (e.g., Altheide 1997; W.L. Bennett 1988; Dunaway 2011). Whether these concerns prevent effective public responsiveness, as we have discussed, has not been directly addressed empirically. That is our objective.

We want to make clear that we are not arguing that media are the only means by which citizens learn about policy or that media coverage is necessarily accurate. Regarding the former, there clearly are various ways in which people might learn about policy change. Some citizens will have direct experience with certain policies, some may learn about policy through social networks,[3] and some may have a sense for policy change not through any observation about policy itself, but through the partisan control of government.[4] Regarding the accuracy of media coverage, we readily acknowledge that even as accurate media reports may facilitate responsiveness, inaccurate reports may produce reactions that are not in line with actual policy change. It nevertheless seems likely that media can play a role in facilitating public responsiveness to policy change. And we can settle the issue empirically.

Our analysis of media as a mechanism producing thermostatic public responsiveness uses defense spending in the United States as a case study and proceeds in five steps, set out in detail in the section that follows. The analysis focuses on spending because we have regular measures of both preferences and policy and on defense because it is a salient spending domain in which there is evidence of public responsiveness in the United States and other countries (Eichenberg and Stoll 2003). We draw on a content analysis of more than 600,000 stories in the *New York Times* and the *Washington Post* from 1980 to 2015, alongside survey data from both the American National Election Studies (ANES) and the General Social Survey (GSS). Results suggest relatively strong connections between policy, media coverage, and public opinion. That said, we also consider how media might not just facilitate public responsiveness, but confuse it.

Mass Media and Public Responsiveness

Our mass media-focused account begins with the following supposition: in contrast to what some analysts seem to believe, public responsiveness to policy does not require a high level of information. Here, we leverage the literature on "thermostatic responsiveness" showing that citizens adjust their preferences for policy change based in part on policy. If there is such responsiveness, people will favor less (more) policy in the wake of policy increases (decreases), other things being equal. This is important in representative democracies because it provides a basis for holding policymakers accountable, *and* also informed preference signals that policymakers can effectively represent.

In particular, we argue that this public responsiveness requires only that people have a sense for the direction of policy change—whether policy has gone up or down—and perhaps the magnitude—whether it has gone up by a little or a lot. These are basic pieces of information that can easily be accessible through simple cues available in the media environment (see, for example, Lupia and McCubbins 1998). Public responsiveness need not depend on citizens knowing what exactly is happening in a policy domain; it only requires that (some) citizens know generally how policy is changing.

This information needs to come from somewhere, however, and there are good reasons to expect that at least some policy information is transmitted by mass media.[5] The prospect that mass media provide the information that drives public responsiveness may well seem to be at odds with common critiques of media content. There is a considerable body of work detailing a range of biases in media content, and a good deal of research lamenting variability in, or a total lack of, policy content specifically (e.g., Dunaway 2011; Lawrence 2000), alongside research identifying inadequate and sometimes misleading coverage of complex scientific issue domains in particular (e.g., W.L. Bennett 1988; Friedman et al. 1999; Schudson 2003; Stocking and Holstein 2009). Consider also the vast body of work on sensationalism and/or negativity in news content (e.g., Altheide 1997; Cappella and Jamieson 1997; Lichter and Noyes 1995; Patterson 1994; Sabato 1991); and studies focused on the importance—and

potentially misleading impact—of framing in media coverage of public policy (e.g., Entman 1993; Iyengar 1991; Lee et al. 2008; Neuman et al. 1992). These are just some of the literatures concerned with problems of both the frequency and accuracy of media coverage. They are illustrative of much broader concerns that media content offers a barely perceptible and systematically biased view of public policy. See work by Baum and Groeling (2010) on just how far mass media can stray from reality.

That said, we also suspect that media can be inefficient and biased in many different ways but still provide the basic information citizens need to assess the direction of policy change, at least in very salient policy areas that attract a lot of public, political, and media attention. Put differently, even as there can be inaccurate information in media content, there can also be a good deal of information reflecting policy. There is, after all, a considerable body of work suggesting that media reflect government and elite sources (e.g., Entman 2003; Vliegenthart and Walgrave 2008; Walgrave and Van Aelst 2006); this should lead to some correspondence between policy change and media content, at least insofar as all elites are not purposefully—and routinely—obfuscating what actually is happening with policy. (This may sometimes be the case.) There also is research that finds evidence of learning about policy from news content, albeit with some heterogeneity across individuals (e.g., Eveland 2001, 2002). Following work on cues (e.g., Lupia and McCubbins 1998; Zaller 1992), we suggest that news coverage contains informational heuristics that allow citizens to discern the direction and magnitude of spending changes without necessarily increasing specific knowledge about policy. This aligns with work in the framing tradition showing that frames can act as heuristics that simplify news content for readers (see, for example, de Vreese 2005; Entman 1993; Hänggli and Kriesi 2010).

This view of media coverage as providing not all, but some, and perhaps the most important, pieces of policy-relevant information also fits nicely with work on political knowledge and political learning. A good amount of research suggests that people can and do learn from the mass media (e.g., Druckman 2005ab; Jerit et al. 2006). Recent work in the area also highlights the importance of focusing on more than just citizens' ability to recall and learn static political facts. For instance, scholars have shown how learning from media coverage is particularly pronounced for policy-specific knowledge and surveillance knowledge (Barabas and Jerit 2009; Barabas et al. 2014).

How can we best explore the possibility that media play a central role in public responsiveness to policy change? We contend that if our theoretical account of mass media as one driver of public responsiveness is correct, we should be able to identify the following patterns:

1. Mass media content will contain some sufficient number of cues about policy.
2. Mass media cues about policy change will reflect—to some degree—what actually happens to policy.
3. Citizens will be able to identify cues about policy change in media content. (Consider this an important validity check, connecting items 1 and 2 to 4 and 5.)
4. These policy cues will structure citizens' perceptions of policy change.

