

# If a Tree Falls in the Forest...? Conflict, Balance, and the Mass Media's (Lack of) Coverage of Expert Agreement

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## Abstract

A large gulf separates expert and public opinion on a wide range of questions of science and economics directly relevant to public policy. This may problematically put pressure on politicians to enact policies that are welfare reducing in the long-run. Multiple theories have been advanced to explain why these gulfs exist. First, individual-oriented research emphasizes that citizens may be motivated to cognitively resist information from experts that go against their social identity-anchored priors. These theories implicitly assume expert information is readily available in the information environment. Second, media-centred approaches emphasize that news outlets often neglect thematic, context-rich content, which may limit coverage of expert consensus, and towards *conflict* and *balance*. They may elevate dissenting experts and political actors, and in so doing dilute the value of the expert information. However, little effort has made to systematically study these biases beyond the issue of climate change. This study will present an analysis of over 280,000 newspaper, newswire, broadcast, and cable American news stories on 10 issues where there are important elements of agreement among scientists and economists. It will combine automated methods, such as machine learning and dictionaries, with hand coding. This paper aims to demonstrate the extent to which the news media provide expert information through its coverage, including cues signaling consensus, and whether the presentation of such information is limited by episodic, context-poor coverage and contaminated by bias towards conflict and balance.

The role of experts in shaping public opinion has been of increasing interest, driven, in part, by continued confusion over the degree of scientific consensus on anthropogenic climate change in a large segment of the American public. Of particular concern is understanding what explains often sizable gulfs in opinion between the public and experts on a wide range of issues. Growing experimental literature has shown that experts, when in consensus, can often be persuasive on highly technical issues, but processes of motivated reasoning often prevent the assimilation of counter attitudinal signals from experts on other highly charged issues. We also know that features of media coverage, such as fragmentation and episodic framing may limit exposure to information about expert consensus and that balancing among sources may stoke confusion among readers about the state of expert opinion. There is some evidence that this form of reporting once guided climate change coverage.

However, little effort has been made to systematically examine the media environment to examine whether information about expert consensus is readily available across issues, both scientific and economic, and presented in a way that is conducive to influencing public attitudes. This study will present an automated and manual content analysis of over 280,000 newspaper articles, and broadcast and cable transcripts of 10 issues where there is some level of consensus among scientists and economists. In doing so, it will aim to examine how often the media presents thematic, context-rich information on expert consensus related to these issues and whether or not the presentation of such information is contaminated by two types of media bias: conflict and balance.

## Experts and the Public

On many central issues related to important policy areas there is wide agreement among those who have relevant and specialized knowledge acquired through advanced levels of education and experience, such as scientists, medical professionals, economists, and policy experts. We know that the human production of greenhouse gases is causing our climate to warm and that vaccines are safe and have dramatically reduced the prevalence of harmful childhood diseases. Economists, both liberal and conservative, have drawn attention to the destructive impact of rent control and trade protectionism. They also agree on a wide range of other policy topics, particularly involving the free movement of goods and people, and the ineffectiveness of government imposed limits on competition and subsidies for corporations (Caplan 2002; Fuller and Guide-Stevenson 2003, 2014; Gordon and Dahl 2013; Whaples 2009). These areas are often labeled those of “expert consensus” and will be the primary focus of this paper.<sup>1</sup>

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<sup>1</sup> In reality there will always be dissenting experts that challenge the dominant view of their discipline. Dissent and disagreement are valuable in keeping experts honest in different policy domains. For the purposes of this paper, however, these areas of agreement among a large majority in a discipline will be often termed a “consensus.”

Because substantial research has shown that government policy is responsive to the broad contours public opinion on a host of issues (Erikson, Mackuen, and Stimson 2002; Page, Shapiro, and Dempsey 1987; Soroka and Wlezien 2009). The quality of the public's signal sent to policymakers should therefore be of substantial interest. Ideally, we would hope the public uses expert consensus, where and when it exists, to inform their policy evaluations of related topics. But, there is substantial evidence that the public, more often than not, diverges substantially from expert opinion. A Pew survey of U.S. adults and members of the American Academy for the Advancement of Science (AAAS) shows the existence of large gaps in opinion between scientists and the U.S. public. For example, 88 percent of AAAS members believe it is safe to eat genetically modified foods, versus 37 percent of Americans, while 87 percent of AAAS accept the anthropomorphic global warming thesis, compared to only 50 percent of Americans.

If anything, the Pew survey understates the gap that exists between experts and the public on questions of science on some of these matters. AAAS members are not solely composed of those that specialize on the topic. For example, meta-analysis of climate change research has shown that 97 percent of peer reviewed articles endorse the IPCC view that climate change is happening and mostly caused by human activities, while similar meta-analysis has shown little-to-no disagreement among plant scientists on the safety of GMOs or in the medical research community on the safety and efficacy of childhood vaccinations. The picture is not any better on economic issues. If anything it is worse. Sapienza and Zingales (2013) compared a panel survey of economic experts conducted by the Initiative on Global Markets (IGM) at the University of Chicago with a representative sample of Americans. They found an average difference of 35 percentage points between the two groups across 18 issues. The largest differences existed on the ones where economists exhibited the largest agreement. Clearly, the public is offside of expert opinion more often than not when the latter is in agreement. The question is, why?

One possibility is that this phenomenon is just another demonstration of the public's ignorance about politics, both at the general (Berelson et al. 1954; Campbell et al. 1960; Converse 1964; Delli Carpini and Keeter 1996), and policy levels (Kuklinski et al. 1982; Kuklinski et al. 1997; Gilens 2001) because of insufficient motivation to become informed (Downs 1957). However, it does not automatically follow that people fail to process information from experts to help them form policy evaluations. They can pick up cues from experts in the media, such as the existence of expert consensus, without having to process the complex policy information undergirding expert opinion (Johnston and Ballard 2016). We might expect, then, some congruence between expert and public opinion providing that the information environment provides them with this information.

Another partial explanation is that people ultimately reject advice from experts when it contradicts their prior beliefs or their worldview – motivated skepticism (Kahan et al. 2012; Johnston and Ballard 2016). This perspective builds off a rich literature on motivated reasoning

in cognitive psychology (Ditto and Lopez 1992; Kunda 1990; Lodge and Taber 2014). Citizens interpret information in a superficial way geared towards maintaining their own beliefs. This psychological process is symmetric – Republicans only tend to be implicated because issues where they reject expertise are currently more salient (Lewandowsky and Oberauer 2016). In other important areas Democratic supporters are more likely to reject expert opinion, such as on the safety of GMOs, pesticides, and on the benefits of nuclear power (Pew Research 2015). The tendency to reject counter-attitudinal expert opinion is particularly intense when issues are highly salient and have clear implications for their social or political identities. It is also strongest among those with the strongest affective attachments to political objects – those that are politically sophisticated (Lodge and Taber 2014). Motivated cognition has likely played a starring role in why citizens have polarized on climate science, driven by increasing levels of skepticism among knowledgeable Republicans (Kahan et al. 2012). It is also important to note that the media play an important role in facilitating the motivated rejection of expert opinion by carrying elite cues to the public from opposing partisan and ideological groups (Darmofal 2006; Merkley and Stecula 2018) thus priming their directional motivation (Kunda 1990).

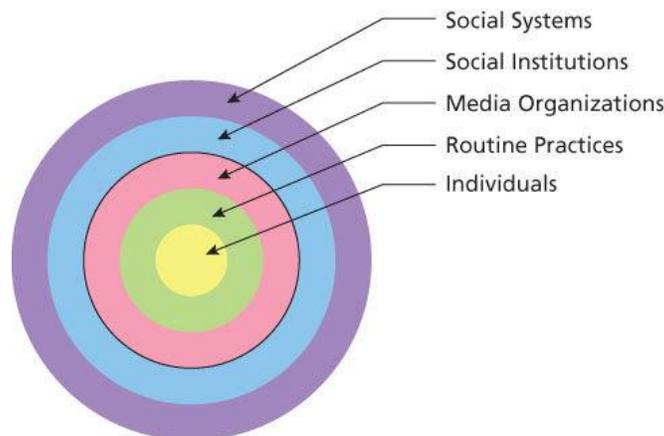
There is little doubt that the gap between expert and public opinion can in some part be explained by processes of motivated reasoning. People are scarcely motivated to have opinions based on the best available evidence. They are motivated instead to have opinions that support their social identities. However, this implicitly assumes the public is adequately informed about the state of expert knowledge in the first place. There are strong grounds to question whether this is the case.

## Media Bias and the Presentation of Expert Opinion

Citizens rely on signals or cues sent from relevant communities of experts carried in the mass media, as they rarely encounter policy experts in their social circles (Wilson 1995). These cues are particularly valuable if they illustrate lines of widespread expert agreement or consensus (Johnston and Ballard 2016). However, much of the experimental literature on the influence of source cues on public opinion, such as from experts, fails to examine the cueing environment in the media (see Gilens and Murkawa 2002 for a broader discussion). In doing so, it implicitly assumes that messages or cues from experts are readily available in the information environment of the average citizen and that they are presented in a way that is easy for them to process.

However, there are strong theoretical grounds to suspect that the mass media routinely fails on both counts. Shoemaker and Reese's (2014) Hierarchy of Influences model presents perhaps the most useful way of understanding the multiple levels of influence that combine to affect media content. This model is shown above in Figure 1. At its heart, the individual journalist or editor acts as a gatekeeper and chooses which stories to cover and how. Their decision making is shaped and constrained by the other levels in the model. Societal norms set the boundaries for what

coverage is legitimate or not. The media are influenced by other social institutions, members of whom serve as critically important sources for media content. Competition between media organizations also serves as an important driver of content by influencing a wide range of media routines that influence day-to-day coverage.

