MASS MEDIA AND POLITICAL POLARIZATION IN THE UNITED STATES

by

Dominik Andrzej Stecula

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The following individuals certify that they have read, and recommend to the Faculty of Graduate and Postdoctoral Studies for acceptance, the dissertation entitled:

**Mass media and political polarization in the United States**

submitted by Dominik Andrzej Stecula in partial fulfillment of the requirements for

the degree of Doctor of Philosophy

in Political Science

**Examinining Committee:**

Paul J. Quirk
Supervisor

Richard Johnston
Supervisory Committee Member

Frederick Cutler
Supervisory Committee Member

Mary Lynn Young
University Examiner

Gyung-Ho Jeong
University Examiner

**Additional Supervisory Committee Members:**

Stuart N. Soroka
Supervisory Committee Member

Supervisory Committee Member
Abstract

This dissertation is composed of three papers broadly examining the relationship between the mass media and political polarization in the United States. The first paper examines whether the media might have played a role in the polarization of the American public. Using an automated content analysis of almost 600,000 news articles and transcripts from a variety of prominent news media sources over the past four decades, the paper analyzes whether coverage of ten issues has changed over time along several dimensions of tone (affect, incivility, conflict) and source cues (in particular, whether the media cover increasingly more extreme politicians). The results indicate that the media likely contributed to the process of partisan sorting by increasingly providing the public with partisan signals in the news coverage. There is also some evidence that the media contributed to the affective polarization of the public. The second paper focuses on the nature of media coverage of climate change and its effect on public opinion polarization of climate change attitudes, finding that despite the common perception, the media, including conservative media, did not overwhelmingly promote climate change skeptics, industry groups, or denialist organizations. Instead, the coverage featured an increasing number of partisan cues as the issue rose in salience, which polarized the public. In the third paper, I examine the relationship between climate change attitudes and news media diets. Previous work has focused extensively on Fox News and posits that Fox has been a dominant player in turning the Americans, and especially Republicans, into climate skeptics. Utilizing a large national survey, I find that the relationship is more nuanced than previously argued. Fox News does seem to have a negative effect on supporting governmental action in reducing greenhouse gas emissions, though
that effect is limited to a small group of purists stuck in the conservative echo chamber. Most people, and importantly, most Republicans, are not very likely to be members of that group.
Lay Summary

This dissertation is composed of three papers analyzing the relationship between the news media and the process of political polarization in the United States. The first paper examines how the news content changed over the past forty years as the media landscape fragmented. Contrary to some theories, the news did not become more negative, conflictual, or uncivil. It did, however, become increasingly politicized. The second paper examines why Republicans became skeptical of climate change, and what role the media played in the process. The findings suggest that the media politicized the climate coverage as it increased in prominence, and the exposure to political signals on the topic spurred Republican climate skepticism. The third paper examines whether Fox News viewership is related to climate skepticism, and finds that it is, but the relationship is strong only for the small group of people in the right-wing echo chamber.
Preface

Paper II of this dissertation has been co-authored with Eric Merkley, a Ph.D. student in the department of political science at UBC. Both Eric and I contributed equally to the development of the research question. Both Eric and I downloaded the stories that the analysis is based on from online databases, but Eric has done slightly more of that. I have collected the public opinion polls from the Roper Center and put together the climate skepticism measure. Eric has been the primary person who conceived of the time series models explaining climate skepticism and ran the analyses. I created all of the figures in Stata. Both Eric and I wrote the paper, and revised it considerably several times. The core of the introduction, literature review, and conclusion has been done by me, while the core of the write up of the model justification and discussion of the results has been done by Eric.

A version of this work has been presented at the annual meeting of the American Political Science Association in 2015 and 2016, the annual meeting of the Pacific Northwest Political Science Association in 2016, as well as the Comparative-Canadian Workshop at UBC in the fall of 2015.