5. Citizens' policy preferences will respond to perceptions of policy change.[6]

The sections that follow examine these five patterns in turn. We regard each, in order, as important to substantiating our key supposition, namely, that public responsiveness to policy is propelled by the mass media.

Are There Policy Cues in Mass Media?

We begin with an exploration of cues about defense spending available in mass media coverage. As noted above, we rely on news content in the *New York Times* and *Washington Post*, from 1980 to 2015. We discuss the extraction of relevant media articles in detail in section 1 of the supplemental appendix. Note here that our aim was to identify policy-relevant articles in the two newspapers, relying primarily on subject codes in existing full-text databases, checked by human coders. We rely on articles from Lexis-Nexis, extracted through a subscription to their Web Services Kit.[7] This is discussed in more detail in the supplemental appendix. For now, note that we rely on a database of more than 600,000 stories related to defense from the Lexis-Nexis database, which we analyze using Lexicoder 3.0, software designed for large-scale, dictionary-based content analyses.

We begin with a simple text-cleaning function that removes punctuation and changes all words to lowercase. Subsequent analyses rely on dictionary-count functions. Our identification of mentions of spending increases and decreases proceeds in two steps: We capture all mentions of *spending*, and then identify the direction of *change* (if there is any). In this section, we focus just on results from the first step, which relies on a dictionary search for terms related to spending. The complete dictionary is included in section 2 of the supplemental appendix. Of the 602,168 articles dealing with defense, there are 233,645 articles that include at least one mention of spending. Put differently, roughly 40 percent of our sample includes at least one mention of spending. These articles form the body of data on which we will focus our analyses below.

The analyses that follow focus on these explicit mentions of spending. We readily acknowledge that this content is an imperfect reflection of spending policy content in mass media. Some articles will deal with budgetary policy but not explicitly mention "spending." Some articles will focus on policy proposals and arguments, rather than on what spending is actually enacted. These are some of the reasons why our data offer only a partial representation of spending policy content in mass media coverage. To the extent that our measures miss relevant information, however, results should understate the degree to which coverage drives public responsiveness. And for those who suspect that media do not provide any information about budgetary policy, some basic descriptive statistics are striking: our search finds an average of 17.7 articles referencing defense spending every week for the thirty-five years from 1980 to 2015. This seems to us to be a substantial volume of coverage. The

extent to which these data capture actual spending change is a testable proposition, which we turn to next.

Do Media Cues Reflect Budgetary Policy?

Do media cues actually reflect spending change? We explore this possibility by producing a measure of the "media policy signal"—the direction of policy, as suggested by media content. We begin by identifying all instances in which a spending keyword occurs in the same sentence as a direction keyword—for instance, "spend" occurs alongside "more" or "less." Focusing on co-occurrences of spending and direction keywords leaves us with roughly 99,024 articles in our database (roughly 7.5 per week) with at least one sentence suggesting the direction of fiscal policy.

We convert these counts into a media spending policy signal using a very simple approach. That is, we separately add up the number of downward spending mentions and upward spending mentions in each fiscal year. We then subtract the number of downward mentions from the number of upward mentions in each year over the thirty-five-year time period.[8]

Is there *any* correspondence between media coverage and policy? Are there any hints in these data that media content captures over-time trends in policy? Figure 1 offers a preliminary test, relying on a comparison of our media signal and actual budgetary policy, drawn from the Policy Agendas' database of appropriations.[9]

The top panel of the figure shows a simple scatterplot of the media signal in each fiscal year and the corresponding change in appropriations in billions of constant dollars. Each dot represents a fiscal year, and the dashed lines show the zero-point for both axes. To the extent that media content points in the same direction as actual spending, we expect dots to appear in either the bottom-left quadrant—where spending is decreasing, and media content suggests a decrease—or in the upper-right quadrant—where spending is increasing, and media content suggests an increase. Dots in the other two quadrants indicate years in which the media signal is in conflict with the direction of spending. In the top panel, we can see that few dots (7 of 36) are in those off-diagonal quadrants, which indicates a close match between the direction of defense budgetary change and the media signal. The data suggest a relationship in magnitudes as well: The correlation between the two measures is a healthy 0.56. Despite its limitations, the "Net Media Signal," thus, appears to capture the direction and magnitude of spending change fairly well.