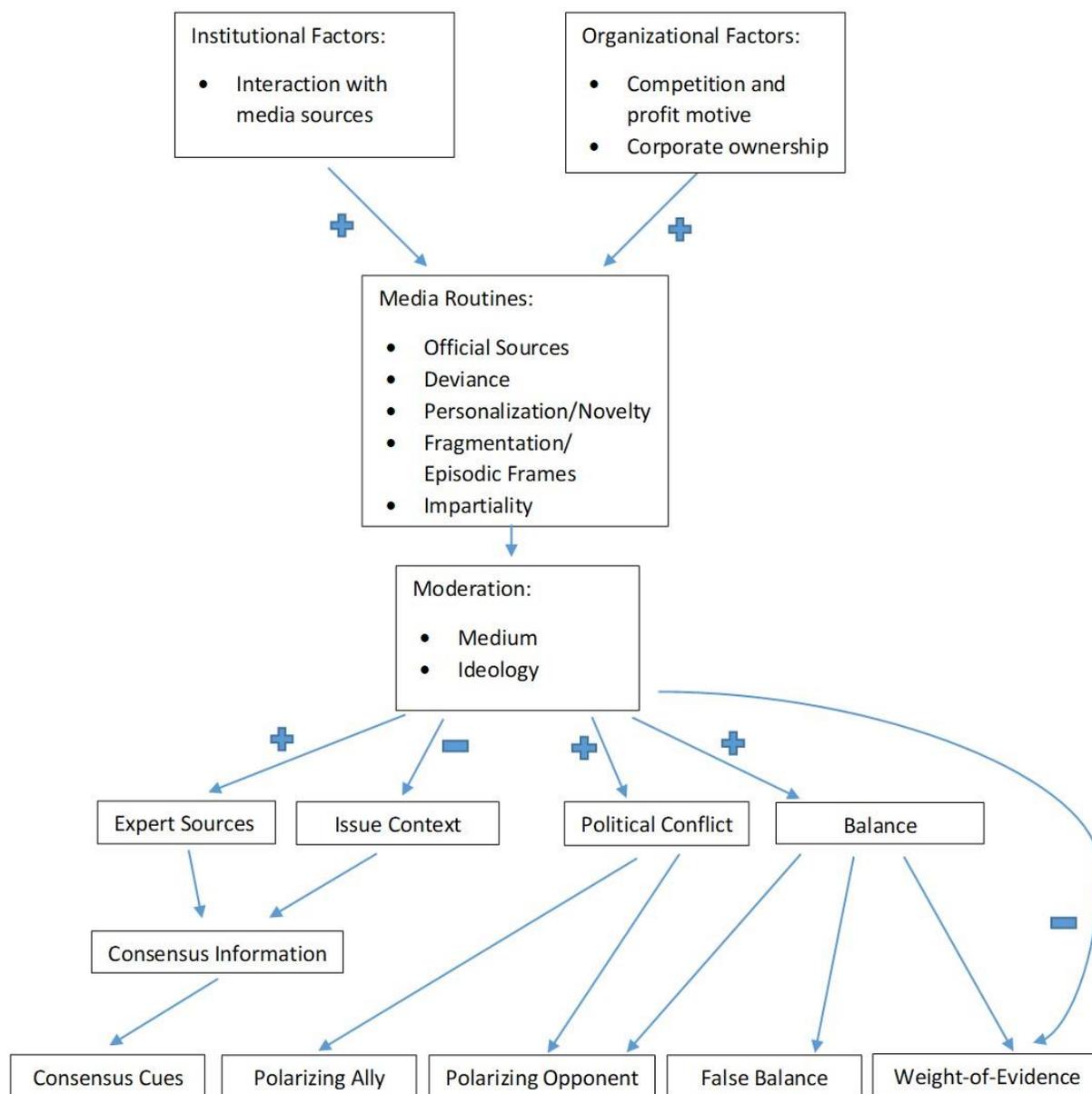


**Figure 1.** Shoemaker and Reese's Hierarchy of Influences

For the purposes of this paper, it is the three middle layers of the model that are of most interest. The level of social systems is more helpful for guiding efforts at cross-national comparisons of media behaviour, and the individual level of analysis leaves us little ability to guide expectations for variation in expert coverage across media and over time. The other three levels of media influence, however, have a direct bearing on our interest in how experts are covered in the news. At the level of social institutions, we know that the mass media exist amidst a complex network of institutions whose members often seek to use the media to disseminate their message in the hopes of influencing public opinion and policy (Shoemaker and Reese 2014). Media sources thus have a direct influence on media content, particularly those with considerable institutional power. Scholars have long noted the tendency of media to rely on official sources (Bennett 1988), but this also extends to the political allies of these sources, such as interest groups and think tanks, such that elites have cascading influence on media content that extends well beyond their direct influence (Entmann 2003).

It would be a gross over-simplification to suggest that media content mechanically represents the views of elites. Institutional factors interact with other levels in the hierarchy. Also important are organizational-level variables. The news media are not a unitary actor. Organizations exist in competition with one another for consumers and advertisers. Technological changes through the 20<sup>th</sup> and early 21<sup>st</sup> centuries have magnified this problem. Gone are the days where newspapers were flush with cash and Americans could only tune into the three major broadcasters for nightly news (Bennett and Iyengar 2009). The media marketplace has fragmented and outlets are struggling to make profits. This pressure has directly influenced decision making. Economic considerations are increasingly important (Bagdikian 2004). As Shoemaker and Reese note “media

personnel are now more likely to evaluate each news item in terms of how it will affect circulation and/or ratings....suggesting that whether professional goals usurp economic ones is dependent on the organization bringing in enough money to survive —and this has become less and less feasible since the mid-20th century” (2014, 140). The economic viability of an organization is tied to advertising revenue and subscription fees, which are linked to the consumer reach of an outlet. The new economic reality – combined with the rise of corporate ownership (Bagdikian 2004) – means that media outlets are more risk-averse and increasingly responsive to the tastes of news consumers.



**Figure 2.** The Hierarchy of Influences and News Coverage of Expert Consensus

Together, the institutional and economic influences on media organizations influence a number of operational routines that can give us some expectations about how expert information is presented in news content. First, as Boykoff and Boykoff argue “journalists tend to primarily, and sometimes solely, consult authority figures” (2007, 1193). This reliance on official sources or *authority bias* has the effect of “indexing” political debate to reflect the spectrum of opinion among societal elites and to the exclusion of minority voices (Bennett 1990; Althaus et al. 1996). In part, this is due to the institutional pressure for media to carry their opinions, but it is also a low-cost way of generating news content with a high degree of accuracy (Shoemaker and Reese 2014).

Second, news routines have formed around perceptions of newsworthiness. The increasing need to be responsive to consumer tastes has generated a number of news content regularities that have been the focus of a wide range of literature. Most importantly, the media focus on deviance because of hard-wired tendency for the public to be more interested in threats and unusual stories (Shoemaker 1996; Soroka 2014). As explained by Shoemaker and Reese, “Surveillance of the environment is an evolutionary, adaptive activity that enhances our quality of life and affects whether we live or die.... Over the generations, attendance to deviance has become hard wired in the brains of all humans and has manifested itself in the surveillance function of the news media” (2014, 172). An emphasis on deviance has three empirical implications. Coverage is likely to be *dramatized* by emphasizing lines of conflict and focusing on bad news. New stories of events thus tend to feature dueling quotes of personalities for or against a certain proposition (Bennett 1988; Boykoff and Boykoff 2007). Journalists will also tend to *personalize* coverage. As Bennett notes, news stories give “preference to the individual actors and the human interest angles in events while downplaying institutional and political considerations that establish the social context of events” (1988, 26). Relatedly, there will be a focus on *novelty* (Wilkins and Patterson 1991). The drama of a story is lessened if it is covered with a similar angle repeatedly, such as the growing threat of global warming (Hilgartner and Bosk 1988; Boykoff and Boykoff 2007). The combination of the drama, personalization, and novelty lead to the framing of political issues in ways that are superficial and episodic. News content will typically eschew linkages between stories and continuity in coverage in favour of covering controversial events and personalities (Iyengar 1991).

Lastly, there is an important norm of objectivity among journalists that shapes news content. In part, this professional norm exists because both journalist and societal beliefs prize news for being covered in an even handed manner (Giannoulis et al. 2010; Schudson 1978). But it is also a mechanism to protect journalists from attack that might undermine their credibility (Hallin 1986; Shoemaker and Reese 2014). Ultimately, media outlets depend on a positive relationship with their sources, which requires an appearance of neutrality. The rise of corporate media ownership in the context of competition with other news providers has also made media organizations more risk-averse, which provides additional support for a norm of objectivity. In practice, this means balance prevails in content. Journalists will provide both sides of any political dispute and weight

them relatively evenly in coverage (Dunwoody 1999), which also serves their proclivity for personalized and dramatized coverage (Stocking 1999; Zehr 2000).

There are clear links between the journalistic routines, perceptions of newsworthiness, and coverage of expert consensus. The possible relationships between the Hierarchy of Influences model and our variables of interest are shown in Figure 2. A reliance on official sources provides one avenue for experts to be covered (McManus 2000). Some will serve in an official capacity, others may be employed in allied interest groups and ideological think tanks and press to have their organizational positions reflected in media content. More impartial experts from universities and non-partisan think tanks may be less likely to deliberately seek out media coverage, but journalists may cite them for the purpose of objectivity and to bolster the credibility of the narrative chosen by the journalist (Steel 1990). On the other hand, experts often provide thematic context to certain issues, which may not fit in episodic, drama-laden coverage. The degree to which experts are cited in coverage is ultimately an empirical question, and serves as the first guiding question for this paper:

**RQ1 (Expert Sources):** How often do news media cite experts in coverage?

We are not just interested in the prevalence of experts in coverage. We are interested in whether they are conveying messages related to agreement among experts on central, general questions of science, economics, and public policy. This is likely to be less prominent in coverage for a couple reasons. First, consensus, by its very nature, leaves little room for drama and novelty. Second, and most importantly, discussion of the central elements of general area in policy, like whether trade protectionism is generally welfare-enhancing or reducing, is unlikely to find its way into media coverage that is episodic and fragmented rather than thematic and context-rich (Iyengar 1991). The details of an expert consensus, however, are often necessary context to interpret events or the cut and thrust of a political debate.

For instance, there is a consensus among economists that immigration, both high and low-skilled, is beneficial for the average citizen and that even high levels of immigration have relatively small displacement effects on low-skilled workers (Kerr and Kerr 2011). This is an extremely crucial piece of information for citizens interpreting the debate on immigration reform. But how does a journalist work this into coverage that often highlights crimes committed by illegal aliens, efforts at border enforcement, or the cut and thrust of debate in Washington? The answer is not obvious absent a fundamental shift in the way journalists cover politics – to emphasize recurring themes and central questions at the expense of personalities, drama, and discrete events. The media’s coverage of climate change is not perfect, but we do know they often reference the IPCC consensus. It is far from certain whether this type of information is common in other areas where experts exhibit a high level of agreement.

We also know that citizens often use cues in their environment to make low-cost judgments on politics (Popkin 1991; Johnston and Ballard 2016). Absent a detailed discussion of the context surrounding these issues, it is possible journalists provide simple cues on the stance of the expert community where relevant. This discussion leads to the first two additional research questions that motivate this study:

**RQ2A (Expert Cues):** How often do news media use experts as sources to support positions on central questions of policy that have broad expert agreement?

**RQ2B (Consensus Cues):** How often do news media provide clear cues that signal broad expert agreement in a policy area (i.e. expert consensus)?

Separate from concerns about whether or not experts are present and conveying information about important areas of research in coverage is the possibility that such information might not be presented in a clear and persuasive manner. There are two related issues. First, the media's norm of objectivity is likely to lead to coverage that presents information from both sides of a policy debate evenly – often labeled *balance*. Second, the tendency of journalists to provide drama likely means that coverage of a policy area will be laced with *conflict* where some actors reject the expert consensus. Taken together, this means consensus information from experts will often be supported and contested in coverage by polarizing political actors (Bennett 1990; Merkley and Stecula 2018; Trumbo 1995, 1996). So, when Republicans reject climate change, the media is sometimes obliged to report this material alongside information on the scientific consensus. It is not inevitable that citizens are more persuaded by experts than other sources of information they value. People learn from those they trust, which is driven to a large degree by perceptions of common interest (Lupia and McCubbins 1998). Indeed, there are reasons to suspect the public broadly doesn't trust the economics profession (Ballard and Johnston 2016). Moreover, as the rich literature on motivated reasoning cited above indicates, citizens are often ideologically motivated to reject expert advice. This is made much easier when sources they trust are carried in the press to prime them to reject such opinion.

**Q3A (Polarizing Opponent):** How often does news media present influential information sources, such as parties and ideological groups that oppose the stated position of the expert community?