An academic paper that is based on Paper II, and which utilized parts of its data has recently been published in the journal Science Communication. The full citation is:

Papers I and III have been entirely single-authored endeavors, where I formulated the research questions, collected the data, performed the analyses, and wrote up the results. Paper III relies on data collected by YouGov in an internet panel survey, which are part of a larger research project conducted by Dr. Andrew Owen, Dr. Paul Quirk, and Dr. Kathryn Harrison (all UBC), as well as Dr. Nancy Olewiler (Simon Fraser University). They have generously agreed to allow me to ask several questions to get the data for my dissertation. The media questions, designed by me, on which Paper III is based, are part of the larger study which has been approved by UBC’s Behavioural Research Ethics Board (application # H13-03509). A previous version of Paper III has been presented at the annual meeting of the Western Political Science Association in 2017.
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Dedication

Dla Babci Marysi i Dziadzia Wlacja
Introduction

Mass media play an important role in a democratic society. Although there are different forms of mass media, the focus of this dissertation is on the news media, and especially the legacy news media outlets that have existed prior to the digital revolution. Over the past several decades, with the rise of the internet, regulatory changes, and changing public preferences, the media landscape in the United States has undergone significant shifts. Technological progress resulted in considerable shifts in the news industry, with a decline of local news sources, a proliferation of new sources, often with a thematic or ideological bent, and a proliferation of the decline of “information commons.” Growth of social media platforms, like Facebook and Twitter, facilitated great changes to how Americans consume the news, with algorithms promoting sensational and divisive content.

At the same time, a parallel process has been going on in the world of American politics, which has been growing increasingly dysfunctional. As many scholars have documented, recent decades featured a rapid growth in levels of political polarization in Congress, where Republicans have shifted considerably further to the ideological right, while the Democrats moved to the left. This resulted in a notable decline of bipartisanship, an erosion of important norms, and a general dislike of “the other side” among partisans. Scholars have also documented a rise in social polarization among many American citizens, which is not necessarily manifested in more extreme ideological convictions, but a dislike of supporters of the other party. That affective polarization results in people who might not necessarily disagree with each other, but they nonetheless do not get along.
Many commentators and researchers have speculated that the fact that the two processes have been going on in tandem is no coincidence, and many place the blame for the polarized politics of today at the feet of the news media. Whether they are, in fact, related, however, remains to be shown. This dissertation aims to contribute to this effort by examining the role that the news media play in polarized politics of the United States. It is composed of three papers, all of which stand on their own, although there is an underlying motivation behind all three, which is to examine to what extent the media contribute to different forms of political polarization. Furthermore, this thesis aims to highlight the importance of studying news content in the subfield of political communication. Much has been written about the changing news media landscape, but much less has focused on over time trends in the news stories. Understanding not only the structural factors that affect the information environment, such as the proliferation of digital news sources, decline of advertising revenues due to the rise of the internet, and the decline of journalistic jobs, but also what makes up the news, is an important component in studying media effects, and I hope to contribute to this literature in this dissertation.

Conventional wisdom about the state of the American news media, at the time of this writing, suggests that the media cover the news differently now than they have in the past. Much work has focused on documenting the outrageous, in-your-face coverage of polarizing issues on cable networks, frequently omitting the nature of coverage of these topics in more traditional sources. Dramatic episodes of polarizing coverage on Fox News or other outlets get undue prominence in commentary, while the bulk of the mundane coverage frequently gets ignored. Discussion about the proliferation of news outlets, with countless websites, print publications, apps, and other news media ventures, frequently conclude that the news audience is balkanized and stuck in ideological echo chambers. But in-depth analysis of audience choices given a wide
selection of news outlets leave a lot to be desired. The goal of this dissertation is to test the conventional wisdom by systematically examining two things: how news content changed over time along several dimensions of coverage, and how people consume their news. To do that, I utilize both manual and automated content analysis of a large number of articles and transcripts from a variety of prominent media outlets that go beyond the traditional focus on prestige press and cable news. I add to that analysis of news media consumption data from an original, nationally representative survey, in the three papers below.

The first dissertation paper conceives of several specific descriptive tests to gauge whether the news might have contributed to political polarization in the United States. It focuses on news media coverage of ten issues of varied salience in 19 different news sources across over 30 years, which amounts to nearly 600,000 articles and transcripts. The news content is examined across several dimensions of tone (affect, incivility, conflict, and cooperation) and source cues (which politicians are featured in coverage) with a goal of testing whether certain patterns in coverage emerge that would suggest a role for the news media in the process of polarization.