The bottom panel of Figure 1 plots over-time trends in both policy change and the media signal—the same data as in the top panel, just depicted differently. The dark line shows changes in defense appropriations, and the gray line shows our media measure. Here, there is no escaping the conclusion that media coverage of defense budgetary policy closely follows actual policy change. Indeed, given the vast body of work on biases and flaws in media coverage (e.g., Altheide 1997; W.L. Bennett 1988; Dunaway 2011)—and the very basic approach we use to capture magnitude in our media signal—the relationship in Figure 1 is striking.
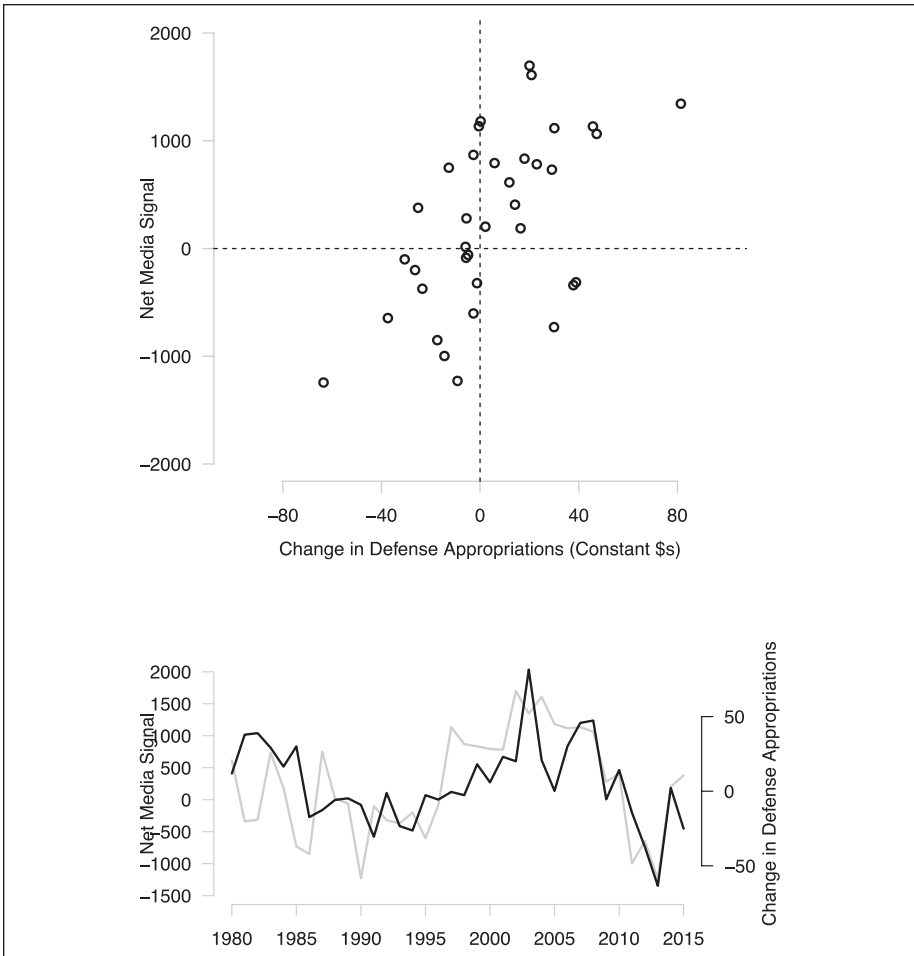
Figure 1. Media cues and budgetary policy.

We take these results as evidence that, on average, the media cues we have identified do reflect policy change in the defense spending domain in the United States. We, thus, proceed to the third step of our analysis.

Can Citizens Identify Mediated Policy Cues?

Subsequent sections of this paper assess responsiveness of public perceptions of policy change to media coverage and its impact on preferences. Results of such analyses can offer only indirect evidence that the public is receiving and processing media signals, of course. It, thus, is useful to provide more direct evidence that citizens can

identify spending cues in media content. We present the key takeaway from analyses focused on this issue here, and refer the reader to section 3 of the supplemental appendix for a more complete discussion.

In brief, we assess whether the public can identify spending cues in media content through a study fielded on Amazon Mechanical Turk (MTurk). We had roughly 1,350 U.S.-based respondents assess two newspaper articles (randomly drawn from thirty-seven articles in our database) for whether the article provided any information on changes in defense spending and, conditional on a positive response to this initial question, what the direction and magnitude of this spending change was. We then compare survey responses—both at the aggregate and individual level—to our Lexicoder-derived measures of spending change.

We first find that the tendency to report policy change increases with the number of spending mentions in an article. More important, we find a strong relationship between our Lexicoder-based measure of spending change and MTurk responses: Increases in the net media measure are associated with perceptions that spending is increasing (see section 3 of the supplemental appendix). Moreover, a model that independently captures the impact of upward and downward cues indicates that both are associated with perceptions that spending is increasing or decreasing. In sum, these results suggest that people are able to identify the types of cues about policy change in media content that we posit facilitate responsiveness.

Do Perceptions Reflect Mediated Policy Cues?

The preceding sections make clear the availability and informational value of spending cues in media content, and readers' ability to correctly identify those cues. These findings reflect rather simple expectations: When people encounter articles about government spending, they learn how that spending is changing.

Our exploration nevertheless has not yet demonstrated that citizens' policy preferences respond to the cues about policy they receive through mass media. Although we have seen that spending cues exist, and that they reflect policy, and that citizens can understand them, we lack indications that people actually do receive and accept the information captured by our media coverage measure. That is, we do not know whether individuals' perceptions of spending change are informed by media content. This section addresses this issue.

It does so by leveraging two questions that were only included in seven election waves (both presidential and midterm) of the ANES, from 1980 to 1992. (To be clear, these surveys are repeated cross sections, not a panel.) Respondents were asked the following two questions:

Perceived Spending Change: Some people believe that we should spend much less money for defense. Others feel that defense spending should be greatly increased. Where would you place what the Federal Government is doing at the present time? 1 = *Greatly decrease defense spending* . . . 7 = *Greatly increase defense spending*.

Preference for Spending Change: Some people believe that we should spend much less money for defense. Others feel that defense spending should be greatly increased. Where would you place yourself on this scale or haven't you thought much about this? 1 = *Greatly decrease defense spending . . . 7 = Greatly increase defense spending*.

Note that the "perceived spending change" question includes response items that are grammatically strange, given that it asks about what the government is doing. We suspect that this is because the question was asked in the same grid as the preference variables; and despite the wording, our assumption is that respondents understood the meaning of the question and responded accordingly. (This assumption is supported by the results.) And while the preferences question is relatively standard, and included across a good number of years of ANES surveys, the perceptions question is rare, and only fielded from 1980 to 1992. It is for this reason—and the fact that other survey organizations have not fielded a question about defense spending *perceptions*—that we have to limit some analyses to the 1980–1992 time frame.