That the media may present conflicting information from polarizing information sources is not the only feature of dramatization and balance that may limit the persuasiveness of expert information. In the context of a political debate, journalists may cite polarizing sources that support the expert position as well. For example, journalists may carry supportive messages of climate science from Democratic elites or of GMOs by Monsanto representatives. Such messages may act as a boomerang that undermines support for expert positions among segments of the public predisposed to disliking or distrusting those sources (Hart and Nisbet, 2012, Merkley and

Stecula 2018). Out-group cues have been shown to be persuasive much like in-group cues (Berinsky 2009; Nicholson 2012).

**Q3B (Polarizing Ally):** How often does news media present influential information sources, such as parties and ideological groups that support the stated position of the expert community?

Balance as form of journalistic bias also means that experts in line with mainstream consensus will often be featured in coverage along with those that are not representative of the broader expert community – often labeled as “false balance” by media critics. The resulting dueling quotes in coverage serve to dramatize and personalize coverage, but may also be the result of journalists having difficulty distinguishing legitimate from less legitimate expert opinion unless they regularly report on an issue (Wilson 2000). Conflicts between experts as portrayed in the media may increase public perceptions of uncertainty in expert findings, thus leading to divergence between public and expert opinion on key issues (Koehler 2016). A number of experiments have tried to determine the extent of the problem and possible remedies with some findings that exposure to dueling experts increased perceptions of disagreement among experts and less certainty in the science (Clarke et al. 2015; Dixon and Clark 2013; Dixon et al. 2015; Koehler 2016). Other studies had more mixed results (Corbett and Durfee 2004; Jensen and Hurley 2012). However, on balance, there is strong reason to suspect such falsely balanced coverage of expert consensus may facilitate confusion among citizens about the state of expert knowledge.

A number of scholars have argued that balance was common in media coverage of climate change in the United States where journalists pitted the IPCC consensus against dissenting scientists often with ties to conservative groups and the fossil fuel industry (Zehr 2000, Boykoff and Boykoff 2004; though for a more skeptical account see Merkley and Stecula 2018), and in other areas of science-based policy (Dearing 1995; Dunwoody 1999; Stocking 1999). Most work on this topic has not examined the prevalence of balanced coverage systematically over time and across issues. This motivates the fourth research question:

**RQ4A (False Balance):** To what extent are contrarian experts presented in coverage alongside those in line with the relevant expert community?

The concern with balance in the media’s coverage of climate change has sparked a debate on what the press should do differently in their coverage. Balancing provides an important avenue for minority viewpoints to be heard in the public domain that might otherwise get shut out. Journalists are also often not in the position to adjudicate what positions are correct or not. That is to say, on a large majority of political issues balancing should, if anything, be encouraged. Unsurprisingly, many scholars and journalists are thus reluctant to advocate shutting out minority views on areas where there is expert consensus. Instead, there has been growing interest in providing “weight-of-evidence” information in addition to dueling quotes. Journalists would both

summarize the evidence and report the distribution of expert opinion with this approach. This information gives citizens the necessary context to judge for themselves which point of view is more credible.

However, studies of media content on climate change and other issues of science scarcely make the distinction between weight-of-evidence reporting and articles presented with “false balance”. This distinction is important, and will be incorporated into the media content analysis that follows. Journalists may provide additional information that allows news consumers to discount information from less credible sources, like exposing conflicts of interest or ideological motivations of contrarian experts. But, the demands that this places on journalists are extensive. In a competitive news environment it is perhaps unlikely for such a norm of reporting to prevail. Little attention has focused on the extent to which this practice pervades journalists’ reporting of areas of expert consensus.

**RQ4B (Weight-of-Evidence):** How often does the media provide important weight-of-evidence information when balancing expert voices, such as acknowledging expert consensus or identifying potential conflicts of interest for contrarian experts?

These four questions motivate much of what follows. However, we are also interested in whether journalist practices vary across issues, media, and outlet ideology. This study will examine variation on these dimensions as well. For example, broadcast and cable formats are more conducive to episodic coverage compared to print and newswire (Shoemaker and Reese 2014). We might expect coverage of experts and consensus to be less frequent in these media. The partisan and conflict-orientation of cable news also likely means they will be likely to situate discussion of expert consensus in the context of a political debate and engage in false balance. We might also expect modest differences across the ideological and partisan leanings of outlets. Journalists may selectively cite experts or opponents of the expert community to bolster narratives that align with the partisan leanings of an outlet.

## Data and Methods

Experts and scientists are in agreement on a wide range of topics. Those that are highly technocratic in nature may never capture the media or the public’s attention. However, others do, particularly when there is a motivated opposition to the expert position. Some of these are issues of science. Here, the media turns to scientists, doctors, physicists, ecologists, and a whole host of other disciplines in the hard sciences. Other matters are more focused in anticipating the benefits of costs of a policy for society writ large. Here, economists tend to dominate, in addition to specialists for particular policy areas. We cannot possibly analyze media coverage of all areas of expert agreement that attract media attention, nor do we know what the population of such issues looks like. Thus, I selected nine issues along two different dimensions, in addition to climate change, which has been the focus of most of the literature. These are shown below in Table 1.

More information on the nature of the expert consensus on each issue can be found in the Appendix.

**Table 1.** Issue Selection

	<b>Democrats Against Experts</b>	<b>Mixed/None</b>	<b>Republicans Against Experts</b>
<b>Low Salience</b>	GMOs; rent control	Farm support; childhood vaccinations	Federal Reserve; road pricing
<b>High Salience</b>	Nuclear power	Trade protectionism	Immigration; climate change

The first dimension is issue salience. We might expect salience to materially affect the media's coverage of an issue. As debates become heated and conflictual we may expect the norm of *balance* to play an even more important role in media coverage, and they may dedicate even less space for experts at the expense of parties and advocacy groups. In addition to climate change, immigration, trade protectionism, and nuclear power have gained considerable media and public attention, though their relative saliences have ebbed and flowed over time. For instance, nuclear power was more prominent in the 1970s and 1980s, while concern over climate change took off after the release of *An Inconvenient Truth* in 2006. Although there may be debate as to whether some of these issues are truly salient, they are at least *more* salient than the other issues selected, such as GMOs, agricultural subsidies and road pricing.

**Table 2.** Source Selection

<b>Newspapers</b>	<b>Conservative Newspapers</b>	<b>Cable</b>	<b>Broadcast</b>	<b>Newswire</b>
New York Times (1980)	San Diego Union-Tribune (1983)	CNN (1990)	ABC (1980)	Associated Press (1980)
Washington Post (1980)	Houston Chronicle (1991)	FOX (1997)	CBS (1990)	
USA Today (1989)	Dallas Morning News (1992)	MSNBC (1999)	NBC (1997)	

The second dimension of issue selection is the direction of party and elite cues on the topic. This dimension was chosen to rule out bias in the press in their coverage of experts as driven by partisanship. Democrats and liberal advocacy groups tend to be supportive of rent control and skeptical of the safety of GMOs and nuclear power. Republicans and conservatives tend towards skepticism of Federal Reserve independence, road pricing, and immigration. This does not mean all elites fit this description, and in some cases partisan dynamics change over time. For example, in the 1980s skepticism of the Federal Reserve was found mainly in Democratic ranks because of aversion to the Fed's inflation fighting stance under Chairman Paul Volcker. However, at present, there is a tendency for partisan elites to stand opposed to experts on these issues. There are also some issues with no clear direction of party cues. There is generally strong cross-partisan support for vaccinations. Backing for farm support programs cut across farm state lines, while Democratic

presidents and Republican lawmakers have together advanced an agenda of free trade. Together, these ten issues incorporate a number of key issues that economists and advocates of science have prioritized.

Media coverage was gathered from the *Lexis* and *LexisNexis Academic* services with a battery of key terms found in the Appendix. The keywords and phrases were selected for coverage, rather than precision, to draw in all possible news coverage that relates to our issues of interest. They also carefully avoided reference to experts. Sources were gathered to cover the primary news media (newspaper, newswire, broadcast, and cable), and, where feasible, ideology. Liberal-leaning outlets like the *New York Times* and *CNN* were gathered alongside editorially conservative outlets like the *San Diego Union-Tribune* and *Fox News*. The sources used and their start dates are shown in Table 2. All told, over 280,000 articles and transcripts were downloaded for the analysis. Table A1 provides the total number of articles or transcripts across issues. This is by no means a complete picture of their coverage, but it is a significant and balanced slice of the media environment that cover how the vast majority of Americans receive their news.

**Table 3.** Topic Classification Manual Coding Criteria

Issue	Coding Criteria
Climate Change	Coded '1' if... discussion of climate science or impacts
Immigration Economics	Coded '1' if... discussion of the economic benefits/costs of immigration
Trade Protectionism	Coded '1' if... discussion of the economic benefits/costs of liberalized trade or protectionism
Nuclear Power	Coded '1' if... discussion related to the safety of nuclear reactors
Road Pricing	Coded '1' if... discussion of the advantages/disadvantages of road pricing/tolls
Childhood Vaccines	Coded '1' if... discussion of benefits/costs of vaccines and vaccine safety
GMOs	Coded '1' if... discussion of benefits/costs of GMOs and GMO safety
Federal Reserve Independence	Coded '1' if... discussion of merits/drawbacks of Federal Reserve independence
Farm Support	Coded '1' if... discussion of benefits/costs of subsidies/farm supports
Rent Control	Coded '1' if... discussion of benefits or costs of rent control

For the first stage of the research I built dictionaries of keywords and phrases were built for each issue to be used in conjunction with the R package *Quanteda*. This allows us to count the number of references to experts in coverage. On economic issues, the dictionary contained categories for economists and policy analysts, along with a category to capture generic references to experts, containing words such as analyst, expert, specialist, and professor. On science issues, the generic category was maintained, along with the addition of categories specific to each topic. These dictionaries, which can be found in the Appendix, aim for coverage rather than precision. This sets an upper limit of the proportion of coverage that may contain discussion of the state of

expert knowledge on these topics. In reality, many “experts” portrayed in the media may be anything but. Genuine experts may also be used to shed light on information unrelated to the topics of expert agreement that are the focus of this paper.