The second paper of this dissertation is a joint research project with Eric Merkley, examining the role of the news media in polarization of climate change attitudes. Climate change makes for a compelling case for a few reasons. Most importantly, it is a global issue of utmost importance, as climate scientists proclaim. However, it is also an issue that is relatively recent, and can therefore be examined from the beginning. In the paper, we aim to do several things. First, we want to understand how the media covered climate change. In an effort to move beyond the traditional focus on the prestige press and the recent interest in cable news, we examine a wider swath of the news environment, from the AP newswire, to network news channels, to the
most prominent regional and national newspapers, and cable news. We analyze the news content through the prism of several prominent explanations behind American (and primarily Republican) climate skepticism: partisan cues, ideological cues, messages related to economic costs, and messages from climate denial groups. Second, we analyze how the news content is related to climate attitudes, which we operationalize with an original measure of climate skepticism mood composed of several decades worth of public opinion polls.

The third paper returns to the issue of climate change, to study in detail the relationship between news media diet and climate change skepticism. A common view is that conservative news media, and in particular Fox News cable channel, have played a large role in polarizing the public on the topic of global warming, by turning Republicans into climate skeptics. However, the examination of survey data in previous work never considered that for many people, Fox News is not consumed in isolation, but is actually a part of a diverse news media diet. This paper tests whether climate skepticism is related to news media diets, using an original nationally representative sample.
1 Introduction

In his first public remarks since leaving office, President Barack Obama, in a thinly veiled comment, criticized the news media for polarizing the American public. “Because of changes in the media,” Obama said, “we now have a situation in which everybody’s listening to people who already agree with them and are further and further reinforcing their own realities to the neglect of a common reality that allows us to have a healthy debate and then try to find common ground and actually move solutions forward.”¹ A version of this argument has become one of the leading explanations of the current state of polarization in the United States among commentators. However, there has been little systematic effort to examine that notion in a comprehensive way. This paper is an attempt to do so.

President Obama is certainly right that the news media landscape has changed dramatically over the past several decades. For example, in 1970, most Americans had access to television sets, and kept them on for over 6 hours a day, but there was little, if any, choice of what to watch (Prior, 2007). At that time, cable was only available in about 6 percent of homes, and the news environment was dominated by the evening broadcasts on “the big three” networks (ABC, CBS, and NBC) mostly serving the same information in a very similar format (Prior

¹ http://time.com/4753027/barack-obama-university-of-chicago-speech-transcript/
At that time, it was exceptionally difficult for most Americans to create “their own” realities since they were subjected to largely the same information (Bennett & Iyengar 2008).

Since then, however, advancements in telecommunications have produced an explosion of media choice. First, cable became widely available and with it, access to 24 hour news, starting with CNN in 1980, later joined by MSNBC and Fox News in the late 1990s. The ways of getting news were also proliferating. Political talk radio became popular after the repeal of the Fairness Doctrine in 1987, and the invention and rise of the internet shifted the media landscape even more dramatically in the early years of the 21st century.

Today, it is easier to get the news than ever before, and especially the news that you like and agree with politically. Due to the proliferation of news outlets, catalyzed by the low barriers to entry brought about by the internet, the media landscape has fragmented, spearheading fights for consumers among the outlets (Bennett & Iyengar, 2008). This dynamic, coupled with the growing prominence of social media, since more than half of Americans regularly get their news on social media according to the Reuters Digital News Report 2017, suggest that perhaps it is the media that aid in polarization of Americans and the never-ending gridlock in Washington. Yet, despite the popularity of that opinion, it has been difficult to establish, with any certainty, what role the media might have played in the political polarization in the US.

I begin below by reviewing the literature on political polarization in the United States and suggest the avenues through which the news media might play a role in the process of polarization. I highlight what types of patterns I expect to find in order to support the thesis that the media play a role in the polarization of American public. I find preliminary support for the

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argument that the mass media potentially played a role in two forms of polarization: partisan sorting and affective polarization, at the very least by fostering climate conducive to these processes. The analyses presented in this paper are not causal and aim to crystalize our understanding about the nature of news coverage, over nearly forty years, along several characteristics, including tone, affect, incivility, undue focus on conflict at the expense of political cooperation, and amplifying the extreme political voices at the expense of moderate ones.

2.1 The media and three types of polarization

The literature on political polarization has been, at times, ambiguous, largely due to the fact that many debates have not been anchored in the same operational definition of polarization. In general, however, discussion of political polarization in the academic literature came to describe one of three phenomena: ideological polarization, partisan sorting, and affective polarization.