These questions tap not only respondents' own preference for increasing or decreasing federal defense spending, but also what they think the federal government is actually doing. The data, thus, offer a unique opportunity to examine two important components of public responsiveness. First, we can assess whether individual-level perceptions of government spending are associated with media content. Second, we can test whether these perceptions of government spending produce responsiveness in defense spending preferences. In short, we can assess the connection between media content and relative preferences for policy.

Our analytic approach here draws on the thermostatic model of public responsiveness. As noted above, this is one of several accounts of how public opinion might respond to policy change, and has the advantage of laying out very clear expectations. In short, the public's relative preference (R) for policy is a function of the preferred level of policy (P^*) and policy (P) itself, where the public preference for more policy goes down (up) when policy goes up (down), other things being equal.[10] Where the current analysis is concerned, *Preference for Spending Change* is our measure of relative preferences, and is the same variable used in published work. Our coding exactly matches the options and scale in the questions above; if there is thermostatic responsiveness, therefore, people's responses will be negatively related to spending.

Table 1 shows results of regression models exploring the determinants of *Perceived Spending Change* for the 1982–1992 period. (Data for the 1980 election are excluded because we have only partial media data for 1979–1980.) The model includes a basic set of demographic controls: binary variables capturing gender (1 = *female*) and education (1 = *some university or more*); a variable capturing income (0–4 for the 5 income quintiles as defined in the ANES cumulative dataset); and a 7-point party ID variable (where 1 = *strong Democrat* and 7 = *strong Republican*). These variables are included only as controls, and their effects will not be interpreted in any detail, though note that they partly capture P^* in the general thermostatic model. Most important, we incorporate two annual variables: (1) defense appropriations, in constant dollars, over

Table 1. Modeling Perceptions of Spending Change, ANES, 1982–1992.

	DV: Perceived Spending Change			
	Model 1	Model 2	Model 3	Model 4
Female	0.107**	0.103**	0.101**	0.103**
	(0.048)	(0.048)	(0.048)	(0.049)
Education	0.054	0.057	0.059*	0.061*
	(0.036)	(0.035)	(0.035)	(0.035)
Income	−0.007	−0.004	−0.004	−0.006
	(0.009)	(0.008)	(0.008)	(0.008)
Party ID	−0.078***	−0.080***	−0.082***	−0.081***
	(0.005)	(0.005)	(0.006)	(0.006)
Defense Spending Change	0.010***	0.009***	0.010***	−0.002
	(0.004)	(0.003)	(0.002)	(0.006)
Defense Spending Levels (t)		0.003*	0.003**	0.001
		(0.002)	(0.002)	(0.001)
Media Policy Signal (t)			0.0002	−0.0001
			(0.0001)	(0.0002)
Cumulative Media Policy Signal				0.0005**
				(0.0002)
Constant	4.977***	3.692***	3.652***	4.592***
	(0.141)	(0.595)	(0.489)	(0.430)
N	8,802	8,802	8,802	8,802
R^2	.053	.061	.066	.071

Note. Cells contain regression coefficients and clustered standard errors by year. ANES = American National Election Study; DV = dependent variable.
*$p < .1$. **$p < .05$. ***$p < .01$.

the past year, drawn from the Policy Agendas dataset; and (2) the media policy signal, also over the past year, from the content analysis described above. As individual respondents are nested within years, standard errors are clustered accordingly.

Results in Table 1 indicate that both actual defense spending change and the media signal matter for perceptions of government spending. Model 1 shows that changes in defense spending have a significant positive effect on perceptions; that is, when spending increases, people are more likely to perceive a spending increase. Model 2 considers the impact of spending levels in addition to change. Those results demonstrate that levels of spending also have a significant positive effect on perceptions, if smaller and less reliable. It, thus, appears that public perceptions of defense spending change respond to both the levels of and change in spending. This means that there is a partial mismatch between the question wording (focused on change) and people's responses (based on both change and levels), which is of consequence for our analysis of preferences in the subsequent section.

Model 3 adds the media signal derived from the automated content analysis, which has a weak positive effect on perceptions that only very narrowly misses standard levels of statistical significance. To assess whether the effect of spending levels is
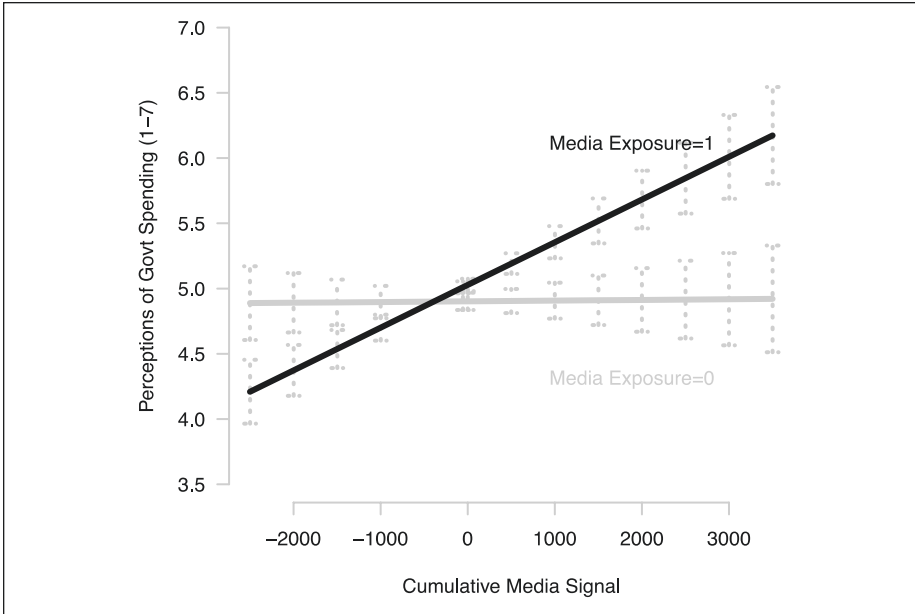
Figure 2. The impact of media, moderated by media exposure, on perceptions of government spending.