**Table 4.** Relevance Coding across Medium

	Total N	Relevant	Expert + Relevant	Total N	Relevant	Expert + Relevant
<b>Climate Change</b>				<b>GMOs</b>		
<b>Total</b>	48924	13314 (27%)	9467 (19%)	1703	990 (58%)	695 (41%)
<b>Print</b>	35693	8339 (23%)	6149 (17%)	1040	571 (55%)	442 (42%)
<b>Cable</b>	2202	464 (21%)	311 (14%)	37	14 (38%)	11 (30%)
<b>Broadcast</b>	1861	490 (26%)	358 (19%)	105	40 (38%)	30 (28%)
<b>Newswire</b>	9168	4021 (44%)	2649 (29%)	521	365 (70%)	212 (40%)
<b>Immigration Economics</b>				<b>Rent Control</b>		
<b>Total</b>	100033	2420 (2%)	843 (1%)	2835	842 (30%)	191 (7%)
<b>Print</b>	62801	1848 (3%)	692 (1%)	2516	774 (31%)	177 (7%)
<b>Cable</b>	8698	68 (1%)	16 (0%)	13	6 (46%)	2 (15%)
<b>Broadcast</b>	3237	62 (2%)	12 (0%)	8	3 (38%)	1 (12%)
<b>Newswire</b>	25297	442 (2%)	123 (0%)	298	59 (46%)	11 (4%)
<b>Road Pricing</b>				<b>Trade Protectionism</b>		
<b>Total</b>	9791	1109 (11%)	233 (2%)	73672	27050 (37%)	8186 (11%)
<b>Print</b>	8941	1011 (11%)	215 (2%)	42012	14251 (34%)	5450 (13%)
<b>Cable</b>	47	1 (2%)	0 (0)	2680	757 (28%)	260 (10%)
<b>Broadcast</b>	110	6 (5%)	2 (2%)	1216	329 (27%)	60 (5%)
<b>Newswire</b>	693	91 (13%)	16 (2%)	27764	11713 (42%)	2416 (9%)
<b>Federal Reserve</b>				<b>Childhood Vaccinations</b>		
<b>Total</b>	600	136 (23%)	70 (12%)	11891	3340 (28%)	2895 (24%)
<b>Print</b>	403	95 (24%)	52 (13%)	7155	2006 (28%)	1709 (24%)
<b>Cable</b>	21	3 (14%)	1 (5%)	590	44 (7%)	34 (6%)
<b>Broadcast</b>	8	0 (0)	0 (0)	909	172 (19%)	153 (17%)
<b>Newswire</b>	168	38 (23%)	17 (10%)	3237	1118 (34%)	999 (31%)
<b>Nuclear Power</b>				<b>Farm Support</b>		
<b>Total</b>	30704	6205 (20%)	1681 (5%)	6180	1044 (17%)	281 (4%)
<b>Print</b>	16351	2334 (14%)	845 (5%)	3336	522 (16%)	164 (5%)
<b>Cable</b>	1047	29 (3%)	11 (1%)	184	13 (7%)	0 (0)
<b>Broadcast</b>	1184	98 (8%)	51 (4%)	161	20 (12%)	2 (1%)
<b>Newswire</b>	12122	3744 (31%)	774 (6%)	2499	489 (20%)	164 (5%)

Of course, there is no guarantee that the citation of experts in coverage mean that these experts are being used to shed light on important issues of expert agreement. For example, most immigration stories likely do not focus on the economics of immigration, but rather the politics of illegal immigration or refugee flows. Similarly, some climate change coverage may cover the politics

of climate mitigation or industry development of alternative energy sources, rather than climate science or climate impacts. Thus, I parse the sample of articles on each issue by topic such that stories with discussion relevant to the domains of expert knowledge central to this paper are identified. So, we separate stories that discuss climate science and climate impacts from all others, or articles that contain debate on the economics of immigration from all others.

To do this I use supervised machine learning with the *RTextTools* package in R. I manually coded 500 articles for each issue (750 for immigration for a total of 5250 articles) as “1” if they contained discussion of the issues related to the domain of expert agreement that are the focus of this paper, and “0” otherwise. The general coding rules are shown in Table 3. More detail can be found in the Appendix. A random sample of 400 coded articles on each issue was used to train four categorization algorithms in the *RTextTools* package: SVM, Boosting, Random Forest, and Maximum Entropy.<sup>2</sup> Articles were coded by the machine as “1” if a consensus of 3 of the 4 algorithms agreed it was relevant. This had the effect of trading off fewer false positives (important for the second stage of the analysis) for more false negatives (i.e. maximizing precision at the expense of recall). I then tested the trained algorithm on the remaining 100 manually coded articles for each issue. Confusion matrices are displayed in the Appendix (Stage 1 Diagnostics), along with accuracy and precision scores to demonstrate performance.<sup>3</sup> Overall accuracy of the algorithm consensus ranges from 80 on trade protectionism to 92 for Federal Reserve and farm support coverage with an average of 88. Even more impressive are the precision scores given the low baseline of relevance for some issues. It ranges from 0.8 for trade protectionism and the Federal Reserve to 1.00 for road pricing with an average of 0.9. In other words, a best estimate for the rate of false positives is 10% across all issues. After training the algorithms they were used to predict the classification of the full sample of news stories.

Rates of topic relevance varied considerably across issues, from a low of 2 percent for immigration to a high of 58% of GMOs. This is to be expected. Areas on which there is some element of expert agreement is only one part of a broader debate on any given issue. The economic dimension is a very small part of immigration coverage, whereas GMO safety concerns are at the heart of media attention to that issue. Also expected are differences across media. Cable and broadcast content was less likely to be coded as relevant, likely because such media are less

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<sup>2</sup> Computer memory constraints limited my ability to use the other algorithms. Algorithms were trained on a random sample of articles from the newswire and newspaper sources. Random Forest was removed from the ensemble on road pricing, farm support, rent control, and the Federal Reserve. A consensus for these issues is the agreement of relevance between 2 of the 3 algorithms. Algorithms were trained on the print and newswire articles.

<sup>3</sup> This was accomplished by comparing the algorithm’s coding to my own with articles that were not used to train the algorithm. Confusion matrices plot the true positives (TP, bottom right), true negatives (TN, top left), false positives (FP, bottom left), and false negatives (FN, top right). Accuracy tells us how often the algorithm got it right ( $(TP+TN)/Total$ ). But, the purpose of this analysis is to hone in on a sample of articles for manual coding. As such the more important measure of performance is how many true positives we have relative to all articles that were coded as relevant. This is what the precision score gets us ( $TP/(TP+FP)$ ).

disposed to providing the context essential for a story to be classified as such. More details on the relevance results can be found in Table 4. The use of the expert dictionaries in conjunction with classification by relevance can allow us to generate estimates for the share of coverage featuring experts across media, outlet ideology, and time in our broad sample of articles and among stories featuring discussion relevant to important areas of expert agreement (RQ1).

A measure of expert share, however, does not tell us a lot about whether or not expert agreement on an important dimension of a policy area is being clearly conveying to readers and viewers. So, for example, are these expert references conveying information about the topic of interest? Are there cues conveying the state of expert agreement? Are expert voices balanced against competing political interests or dissenting experts? These are more nuanced questions that deserve more delicate treatment. To answer these questions I manually coded a stratified random sample of articles and transcripts that were both classified as relevant and having an expert citation. The aim was to code 100 articles for each relevant subset of sources on each issue. So, I coded 100 articles each for Republican-leaning newspapers, broadcast sources, liberal cable outlets, and so on. For most of the issues, particularly those of low salience, there were not 100 articles or transcripts for a relevant media subset. This was primarily true for cable and broadcast sources. In these cases, I coded all available material. The resulting sample is comprised of 3,147 articles and transcripts across the ten issues. Coding criteria can be found in the Appendix.

First, I coded certain features of the presentation of expert information. I coded whether experts were used to communicate a position on the central issues that undergird expert agreement on a policy area (Expert Cue). I made note of whether that cue clearly signaled that the expert position was a consensus, or at least majority position in the expert community (Consensus). I also coded for softer expressions of expert agreement that stopped short of declaring a consensus or majority agreement. For example, it is often the case that journalists will use phrases like “experts agree”, “many economists support”, to communicate the general position of the expert community without taking a clear stance on whether such opinion is universal. These cues, in addition to stronger claims of consensus, are presented separately (Agreement).

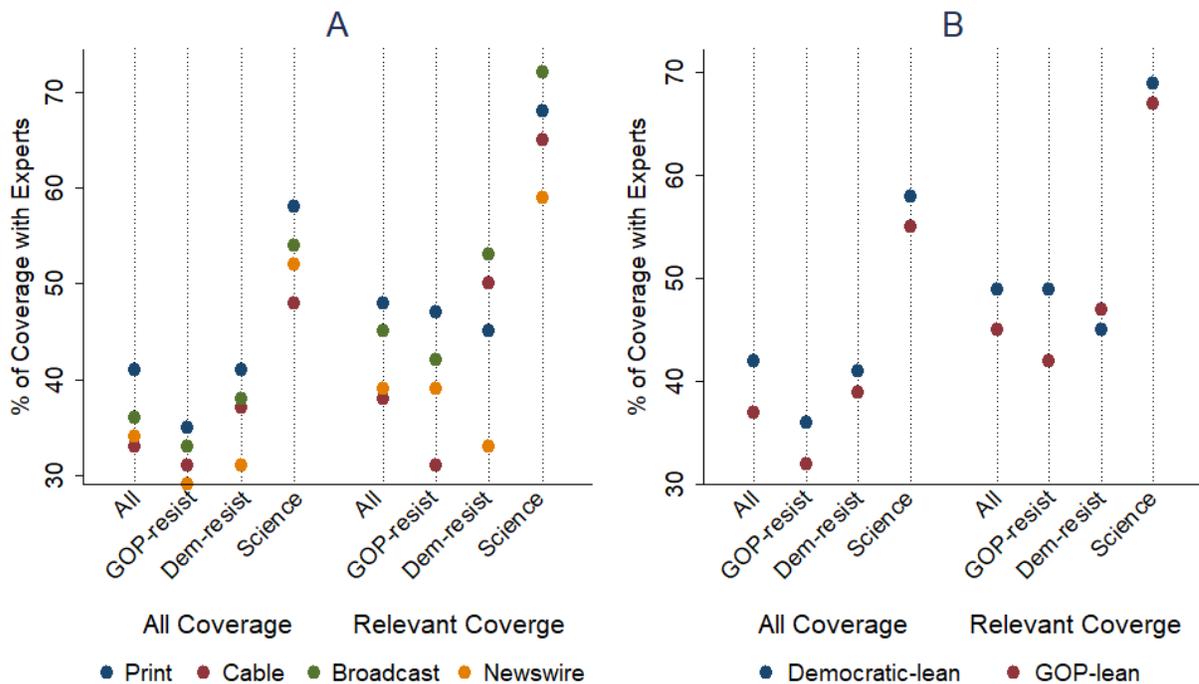
Second, I coded features related to the broader article. I coded each article for slant on a scale of -1 to 1 (Slant). A score of 1 meant that the relevant information contained in the article was entirely aligned with the position of the mainstream expert community, while -1 was entirely against the position. Scores of 0.5 and -0.5 were assigned if there was a notable slant to the article in either direction, but there still contained some effort to balance perspectives by the journalist. A score of 0 indicated that both perspectives were effectively balanced. Both sides were treated equally in the content of the article. All told, the article scores generally reflected the number of arguments made on either side of the debate with a few caveats. Scores of -1 and 1 were given to op-eds that took a clear stance against or in favour of the expert position even if alternative perspectives were mentioned to discredit them. It was also insufficient to simply note alternative perspectives existed on an issue – the journalist had to spend some space paraphrasing their argument or quoting a source in support. If not, scores of -1 or 1 were assigned. I also made note of which sources were used to provide support for the expert position or to oppose it. Of particular

interest were parties, advocacy organizations, and interest groups (RQ3A, Polarizing Opponent), and contrarian experts (RQ4A, False Balance). I also coded whether there were other political actors supporting the expert position with a particular interest in interest groups, advocacy organizations, and political parties (RQ3B, Polarizing Ally).

Finally, for all articles featuring dueling cues from opposing experts I coded articles for whether the journalist provided important context to allow readers or viewers to adjudicate between the two points of view (RQ4B, Weight-of-Evidence (WOE)). For example, a journalist may indicate which side has the weight-of-evidence behind it, or they could provide information on conflicts of interest.