2.1.1 Ideological polarization

It has been well established that American elites have polarized since the 1970s. Utilizing both the interest group ratings (Poole & Rosenthal 1984) and their original measure of polarization, DW NOMINATE scores, which employ the roll call votes of the Members of Congress. McCarty, Poole and Rosenthal (2006) show that Congress is increasingly polarized with party members moving towards the poles of the ideological spectrum, all the while the middle is vacated. What has been contested in this literature, however, is whether the American public has polarized along with the elites.
Several prominent scholars argue that citizens are, in fact, polarized (Abramowitz 2010; Quirk 2013). Abramowitz points out, using the American National Election Study data and exit polls, that ideological polarization has increased among ordinary Americans since the 1970s. There are major differences in policy positions and preferences between Democrats and Republicans, and the polarization is the greatest among the most educated and politically engaged citizens. Polarization, therefore, does not start with the elites, but with hyper-partisan constituencies, which comprise a considerable proportion of the public and an even larger proportion of the actual electorate (Abramowitz 2010).

Furthermore, there is evidence that even survey respondents who claim to be moderate, are actually extremists “in disguise.” Since “moderate” is a favorable term in politics with connotations of pragmatism, many people opt in to select the “moderate” option while answering a survey, even though they are not truly centrist. Using the Aldrich-McKelvey scaling procedure, which corrects bias in respondents’ self-placement, reveals that many of the self-declared “moderates” hold views similar to those of strong partisans (Hare et al. 2015). Secondly, a sizable share of the public supports policies that are more extreme than their legislators pursue when such options are presented to them on surveys (Broockman 2016). However, since many people are not very consistent ideologically, especially the least informed, their apparent “centrism” is a function of aggregating a series of both liberal and conservative extreme policy positions. In short, there is some evidence to suggest that the public has been increasingly polarized.
2.1.2 Partisan sorting

The notion that the public became increasingly ideologically polarized in the past few decades has been contested by some scholars, especially Fiorina et al (2006). Along with various co-authors, he has argued that Americans remain largely centrist and alienated by the polarizing elites. The voters appear polarized because of the tendency of the political system to only offer the voters highly polarized choices, and partly due to sorting.

The logic of sorting is simple, it is the process through which the party identity increasingly matches ideology, i.e. the Democrats are more homogeneously liberal and Republicans are more homogeneously conservative (Levendusky 2009). As Fiorina argues, the correlations between ideology and partisanship and issue positions used to be weak, since there were many conservative Democrats and liberal Republicans. However, since the 1970s, the correlation between partisanship and ideology increased dramatically, as the parties have sorted so that only liberals are Democrats and only conservatives are Republicans. This process, according to Fiorina, is entirely elite driven, and does not mean that Americans, in general, have become more extreme. Instead, most Americans are still centrists, it’s just that there are no parties that adequately represent them (Fiorina 2016).

The dynamic of partisan sorting is well documented empirically. Regardless of the claim as to whether most Americans are moderate centrists, and there is evidence to the contrary, as was described above, it is clear that the Democratic party is no longer a home to many conservatives, while it is nearly impossible to find liberals in the GOP. Despite the fact that most Americans are not consistently ideological (Converse 1964; Achen & Bartels 2016; Kinder & Kalmoe 2017) people clearly are better at associating certain policy positions with certain parties.
2.1.3 Affective polarization

The literature also extends beyond policy preferences and ideological self-placement. The phenomenon of polarization also concerns broader dynamics of dislike and even hatred of the opposite political party, decreased willingness to seek consensus and compromise and sticking to ideological principles, turning off moderates and centrists, all the while amplifying partisan intensity. In short, polarization isn’t only about ideology and preferences, but also about affect and social identity.

Some of the recent work explores polarization in the context of these deeper divisions in American society, beyond ideological preferences (Iyengar & Westwood 2014). As Iyengar et al (2012) indicate, affect plays an important role in mass polarization, and both Republicans and Democrats “increasingly dislike, even loathe their opponents.” When defined in terms of social identity and affect toward in- and out-groups, Iyengar with co-authors demonstrate that polarization has in fact increased among the public and the antagonistic feelings for the out-party are deeply ingrained in people’s psyches. Perhaps surprisingly, Iyengar and Westwood (2014) find that affective polarization based on party exceeds polarization based on race and other social cleavages. The authors point out that the presence of increased partisan affect provides a clear incentive for elites to engage in confrontation rather than cooperation.