mass mediated, however, we need a media measure that reflects spending levels, keeping in mind that, as we have seen, the Media Policy Signal reflects spending change. This is difficult to imagine, let alone construct, though we can simulate one by simply cumulating our media signal over time: Because the measure captures policy change, the running tally of it should capture the sum of policy change. The resulting measure does not literally tap spending levels at each point in time, of course, and it seemingly differs in the form of an intercept, but the time-serial correspondence should be high.

Model 4 in Table 1 shows results including the cumulative media signal. This variable has a positive, significant effect on respondents' perceptions, and the impact of spending levels virtually disappears. There also is no impact of the media signal tapping spending change, implying that perceptions reflect coverage of spending levels rather than change—insofar as our cumulative media signal captures coverage of levels, at least. These results strongly support the conjecture that people are responding to media coverage of spending.

While models in Table 1 confirm that preferences react to our media-based measure, they do not directly examine the possibility that media *exposure* is driving the process. Thankfully, the ANES includes media exposure measures; and we capture individuals' media exposure using a variable, rescaled from 0 to 1, that combines the self-reported number of days a respondent read a newspaper in the past week, and the number of days they reported watching national TV news.

Table 2. Modeling Relative Preferences for Spending, ANES, 1980–1992.

	DV: Preferences for Spending Change		
	Model 1	Model 2	Model 3
Female	−0.181***	−0.185***	−0.166***
	(0.055)	(0.053)	(0.054)
Education	−0.297***	−0.296***	−0.285***
	(0.024)	(0.024)	(0.027)
Income	0.049***	0.047***	0.046***
	(0.017)	(0.016)	(0.016)
Party ID	0.184***	0.186***	0.169***
	(0.013)	(0.012)	(0.014)
Defense Spending Levels (t)	−0.006*	−0.007*	−0.006*
	(0.004)	(0.004)	(0.003)
Defense Spending Change (t)		0.006	0.008
		(0.006)	(0.005)
Perceived Spending Change			−0.188***
			(0.037)
Constant	6.652***	6.827***	7.247***
	(1.425)	(1.421)	(1.334)
N	9,857	9,857	9,857
R^2	.117	.125	.148

Note. Cells contain regression coefficients and clustered standard errors by year. ANES = American National Election Study; DV = dependent variable.
*$p < .1$. **$p < .05$. ***$p < .01$.

Supplemental appendix Table 6 shows results from models that allow the impact of our cumulative media signal to vary across levels of media exposure. We illustrate the effects in Figure 2, which plots the impact of the cumulative media signal for those who report very low (0) versus very high (1) levels of media exposure. The interaction is in the expected direction and highly significant: The impact of the media signal is much more pronounced for those with high media exposure; indeed, for those with very low levels of exposure, the estimated effect is indistinguishable from 0. We take these results as evidence that media coverage plays a role in individuals' perceptions of government spending.

Media coverage clearly does not completely determine perceptions, but it matters. Most important, coverage mediates public perceptions of defense spending; it informs people about what government is doing. Given that media content does not exactly follow spending change over time, public perceptions of government action are imperfect—we return to this issue below. That said, there clearly are strong links between policy, the media, and individual-level public perceptions.

Do Preferences Respond to Perceived Spending Change?

But do perceptions of policy condition preferences for policy change? We offer two separate analyses addressing this question. The first is straightforward: We use the

ANES survey data to examine the relationship between *Perceived Spending Change* and *Preference for Spending Change*.[11] Results are shown in Table 2.

In Table 2, *Preferences for Spending Change*, scaled from 1 to 7, is the dependent variable. *Perceived Spending Change* is an independent variable, alongside the same set of demographic and budgetary predictors included in Table 1. Model 1 in Table 2 shows estimates including defense spending levels only, which is the specification implied by the thermostatic model outlined above. Here, we see the negative coefficient the model implies, which is also statistically significant ($p < .10$). This means that when spending is higher (lower), preferences for spending change tend to be lower (higher). Model 2 adds spending change, which does not contribute to negative feedback. This also is as we expect given the thermostatic model. Model 3 further adds the impact of *Perceived Spending Change*, the dependent variable in Table 1. The coefficient for defense spending levels drops slightly. Given that Table 1 demonstrates a connection between actual spending levels and perceptions of spending change, this implies that expressed perceptions only partly mediate the effect of spending on preferences. Indeed, the pattern of results implies that spending-related media coverage (and perceptions) may matter more for preferences than other sources of public perceptions of spending change.

Results in Table 2 nevertheless imply that perceived spending change, at least in part, drives thermostatic public responsiveness.[12] The magnitude of this effect is as follows: The coefficient (–0.188) implies that a one-standard deviation shift in perceptions (1.4 units in this sample) is associated with an average shift in relative preferences of 0.26—roughly 16 percent of the standard deviation of the dependent variable.[13] Of course, what ultimately matters is that people appear to respond thermostatically to mass-mediated spending change.

One drawback of the analyses in Table 2 is that they necessarily rely on just twelve years of ANES data owing to the limited time series for the *Perceived Spending Change* variable, which leads to our second analysis of preferences. Specifically, we extend the first analysis by using the GSS, which lacks a measure of perceptions, but allows for an examination of preferences and their relationship with spending and media coverage between 1981 and 2015. Insofar as our GSS analysis captures the effects of perceptions on preferences, it does so indirectly—and only in part—through media coverage. For this analysis, we shift to a yearly time-series model, where the dependent variable is the annual average of preferences for spending change.