## Results

I will begin by presenting the big picture results before drawing attention to patterns in coverage of individual issues that might be of interest. First, I will discuss general patterns of expert citation (RQ1). Second, I will present the results of the manual coding that dig deeper into the presentation of expert information (RQ2). Finally I will discuss the manual coding results that focus on conflict and balance in coverage (RQ3-RQ4).

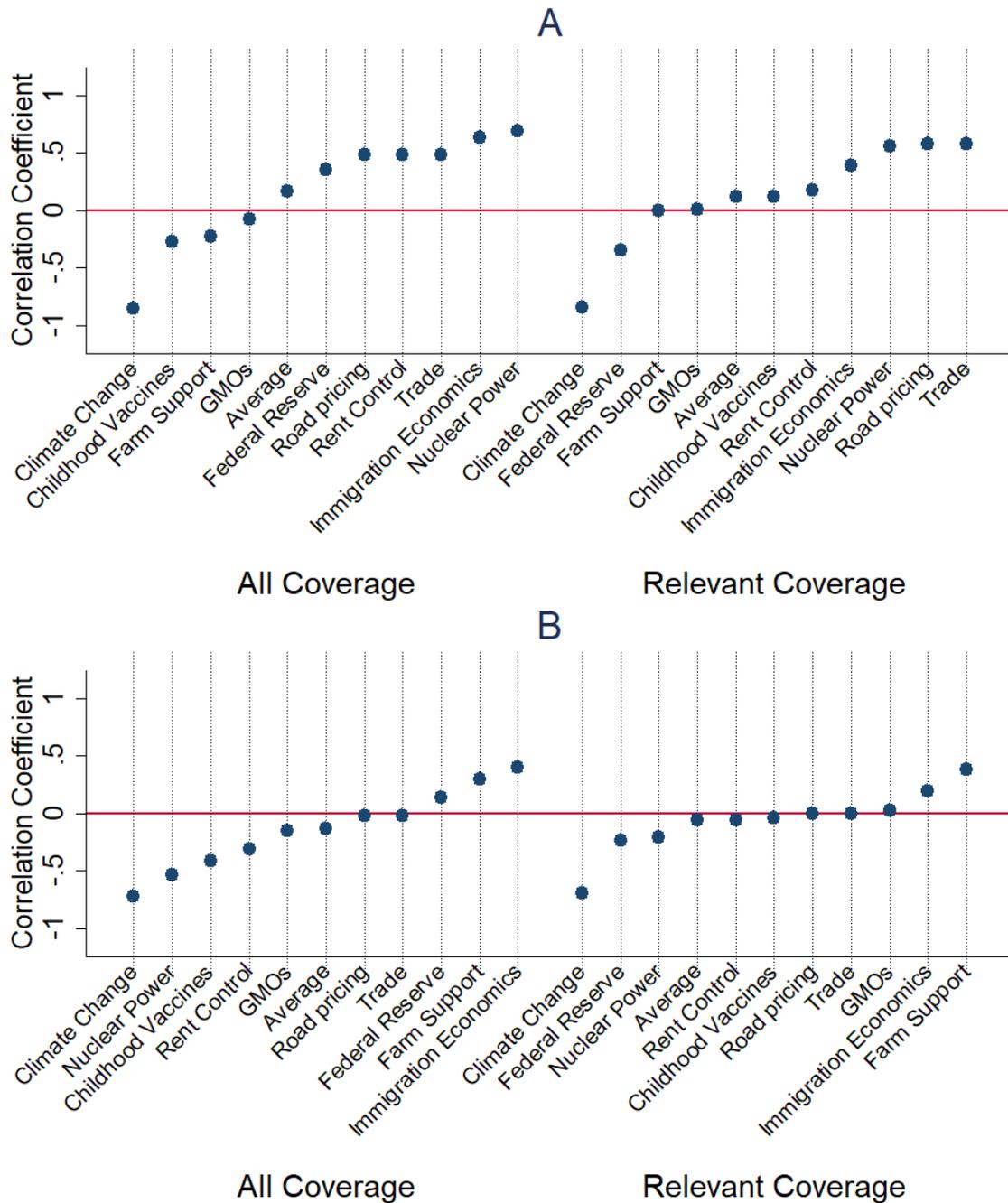


**Figure 3.** Expert Share of Coverage across Medium (Panel A) and Outlet Ideology (Panel B)

### Prominence of Experts in News Coverage

A useful starting point is the examination of how often experts are cited in coverage. Across all issues and media, experts command a presence in a reasonable 38 percent of coverage. That is, 38 percent of articles and transcripts contain a reference to an expert as captured in the dictionaries. Figure 3 below presents the breakdown of this metric across medium (Panel A) and ideology (Panel B). Generally, print media does a better job covering experts (41%) compared to cable (33%) and newswire (34%). Democratic-leaning outlets also covers experts more readily (42%) than their GOP-leaning counterparts (37%). The more frequent citation of experts by Democratic-leaning outlets holds regardless of the partisan and ideological implications of the issues, though science topics do feature experts (55%) more than others. Overall, coverage of childhood vaccinations contains the highest share of expert sources (72%), followed by GMOs (62%), and climate change (57%), while they are the least frequent in immigration (20%). Figure 4 presents pairwise correlations between this measure and both a yearly trend and article count, which is used here as a proxy for salience. Averaging across all issues there is a slight increasing tendency to cover experts over time, but this varies considerably across issues – steadily rising in immigration and nuclear power coverage, but dropping for climate change. There is also a slight tendency for experts to be crowded out when issues become salient, and this is most prominent for science-based issues like climate change, nuclear power, and vaccinations. More detailed plots of each issue time series can be found in the Appendix.

Of course, it is possible that expert shares of coverage may be higher when the topic of focus is relevant to an important area of expert agreement. Journalists may be more likely to turn to experts knowing they have a clear message on an important element of a policy debate. Results restricting the expert share measure to relevant articles are presented in Figure 3. There is only modest support for that contention. The share of coverage with expert references only rises a modest 6 points to 44 percent in those articles classified as relevant. This effect is stronger for science based issues, rising 9 points to 64 percent. Again, print media appear to more prominently feature experts (48%), with cable (38%) and the newswire (39%) performing the worst. Interestingly, outlet ideology appears to moderate the propensity to cite experts in relevant coverage. Across all issues there is a modest four point gap between Democratic-leaning (49%) and Republican-leaning outlets (45%). This expands to a seven point gap on issues where Republican elites are more resistant to expert opinion (49% v. 42%). However, on issues Democratic elites are more resistant to expert opinion the difference disappears and Republican leaning outlets are actually slightly more likely to cite experts (47% v. 45%). This suggests there is some degree of ideological motivation behind patterns of expert citations. Outlets are more likely to cover experts when they are more sympathetic to the aims. However, these differences are modest.

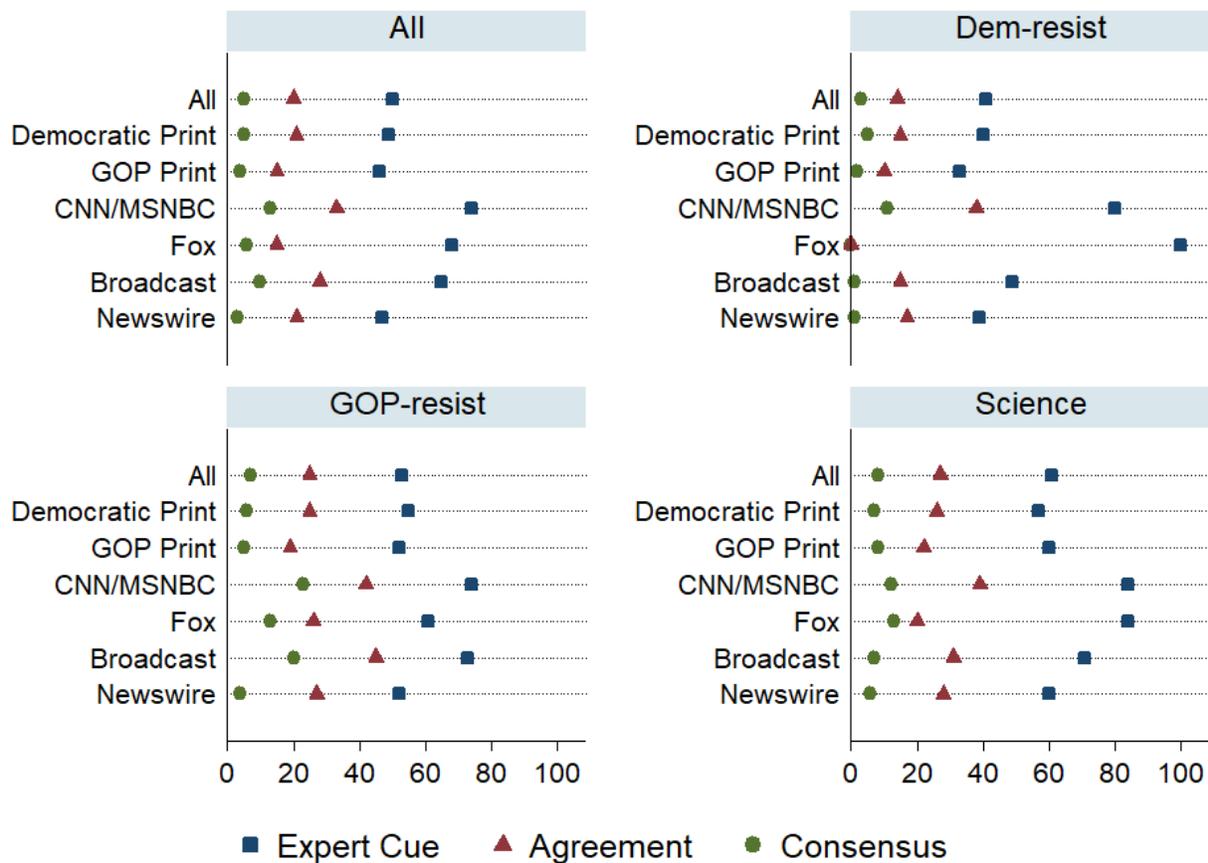


**Figure 4.** Pairwise Correlations of Expert Share (%) with Trend (Panel A) and Salience (Panel B)

Figure 4 also shows that there is, across issues, only a modestly increasing tendency for the media to cite experts in relevant coverage. This is most obvious for nuclear coverage and economic issues like immigration and road pricing. On climate change, however, coverage of experts appears to be decreasing even when the topic is relevant. This fact, paired alongside a strong negative correlation with salience suggests either that experts are getting pushed aside in climate coverage

as the issue has become politicized or that the media is taking the scientific consensus for granted in an increasing amount of coverage. Detailed time series plots on expert share of relevant coverage can be found in the Appendix.

Ultimately, news coverage, across media, only inconsistently covers experts when it is particularly pertinent. This coverage is often only a small fraction of its overall total. The media fare better on science-based issues like GMOs (41%), vaccines (24%), and climate change (19%), but poorly on other issues, averaging a mere 6 percent. This is a *ceiling* on the degree to which information on expert agreement is disseminated by the press. There is no guarantee that experts cited in these stories make arguments that reflect agreement among scientists or economists, or that such information is presented in a way to be digestible to readers and viewers. Examining these traits of coverage is the focus of the next section.