Model 1 in Table 3 offers a variant of the standard thermostatic model, as it includes spending levels. In contrast with previous formulations, the model includes the cumulative media signal. (It also includes the lagged level of spending preferences to account for dynamics.) The specification allows us to assess the relative impact of spending and media coverage, the latter of which we know reflects spending itself *as well as other things*. The analysis, thus, can tell us whether (and how) preferences respond solely to spending or to all media coverage. (Time-series specifics and diagnostics are reported in the supplemental appendix.)

Results in the first column of Table 3 indicate that spending has the expected negative thermostatic effect on preferences. Media coverage has a seemingly unexpected

Table 3. Modeling Relative Preferences for Spending, GSS, 1981–2015.

	DV: Preferences for Spending Change	
	Model 1	Model 2
Defense Spending Levels (*t*)	−0.178**	
	(0.042)	
Cumulative Media Signal (*t*)	0.004**	
	(0.001)	
Spending-based media		−0.002**
		(0.000)
Residual media		0.004**
		(0.001)
Preferences (*t*−1)	0.519**	0.519**
	(0.097)	(0.097)
Constant	55.288**	55.288**
	(14.052)	(14.052)
N	35	35
R^2	.789	.789

Note. Cells contain regression coefficients and standard errors. GSS = General Social Survey; DV = dependent variable; Breusch-Godfrey p=.78.
*p < .05. **p < .01.

positive effect, however. These results might appear to imply that media coverage does not facilitate responsiveness, though this is not the case. Rather, they imply that the nonspending portion of media coverage matters very differently for preferences, and that it more closely taps shifting demand for spending over time, for example, that associated with national security threat. These shifts should positively influence preferences given spending levels.

To clarify the differences in media effects, we can separate the two components of cumulated coverage—one predicted by spending and the remaining residual component—and then reestimate the model substituting these two components for the spending and media coverage variables.[14] Results, shown in the second model of Table 3, reveal the different effects of the two components. The impact of media that is predicted by spending is negative—this is the thermostatic responsiveness part of the media-opinion relationship.[15] By contrast, the impact of residual media coverage is positive. This is expected, as discussed: While our media measure reflects the ebb and flow of actual policy, it picks up other things that matter to the public as well. These results, thus, highlight the fact that the public follows media coverage—spending-related or not—and that media inform the public in important, if contrasting, ways.

Discussion

Taken together, evidence from the automated content analysis, the MTurk-coded study, and the ANES and GSS analyses suggests that spending cues exist, that citizens

can extract these cues from news content, and that this information matters for perceptions of government spending, and, thus, to preferences for policy change.

All of this supports our main theoretical proposition, namely, that the basic information needed for the kind of public responsiveness identified by a large and growing number of researchers is readily available in media content. Recognizing this is a significant step toward better understanding the role of media content in public responsiveness, and in representative democracy more broadly. This is not an argument that media perfectly represent policy change or that citizens are deeply informed. It is an indication, however, that even in the presence of flawed reporting, low attentiveness, and misinformation, there are signals in media content that can facilitate a form of public responsiveness necessary to a functioning representative democracy.

There are important caveats, however. Political knowledge still varies across individuals; and our MTurk study suggests heterogeneity in respondents' ability to identify spending change. Aggregation is, thus, an important part of the process producing thermostatic responsiveness, though a large (and diverse) minority receiving relatively reliable mediated cues about policy change drives the pattern. Put differently, our results indicate that many, though not all, citizens can pick up on mediated cues about spending. We also acknowledge that while our MTurk study shows that respondents are able to identify spending change, we do not experimentally link these perceptions to policy preferences. This is an avenue for future research.

Moreover, our results cannot speak to whether people's *underlying* preferred levels of policy are "correct." We are not arguing for a rationality in preferences at odds with recent research suggesting that individuals' preferences for levels of redistribution seemingly are below where they should be, given their own economic situation (e.g., Bartels 2005), for instance. (That said, people often have preferences that differ from what we would expect based on financial self-interest.) Our argument focuses entirely on over-time change in preferences for policy change; it cannot speak easily to the possibility that people's preferred levels are right, or wrong.

This paper has shown that mass media can facilitate public responsiveness by communicating information about policy change. As we have seen, however, news coverage does not perfectly reflect policy actions. This means that the mass media might, to some degree, frustrate public responsiveness, leading people to systematically under- (or over-)estimate what government is doing. To address this issue, Figure 3 provides an illustration, depicting hypothetical mean values for both perceived spending change and relative preferences for spending as if they had been driven by (1) only spending-driven (i.e., accurate) media coverage, or (2) both spending-driven and residual (i.e., seemingly inaccurate) media coverage. The figure is based on (1) a model regressing media coverage on spending change, to separate out the portion of the media signal that is in line with spending, and the portion that is not; and (2) the coefficients for the cumulative media signal and perceptions in Tables 1 and 2, which, in conjunction with the predicted (accurate) and residual (inaccurate) media coverage, provide predictions for perceived spending and preferences for spending. We outline each step of the estimation in greater detail in section 4 of the supplemental appendix; here, we focus on the difference between simulated perceptions and preferences under the two hypothetical media conditions.
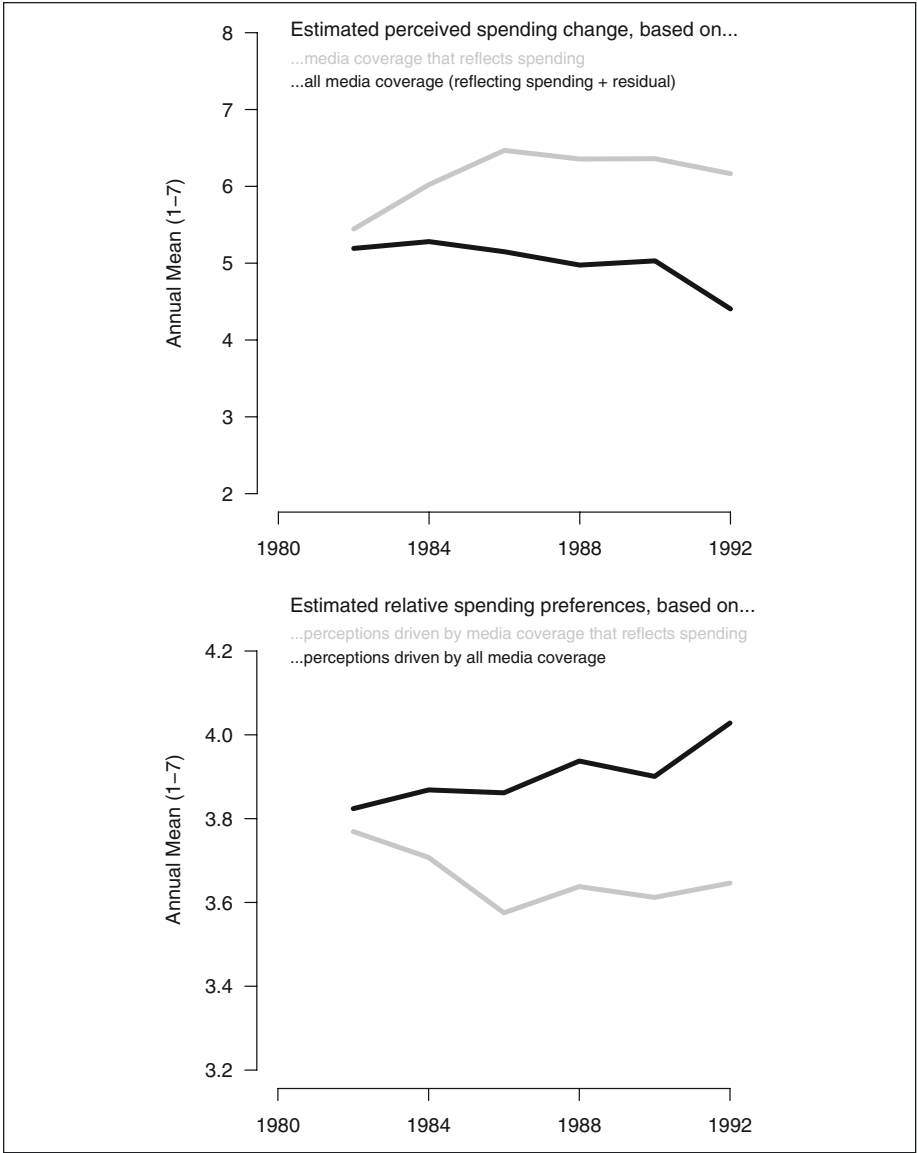
Figure 3. Perceived spending change and relative preferences, under different media conditions.

Figure 3 shows how the content of media coverage can impact both perceptions and preferences. In the top panel, we see a sharp difference between perceptions of spending change based on spending-based versus all media coverage of spending. The black

line predicted from all media coverage drops and remains well below the gray line predicted by spending-based media. This spills over into relative spending preferences, in the bottom panel of Figure 3, where preferences for spending change after 1980 are higher than they might be were media coverage more accurate. Of course, as discussed, these estimates are meant to be illustrative, not a test of the extent to which public preferences are driven by media inaccuracy. The figure still does make clear the potential consequences of media coverage: Just as it can help facilitate public responsiveness, so, too, can it lead the public astray. The degree to which one or the other is true—and why—seem important avenues for further research.

The generalizability of these findings beyond the defense spending domain also is not clear. There are good reasons to think that defense is an easy case—one in which policy change is often directly linked to (and discussed in terms of) spending, and one that is consistently highly salient. We expect that shifting to a low-salience domain in which a large proportion of policy change is regulatory rather than budgetary, for instance, would produce weaker results. Indeed, past work noted above already highlights variation in responsiveness across issue domains (e.g., Soroka and Wlezien 2010), and the tendency for low-salience domains to exhibit weaker opinion-policy links. Our supposition is that this cross-domain variation is partly explained by what is likely much less, and much less clear, media coverage of policy change in these domains. Indeed, our single issue may not be representative and the media signal could be weaker in other domains that are not polled as frequently as the defense issue. (See Note 1.) We leave a test of this possibility to future work.

So, too, do we note, and leave for future research, the possibility that different media sources offer rather different kinds of policy information. We have focused here on two prestigious broadsheet newspapers, and these may be the sources most likely to produce a large number of accurate policy stories. There are no social media for the first half of our study period, but more recent analyses might focus on information circulated through social media; and on the online distribution of "legacy" media content as well. (See also Note 5.) Analyses over longer time periods might also expand the number of traditional news sources considered. How does content vary from the *New York Times* to the *Houston Chronicle*, the *Huffington Post*, ABC News? There surely are important differences in the quantity and quality of policy content across media sources; indeed, research already points in this direction (Aalberg et al. 2013; Druckman 2005b; Fraile and Iyengar 2014; Jochen et al. 2004). Moreover, there have been important shifts in the production and consumption of news. Changes to the information landscape, coupled with polarized media environments in which people seek out congenial—and oftentimes inaccurate—information, highlight the possibility that contemporary media may facilitate responsiveness to a lesser degree than in the past.