**Figure 5.** Manual Coding Results – Expert Cues

Consensus, Conflict, and Balance in News Coverage of Experts

The findings above suggest that media coverage that communicates information from experts on central, general questions of public policy is rare. The degree to which this is true is striking in its consistency across issues, across media, and across outlet ideology. But, this measure likely

overstates the degree to which experts are being used to communicate important areas of agreement on central policy issues and how clearly this message is conveyed. To unpack the signals being sent by experts on these issues, we turn to manual coding, the results of which are displayed in Figure 5.

On the whole there is no question that the use of the expert dictionary overstates the degree to which experts are both featured in coverage and convey information on the position of the broader expert community on the important central issues for a given policy area. Only half of the stories identified as having an expert reference fit this description, on average (50%). This figure is modestly higher for broadcast (65%) and both liberal (75%) and conservative cable news (68%). It is also substantially higher for science-based issues (61%). Expert information is also more likely to be featured on issues where Republicans resist experts compared to others where Democratic elites are at odds with them, but this is largely a function of the limited presence of experts in nuclear coverage (32%) compared to a high level in climate change (86%).

Climate change and vaccine coverage (75%) are the only cases where experts consistently convey the stance of the expert community on the topics of concern here. It raises the question of why the numbers are so low on the other issues. There are two reasons for this. First, experts are often drawn into news coverage for reasons other than conveying the stance of the expert community on the central causal issues in a policy area. Often, they are used as background to explain how certain policies have worked or will work, to describe the state of the world, or to make neutral predictions about the future. For example, economists are often cited by journalists to explain America's economic performance and how they anticipate the markets would react to certain developments. Second, in many cases only a fraction of a given article is relevant to the issues we are interested in. Experts are cited in the context of discussion that is simply unrelated to our topic of interest. For example, an article with some discussion on the merits or drawbacks of free trade may primarily focus on describing the current trade deficit and its future trajectory. In short, however limited the role of experts may have looked based on the previous section's analysis, the reality is even bleaker (RQ2).

It is also clear that the media does a poor job providing cues about the position held by the expert community writ large (RQ3). On average, only 20% of our manually coded stories have a cue, and only 5% have a cue that very clearly conveys the majority or consensus position of the expert community. Interestingly, liberal cable and broadcast news are modestly better at providing such cues (28 and 33%). There is one exception to the media's poor performance: climate change. Expert agreement cues are provided in 55 percent of coded coverage, and clearly convey majority expert opinion in 18% of stories. This is not a function of it being a science-based issue. These cues are extremely rare in nuclear coverage (11 and 1%), and are surprisingly not all that common in vaccines news (21 and 7%). Consensus information is typically not presented outside of the context of climate change, and this holds regardless of outlet medium or ideology. When put into a context in which expert information on these issues is not all that common in media coverage, these essential contextual cues are very rare indeed.

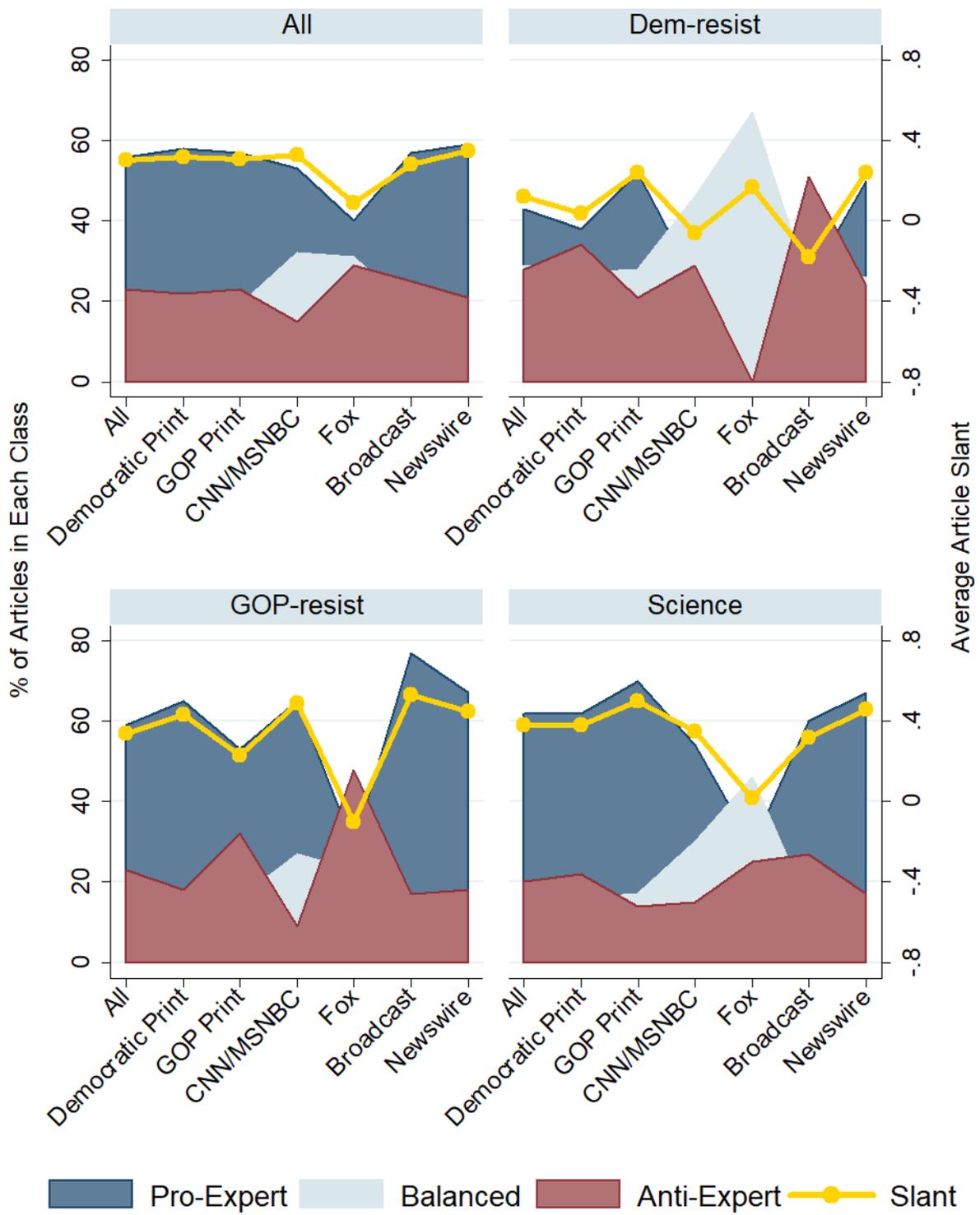
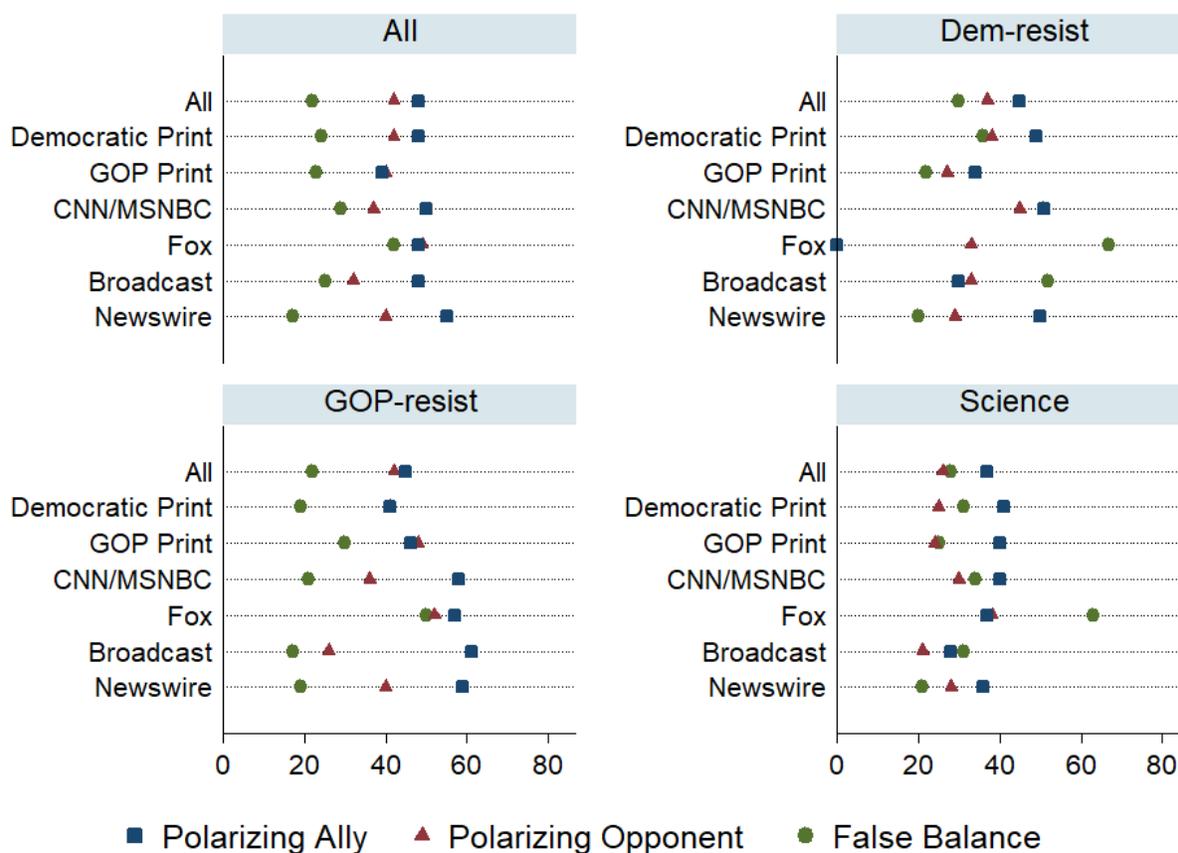


Figure 6. Manual Coding Results – Balance

Thus far the story presented has been rather bleak. The media does not often carry messages from experts, and it is rarer still that they convey information about expert consensus. However, there is one area where the media performs much better: balance. The results of which are presented in Figure 6. To be sure, most articles displayed some balance, but a slant in either direction could be detected in around 80% of articles and transcripts. Only 21% of articles were truly balanced between positions in favour and opposed to the stance of the pertinent expert community. This number is expectedly somewhat higher in cable news (33% and 31%). More surprising is that broadcast news performs similarly to print in this regard. Against expectations, the media typically do smuggle in a dominant perspective in their coverage of these issues. This slant, on average, is towards the expert position (0.29), which is largely consistent across medium and outlet ideology. The only exception is *Fox News*, which, on average, is more balanced (0.09). 56% of articles contain slant in favour of the expert position on average, compared to 23% against. This slant is somewhat higher on science-based issues (0.37), but, as we will see, that number varies substantially by issue.

Perhaps the most interesting finding here is that slant varies in expected ways across outlet ideology, but not in ways that take away from the overriding finding that the press skews coverage towards expert positions. On issues where Democratic and liberal elites are more likely to resist experts, Democratic-endorsing newspapers average much closer to balance 0.04 than their GOP-leaning counterparts (0.24). There is a similar divide between liberal (-0.06) and conservative cable news (0.17). The *Associated Press*, a thoroughly non-partisan newswire, is closer to GOP-newspapers on these issues (0.24), while broadcast news is closer to Democratic-leaning outlets (-0.18). On issues where Republican and conservative elites are more likely to resist experts, GOP-endorsing newspapers average much closer to balance (0.23) than their Democratic-leaning counterparts (0.43). There is a similar divide between conservative (-0.10) and liberal cable news (0.49). Here, both the *Associated Press* (0.45) and broadcast news (0.53) are closer to Democratic-newspapers on these issues.

These differences emerge not because of the number of balanced articles changes – in fact, there is very little difference between outlets on this count. It emerges because of differences in the number of slanted articles. For example, on Democratic-resist issues 52% of newspaper articles in GOP-leaning newspapers are slanted towards the expert position versus only 38% for Democratic newspapers. On GOP-resist issues, 53% of articles in GOP-endorsing newspapers are slanted towards experts versus 65% for Democratic-leaning outlets. In sum, the media does slant its coverage, on average, in the direction of positions supported by experts, but there are important, yet subtle, differences across outlet ideology and medium. There are also important differences across issues. Climate change and vaccine coverage appear to be the gold standard (0.61 and 0.80), while nuclear power coverage is slanted modestly against the expert community (-0.18). More details on this will be provided below.



**Figure 7.** Manual Coding Results – Balance and Conflict

How likely are sources of expert information to be balanced against polarizing political actors (RQ4) or contrarian experts (RQ5A)? These results are presented in Figure 7. It turns out that balancing perspectives is not as common as we would expect, and this is particularly true for cases where contrarian experts provide balance to the perspectives of experts aligned with the broader community – the dreaded case of “false balance.” This only happens in 22% of coverage on average. It is much more common for expert perspectives to be balanced against those of other political actors (42%). The prevalence of expert balancing is relatively consistent across outlet medium and ideology, though it is more common in *Fox News* coverage (42%), as the tendency of journalists to cite polarizing opponents (49%). As was the case with the slant scores, there is some evidence of ideological bias. GOP-endorsing newspapers are more likely to balance experts against other experts for GOP-resist issues (30% vs. 19%), while Democratic-leaning newspapers do the same for Democratic-resist issues (36% vs. 24%). These same patterns are reflected in the citations of polarizing opponents. The *Associated Press* behaves more like GOP-leaning newspapers for Democratic-resist issues, and more like Democratic-endorsing newspapers for GOP-resist issues. Broadcast news behaves similar to Democratic-leaning newspapers. Finally, false balance is more common relative to the citation of polarizing opponents on science-based issues, the reasons for which will be explored below when we go into more depth on specific issues.

The tendency of the media to balance the perspectives of experts with those of opposing political actors represents the media's tendency of anchoring news in political conflict. This is a two way street. In many cases the views of party elites, interest groups, and advocacy organizations sympathetic to the expert position are also mentioned alongside experts. Experts aligned with the broader expert community, when covered, are caught in the middle of claims and counterclaims by competing parties and interest groups. The messages made by these actors may prime citizens who are motivated to resist their messages to also resist the message conveyed by the relevant experts. Almost half of stories that cover an expert message also contain messages from supporting political actors (48%). This is consistent across outlet ideology and medium, though it is somewhat lower for science-based issues (37%), the average of which is dragged down by the relative rarity of such supporting cues in vaccine coverage (15%). Whether or not supporting political cues may undermine the persuasiveness of expert messages is a topic that has not been addressed in experimental research. It deserves further inquiry as it is a common feature of news coverage.

Finally, it appears that the media often fail to provide weight of evidence context when they present dueling opinions from competing experts (37%), though this varies considerably across issues, with it being most common in vaccine coverage (57%) and least common in coverage of Federal Reserve independence (0%) and agriculture subsidies (10%). More often than not the media uncritically present competing expert perspectives making it difficult for people to judge which perspective is more credible (RQ4B). The full results broken down by media type can be found in Figure A1 of the Appendix.

### Trends

It is also possible to use the hand coding results to look at whether there have been any meaningful changes in the media's coverage of these issues over time. Table 5 above plots the results for consensus cues, slant, and false balance by decade for each issue. Generally speaking, there has been little change in the relative rarity of consensus cues available in the media with three possible exceptions. First, consensus cues appear to be more common in climate change coverage increasing from 9-10% before 2001 to between 20-23% afterward. The same is true for vaccines and GMOs, albeit more modestly. Consensus cues were virtually non-existent in the 1980s for vaccine coverage, and now are featured in approximately 13% of articles. They were also rare in GMO coverage (4-5%), but have started to pick up in recent years (13%). This improvement, however, was not found in coverage of nuclear power, so it was not common to all of the science-based issues studied here.

Table 5. Manual Coding Results by Time Period

Issue		1981-1990	1991-2000	2001-2010	2011-Present
<b>Climate Change</b>	Consensus	10%	9%	20%	23%
	Slant	0.76	0.79	0.64	0.67
	Slant (No Fox)	0.76	0.79	0.86	0.84
	Slant (Fox)			-0.12	-0.24
	False Balance	28%	24%	20%	10%
	False Balance (No Fox)	28%	24%	9%	9%
	False Balance (Fox)			66%	20%
<b>Immigration Economics</b>	Consensus	4%	4%	3%	6%
	Slant	-0.06	-0.11	0.30	0.34
	False Balance	13%	54%	33%	5%
<b>Road Pricing</b>	Consensus	0%	4%	2%	0%
	Slant	0.29	0.69	0.46	0.09
	False Balance	0%	8%	9%	13%
<b>Federal Reserve</b>	Consensus	0%		6%	0%
	Slant	-0.50		0.22	0.16
	False Balance	50%		0%	50%
<b>Nuclear Power</b>	Consensus	2%	0%	0%	1%
	Slant	-0.21	-0.14	0.00	-0.23
	False Balance	50%	40%	25%	27%
<b>GMOs</b>	Consensus	4%		3%	12%
	Slant	0.19		0.20	0.35
	False Balance	0%		29%	40%
<b>Rent Control</b>	Consensus	6%	0%	0%	
	Slant	0.39	0.34	0.06	
	False Balance	16%	15%	0%	
<b>Trade Protectionism</b>	Consensus	8%	8%	5%	8%
	Slant	0.14	0.34	0.13	0.15
	False Balance	13%	12%	13%	17%
<b>Childhood Vaccinations</b>	Consensus	0%	7%	8%	11%
	Slant	0.87	0.82	0.74	0.84
	False Balance	5%	15%	14%	11%
<b>Farm Support</b>	Consensus	0%	0%	1%	0%
	Slant	0.26	0.05	0.19	0.61
	False Balance	7%	27%	10%	17%

Note: There was an insufficient sample of articles between 1991 and 2000 for Federal Reserve coverage, between 1981 and 1990 for GMO coverage, and from 2011 to the present for rent control. These periods are collapsed accordingly.

There is also some evidence of important changes in slant, but this varied widely across issues. For climate change there is some suggestion of a modest turn away from the expert position (0.76 to 0.67), but this is an artefact of Fox News' entry into the sample in 1999. All other outlets show

a slight gravitation towards the expert position from an already high baseline (0.76 to 0.84), while Fox News shows the opposite (-0.12 to -0.24). Coverage of immigration economics has also moved progressively towards the expert position over time (-0.06 to 0.34), as has coverage for GMOs (0.19 to 0.35), farm subsidies (0.05 to 0.61), and Federal Reserve independence (-0.50 to 0.16). On two issues there has been gravitation away from the expert position: rent control (0.39 to 0.06), and road pricing (0.69 to 0.09). Coverage of nuclear power began to move towards the expert position through to the 2000s (-0.21 to 0), but coverage turned negative post-2010 (-0.23) likely due to the Fukushima nuclear accident. And what of the dreaded “false balance” norm? This too varies considerably by issue. It is undoubtedly on the decline in climate change and nuclear power coverage, and for immigration economics (after peaking in the 1990s). It is on the rise in coverage of road pricing and GMOs.

#### Issue Specific Results – Childhood Vaccinations

Perhaps the gold standard of scientific consensus is related to the safety and efficacy of childhood vaccinations. This is very clearly reflected in media content. On average, 75% of stories in the manually coded sample contained messages from experts on this topic, which is much higher than the average (50%). This number is even higher for broadcast and cable news. However, the media are not particularly good at providing contextual cues to signal scientific agreement. Only 22% of stories had such a cue, while 7% of stories had cues that clearly signaled the stance of a majority of expert opinion – both only slightly higher than the average. Cable and broadcast news is modestly better at providing such cues, but the presence of strong consensus does not appear to make the press more likely to provide such cues. On the question of balance, however, the media performs remarkably well. The average slant across all outlets is 0.80, and this is broadly similar across outlets. Over 90% of articles are slanted in favour of the expert position, with only 6% balanced and 4% slanted against the expert position. Only 13% of stories with expert messages were balanced with a pseudo-expert, and most weren't even balanced against polarizing opponents (9%). The vast majority were balanced with the messages of parents of children alleged to have suffered vaccine injury, if they had any balance in the story at all. All-in-all, the media clearly conveys expert information in their coverage of vaccines across the board, though they could do a better job providing consensus information. The gold standard of scientific consensus is met with arguably a gold standard of science reporting with very few exceptions.

#### Issue Specific Results – Climate Change

One of the most studied issues in media analysis is climate change. There is a widespread perception that that media has failed to do an adequate job conveying the realities of climate science to the public. Instead of presenting the science as largely settled, the media are alleged to present a false balance to the debate by placing scientists alongside pseudo-experts to fulfill a norm of providing balanced coverage. The reality, however, is much more complex. Across the board, the press do a remarkably good job of covering climate science – at least relative to other issues. 86% of manually coded stories in the sample covered an expert signal related to climate science, much higher than the average across issues (56%). The only exception to this robust

coverage of experts is, unsurprisingly, *Fox News*. More importantly, the media often carry contextual cues that signal scientific agreement. In stark contrast to vaccine coverage, this was the case in 55% of climate change stories in the sample, which is far higher than the average (20%). This is also true for clear signals of majority agreement (18% vs. 5%). However, much like with other issues, the press often cover other political actors in support of the expert position (50%), which may mitigate the impact of expert messages.

The media also score well on balance. Average slant is 0.68, which is significantly dragged down by *Fox News* (-0.13). Slant scores for other media range from 0.77 to 0.90, well above the average across all issues (0.30). There is only a slight difference in the expected direction between Republican (0.77) and Democratic endorsing newspapers (0.85). The meaningful difference is between *Fox News* and all other outlets in the sample. For example, 87% of articles in GOP-leaning newspapers were slanted in the direction of the expert position, compared to 5% that were balanced, and 5% that were skewed against the expert position. *Fox News* coverage is starkly different, with 51% slanted against the expert position, compared to 25% that were balanced, and 25% skewed in favour of the expert position. This difference also manifests itself in the nature of the balance. Only 12-16% of expert coverage was balanced with pseudo-experts in mainstream outlets. This is true for 60% of Fox News coverage. The mainstream media does a reasonably good job of conveying expert information on climate change. In fact, their coverage of climate science is arguably even better than coverage of vaccines. Questionable coverage is largely confined to the conservative media echo chamber.