Additional work clearly is needed to assess whether these findings generalize beyond this U.S. case as well. Defense spending is arguably more salient in U.S. politics than in most other advanced democracies; furthermore, U.S. media content may be relatively unique where the nature of reporting is concerned, on defense policy and in other areas.

For the time being, we have been able to demonstrate each of the patterns expected by our theoretical account of how mass media play a role in public responsiveness, and offer a template for future work on the role of media coverage in representative democracies. There are a good number of cues about policy change in media coverage of U.S. defense spending; these cues reflect changes in budgetary policy; humans are able to identify the cues; individuals' perceptions of policy change shift alongside trends in media coverage; and individuals' relative preferences for policy react to their perceptions of policy change. Each of these five patterns is central to the functioning of representative democracy. That they occur, even in one domain, is, thus, of considerable importance. That they may differ over time, and in other policy domains, is as well.

That these patterns are evident serves to highlight the significance of mass media in responsiveness and representation. The argument that the quality and quantity of media are critical to representative government is, of course, not new—it has been widely accepted, and repeated, at least since the time of *The Federalist Papers*. But the preceding analyses lay bare the potential significance of mass media, and in so doing, this paper elucidates one mechanism underlying public responsiveness to policy, a widely accepted but as yet largely unexamined element of functioning representative democracy.

Acknowledgments

Declaration of Conflicting Interests

Funding

Notes

1. Consider also work that highlights the variation in polling across issues. Polls are typically conducted only on salient issues, and, thus, research tends to miss a good number of non-salient domains in which responsiveness is limited. See Barabas (2016), and Soroka and Wlezien (2010).
2. Although, see Althaus (2003) for a more complicated and less complimentary view.
3. This information, too, likely comes from mass media.
4. For instance, if Republicans are in office, one might simply assume that social welfare spending is decreasing.
5. Note that our content analysis focuses on traditional news media, rather than social media. The public still largely relies on large-scale "legacy" media organizations for its information about politics even when they get that information online (e.g., http://www.people-press.org/2012/02/07/cable-leads-the-pack-as-campaign-news-source/). And in times of declining newspaper readership, these papers can exert large influence on the reporting of other outlets, including cable TV news (e.g., Golan 2006). This does not preclude the possibility that citizens rely on other traditional, "born-digital," and social media sources for policy information; and these, too, could facilitate (or impede) thermostatic responsiveness. See further discussion in the Discussion section.
6. Note that the list does not differentiate between the (1) reception and (2) acceptance of cues, both of which are necessary for public responsiveness. To be clear, we explicitly address the former (in item 3) but not the latter. Our analysis still does allow us to test for acceptance, particularly when we examine whether perceptions respond to media cues (in item 4) and then whether those perceptions inform preferences (in item 5). To the extent that media cues affect public perceptions and those perceptions influence preferences, the public must both receive and accept those cues.
7. It is important to note that our substantive results do not depend on the corpus we use. The fact that our findings hold using text extracted from either Factiva or Lexis-Nexis, relying on somewhat different subject coding schemes, helps alleviate concerns that our results could be driven by a biased article selection mechanism. See section 1 of the supplemental appendix for a discussion of results using the alternative Factiva data.
8. This approach takes the frequency of co-occurrences as an indication of magnitude, and there may be weaknesses with this method. A month in which there are many co-occurrences in a positive direction will show a strongly positive signal, while a month in which there are only a few co-occurrences in a positive direction will show a weakly positive signal, for instance; and it may not be the case that the magnitude of spending change is systematically related to the number of mentions of upward or downward movement. There still are good reasons to expect a relationship—a larger change in spending is bigger news, after all—but we do not expect a perfect correspondence between our current media signal and fiscal policy. In the absence of a clear alternative, we employ our simple approach, which works fairly well, as we will see.
9. These data are available at policyagendas.org, and have the advantage of using functional

definitions that are more temporally consistent than the standard Office of Management and Budget (OMB) Historical Tables. OMB classification actually changes over time, though probably less often than in other countries, where reliable spending data can be even more difficult to identify (see Soroka and Wlezien 2010). The deflator used to produce constant dollar estimates is the one provided in the OMB Historical Tables.

10. The relationship can apply across space and time, though the latter is more common and also the focus of the analysis in this paper.

11. We note that the analysis may suffer from (some) endogeneity, that is, perceptions may be determined, in part, by preferences. But demonstrating a link between the two variables establishes, at a minimum, that they covary, and this is critical to inferring that perceptions are of relevance to thermostatic responsiveness. Moreover, establishing an impact of perceptions on preferences, above and beyond actual spending, highlights the importance of media in facilitating (or impeding) public responsiveness.

12. This is supported by analysis that assesses the separate effects of the time-serial and cross-sectional variance of perceptions.

13. The effect of perceptions is comparable to the estimated impact of spending levels themselves: In Model 2, the coefficient (-0.007) implies that a one standard deviation (or US\$56 billion) shift in spending produces a -0.39, or 24 percent of the standard deviation, drop in preferences. Not surprisingly, the estimated impact of perceptions (-0.33) is even closer in magnitude based on results from separate analyses excluding spending levels from the model.

14. The model includes a linear time trend, and we isolate the spending-related component based on the spending coefficient (33.82) from the estimated equation. Also see the time-series section of the supplemental appendix.

15. Spending accounts for 81 percent of the variance in cumulative media over time, some of which owes to trends in the two variables, and so it is worth noting that detrended spending accounts for 73 percent of the variance in detrended cumulative media.

Supplemental Material

Supplemental material for this article is available online.

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