### Issue Specific Results – Nuclear Power

Unlike with climate change, nuclear power is an issue where Democratic elites tend to be resistant to expert opinion. The media's impressive coverage of climate change does not carry to this issue. Only 32% of articles in the sample contain messages from experts in line with the expert community, well below the average (50%). Contextual cues signaling expert agreement were similarly less common (11% vs. 20%), and clear consensus cues are virtually non-existent (1%). Nuclear power is also the only issue where the media is, on average, slanted against expert opinion (-0.18), well below the average (0.30). There are expected differences across outlet ideology. GOP-endorsing newspapers are modestly more favourable to the expert position (0.01) than Democratic-endorsing newspapers (-0.25), as is *Fox News* (0.17) relative to liberal cable outlets (-0.29). The *Associated Press* falls somewhere in between (-0.16), and broadcast news is perhaps the most hostile (-0.41). Unsurprisingly, contrarian experts are also used to balance the perspective of the expert community at a higher rate than the average (38% vs 22%).

What accounts for the vast difference between climate change and nuclear power coverage? Perhaps the biggest reason is that most coverage of nuclear power safety is focused primarily on safety violations of individual nuclear power plants, particularly a handful of troubled facilities. In this coverage, journalists did a poor job conveying the relative lack of severity of certain violations, often contained sources, such as environmentalists, who waxed apocalyptic about specific nuclear plants, and failed to place incidents within the context of the impressive safety

record of the nuclear industry. Defense of the nuclear power was primarily placed in the hands of industry sources and officials at the Nuclear Regulatory Commission – the integrity of which was often called into question in news coverage by environmentalists or journalists themselves. Matters improve when we focus on the articles that speak to the safety record of the nuclear power industry. Average slant in these articles is higher, though still well below the average (-0.03). There remains a gap between GOP and Democratic-endorsing newspapers (0.22 vs. -0.05) and Fox News and liberal cable (0.25 vs. -0.17). On the whole, however, there is a wide gulf between the media’s coverage of nuclear safety and the industry’s safety record.

#### Issue Specific Results – Genetically Modified Organisms

The findings for coverage of nuclear power is not surprising. It is a much more difficult issue to cover compared to vaccines and climate change. The theoretical possibility of a meltdown is real, if remote, and safety violations do happen at nuclear plants that deserve to attract media attention. The primary failure of the media on this issue is to provide context so readers and viewers can properly evaluate the safety of nuclear power against available alternatives. The issue of GMOs, however, is almost as clear cut as vaccines and climate change. Unfortunately, media coverage of this issue departs considerably from those benchmarks. 53% of stories in the manually coded sample contain expert references in the expected direction, 19% have consensus cues, and 5% have clear signals of majority expert opinion – all close to the average across issues. Average slant is similarly close to the average (0.23), with 51 percent of stories being slanted towards the expert position, 20% being balanced, and another 20% slanted against experts. There are also expected ideological divides. Slant is more tilted towards experts for Republican-endorsing newspapers (0.36) compared to their Democratic counterparts (0.13).

The most concerning feature of GMO coverage, however, is the above average tendency to engage in false balance (40%), which is substantially higher for Democratic leaning outlets (51% & 62%) and broadcast news (74%). Further, only in a minority of instances is context given that would allow readers to identify the more credible position (45%), which is even lower in Democratic-leaning outlets (35% & 0%), and broadcast news (43%). This is even more problematic when considering that many of the expert messages contained in coverage were not actually related to GMO safety at all, but were rather related to the benefits of GMOs. Contrarian expert claims that GMOs are harmful were often left unchallenged in coverage – only 28% of such claims were met with a rebuttal by an expert source. In the case of GMOs at least, the media has not adjusted its coverage to account for expert consensus in the same way as it has for climate change and vaccines.

#### Issue Specific Results – Trade Protectionism

The results on economic issues are closer to that of nuclear power and GMOs than climate change and vaccines, even for areas of robust economic consensus like free trade. Close to 50 percent of the sample had expert cues in the correct direction, while 18% had consensus cues, and 7% had cues that clearly signaled majority expert opinion – all close to the average across issues.

Slant is similarly close to the average across issues (0.25), but there is important variance across outlets. Republican leaning-outlets are modestly more slanted towards the expert position (0.41 & 0.40) compared to their Democratic-leaning counterparts (0.31 & 0.37), and the *Associated Press* stands out for having, on average, balanced coverage (0.00). The media's coverage of trade, however, has a distinct lack of expert balancing (12%), although this number is again higher for Democratic-leaning outlets (21 and 11% vs. 12 and 0%). Instead, the press balances the perspective of the expert community with polarizing opponents, like parties, interest groups, and advocacy organizations (62%). The tendency of coverage to be orientated around political conflict and not false balance is common to all economic issues in this study. Combined results for each issue can be found in the Appendix (Stage 2 Results).

## Discussion

There is little doubt that the general public is often offside expert opinion on a wide variety of important issues. Most research that has tackled this problem views it primarily as one of information processing. Segments of the public are often motivated to resist messages from experts for reasons of ideology and partisanship. Motivated cognition is part of the problem, particularly on highly salient issues like climate change. But neglected in this narrative is the information environment. Lacking policy specialists in their social circles, most citizens learn about political issues from the mass media, which is typically resistant to covering relevant context to issues that lack drama and conflict – in other words the existence of expert agreement. To put it another way, if experts form a consensus, and there is no one else there to hear about it, did it really happen? From the perspective of the public at least: no. Further, the media may be disposed to provide balance in news content and present the expert opinion as one of many in the context of a charged political conflict. The former may confuse readers and viewers as to the true position of the expert community, while the latter may prime citizens to resist messages from experts at odds with the elites they support and their partisan and ideological identities. The lack of congruence between experts and the public may truly be an information problem for many policy issues. The public simply is not being informed about important areas of expert agreement in many policy domains or at least in ways that are conducive to unbiased information processing.

Perhaps the most significant finding in the data presented above is how unusual it is for media to present relevant contextual information from experts when they are in agreement. Only a minority of stories have expert references (38% of the total) and even fewer contain both an expert reference and content relevant to the consensus in the expert community (14% of the total). Of these, only half contain messages or cues from experts that speak to the area of agreement (7% of the total), only a fifth have a cue that signals expert agreement (3% of the total), and 1 in 20 have a clear consensus cue (0.7% of the total). On average, clear signals of expert consensus that would allow citizens to update their policy attitudes are rare indeed. There is important variance across issues, however. The media does the best job with these metrics in its coverage of climate change (55%, 19%, 16%, 10%, and 3%) and vaccines (72%, 24%, 18%, 5%, and 2%) and worst in

its coverage of immigration (20%, 1%, 0.47%, 0.09%, and 0.04%) and nuclear power (31%, 5%, 2%, 0.6%, and 0.45%).

Although experts are reasonably common in media coverage of these issues (RQ1), it is unusual for them to be providing information relevant to important areas of expert agreement (RQ2A), and rare for there to be cues signaling expert consensus (RQ2B). Aside from climate change and vaccines, if citizens are learning about expert consensus, it is arguably not through the press. This finding is remarkably consistent regardless of outlet ideology and medium, but with some caveats. First, there appears to be some modest ideological bias in patterns of expert citations in relevant articles. Democratic-leaning outlets are more likely than their Republican-leaning outlets to cite experts in relevant stories when Democratic elites are aligned with the expert community. The reverse is true when Republican elites are in line with expert opinion. Second, cable and broadcast news is less likely to cite experts and to have coverage with both expert citations and content relevant to important areas of expert agreement.

The media's performance is stronger when looking at balance. On the whole the press slant coverage modestly towards experts on average (0.30), with over half of stories exhibiting some degree of skew towards the expert position across issues. There is no doubt that a norm of balance operates to a degree, as most articles provide some effort to balance perspectives, but it would be a mistake to then assume that most articles truly contain an equal balance of perspectives in favour and opposed to the stance of the expert community. Only a minority of stories (20%) have an approximation of balance on these issues. Again, there is some meaningful variance across issues. In particular, coverage of climate change (0.84, Fox excluded) and childhood vaccinations (0.80) stand out for being robustly slanted towards the expert position. Concern in the literature about balanced coverage of climate change is largely confined to the conservative media echo chamber represented here by Fox News (-0.13).

Again, there is some evidence of important differences across outlet ideology and medium. Republican-leaning outlets are more likely than their Democratic-leaning counterparts to slant their coverage towards the expert position when Democratic elites resist expert opinion. On these issues the *Associated Press* behaves like conservative outlets, while broadcast news coverage resembles that of liberal outlets. In contrast Democratic-leaning outlets are more likely than their Republican-leaning counterparts to slant their coverage towards the expert position when Republican elites resist expert opinion. Here, both the *Associated Press* and broadcast news resemble liberal outlets in their coverage. The differences are substantive, but do not take away from the general tendency of the media to skew coverage towards expert positions – a tendency that is overwhelming in the case of climate change and vaccines. Whether the media's performance on this measure is adequate is ultimately open to subjective evaluation. Technocrats may think any effort at balance is misguided, and those attached to norms of balanced coverage may believe any bias is problematic. What can be said is that any impression that the media provides truly balanced coverage on issues involving communities of experts is misguided, and this is particularly true for climate change and vaccines.

And what actors provide the balance against signals from mainstream, expert communities? Surprisingly, instances of the dreaded “false balance” between experts and contrarian specialists is relatively uncommon (22%), at least compared to providing balance with opposing polarizing actors (48%). The former number is higher for science-based issues, but this is driven primarily by high levels of expert balancing in coverage of GMOs (40%) and nuclear power (38%), compared to climate change (19%, Fox included) and vaccines (13%). More often than not, the media balance expert perspectives with those of other political actors (RQ3A), rather than other experts (RQ4A). Again, there are important differences across outlet ideology and medium that resemble of results for slant. False balance, and, to a lesser extent, the citation of polarizing opponents are both more common for outlets that lean towards political elites resistance to the message from experts. In this sense, “false balance” should not only be seen not as the result of an important norm in journalism, but rather a manifestation of outlet bias. Again, this does not take away from the fact that false balance is fairly infrequent across the board, and the use of polarizing cues is more common. Media critics do have a point, however, when they argue journalists routinely fail to provide context that would allow readers and viewers to adjudicate between competing expert positions (37%). The presentation of experts and contrarian specialists in coverage is often done uncritically (RQ4B).

This work provides a necessary corrective to studies that have examined the link between experts and public opinion. The findings should caution us in drawing too many lessons from experimental work on “false balance.” The dominant problem in media coverage is not balance, but rather a stunning lack of coverage of pertinent expert information. This should not shock us, however. Media scholars have long cautioned us that mass media often lacks the willingness to provide important context in its coverage of important issues. It should also warn us away from stylized experiments where subjects are exposed to an even balance between experts and their contrarian counterparts. This is almost never how citizens actually encounter expert information in the media. These designs lack a critical component of external validity that make it difficult to draw links between findings and real world public opinion formation.

At the same time, the results can point us in some interesting directions for future experiments that examine the public’s processing of expert information. For one, does the endorsement of polarizing political actors of expert consensus undermine the effectiveness of expert cues? Does an endorsement of GMOs by Monsanto, or climate change by Democratic elites weaken the power of consensus information for those predisposed against those actors? For another, does the citation of polarizing opponents dilute the effectiveness of consensus information similar to “false balance”? Future experiments should account for the fact that expert information is often presented in the context of a political debate between competing interest groups and parties. It is not presented in isolation.

There are often large, problematic gaps between expert and public opinion across a range of issues. In order to fully understand why they exist, scholars need to take the information environment seriously, and design treatments rooted in such analyses. Only then can journalists,

educators, science communicators, analysts, and policymakers advance an agenda that can effectively address the problem.

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