Importantly, this broad, affective polarization can happen even among people whose issue positions are moderate, signaling that the more narrow view on polarization might hide the underlying changes among the American public (Mason 2014). Furthermore, this affective polarization that permeates the public has been reflected among the elites. Democrats and Republicans are now less likely to interact with each other after the floor votes than in the past (Dietrich 2017). And, as Sinclair (2006) points out, policymakers were frequently close personal
friends across party lines. They could, and would, disagree on substantive issues, but maintain close friendships across ideological and partisan lines. However, this is mostly no longer the case.

Taken together, a systematic analysis of the evidence suggests that Americans at the mass level have not diverged ideologically, nor have they necessarily sorted. These trends, however, seem to be happening among the most engaged members of the electorate, who also increasingly happen to dislike each other (Lelkes 2016). In short, there is some evidence for each component of polarization, depending on whether it is the mass public or partisans that are of concern.

2.2 Mass media and polarization

The news media matter. They have a virtual monopoly over the presentation of many kinds of important information that is necessary for a functioning democracy. Despite the early findings in the literature that people were quite immune to political persuasion by the news media (the so-called era of “minimal effects”), more recent, methodologically sophisticated work, demonstrates that media effects do exist and frequently are rather substantial (see, for example, Iyengar et al. 1982; Bartels 1993; Ladd & Lenz 2009; Bennett & Iyengar 2008). There has been speculation, however, that due to the changing nature of the media environment, the era of media effects might be coming to an end, due to the proliferation of media outlets fueled by the Internet and cable and the subsequent fractionalization of the audience.

The proliferation of channels and the fragmentation of the news audiences focused the attention of political communication scholars on examining selective exposure, a concept that suggests that many news media consumers live in “information bubbles” as people increasingly choose partisan news media sources that they agree with and tune out anything else, while those
less interested in politics turned to entertainment options (Bennett & Iyengar 2008; Sunstein 2009; Prior 2007).

Researchers began to examine how the changes in the media environment have made the news more polarizing (Stroud 2010; 2011; Levendusky 2013; Jamieson & Cappella 2008; Hollander 2008). Stroud (2011) found that, looking at both cross sectional and time series data, partisan selective exposure leads to increased polarization among news consumers. Furthermore, polarization seems to encourage more selective exposure. Levendusky (2013) found, utilizing experimental data, that partisan media do polarize political attitudes and influence vote choice, but only among those already polarized. The partisan media also make people dislike and distrust the opposition, making its viewers less willing to compromise in search of bipartisan solutions to the nation’s problems.

It is important to remember, however, that most people don’t watch cable news. When choice is included in the experimental design, many research participants simply turn these channels off. Arcenaux and Johnson (2013) claim that much of the literature exaggerates the scale of the partisan media effects. The authors utilized a novel experimental approach that had participants watching pro-attitudinal and counter-attitudinal programs in some treatment conditions that nonetheless allowed some subjects limited choice over what they watch. It turned out that handing people a remote control, and hence replicating more closely the real world news consumption conditions, resulted in much diluted partisan media effects. In short, partisans who chose the partisan outlets were already polarized, while most other people (entertainment-seekers) who were more susceptible to media effect actually chose to tune out of partisan news entirely.
This highlights a big problem with a large focus on partisan news: it obscures the reality that most Americans do not get their news from these sources. Prior (2013) points out that the polarizing effects may exist, but are largely confined to a small, though highly involved and influential, segment of the population, likely the same group that Abramowitz (2010) and Quirk (2011) identify as the drivers of current polarization. These people are marginally polarized by over time exposure to the “echo chamber” effect of the partisan news exposure (Arcenaux & Johnson 2013), but the news exposure is largely endogenous to their partisanship and ideological preferences.

News consumption data helps to illuminate the problem of this narrow focus. Fox News is the cable news leader, and it attracts about 2 million viewers a night in prime time, according to the Pew Research Center. In general, the viewership of Fox News, MSNBC and CNN combined has increased in the past year, with a bump in ratings generated by the presidential election and Donald Trump. Combined prime time viewership now oscillates around 5 million viewers, up from a recent few-year average of 3 million.\(^3\) In a country of over 243 million adults, however, that is a very small audience, regardless of how potentially influential that group of people might be.

At the same time the traditional, more mainstream and less (explicitly) ideological news media continue to reach significantly larger audiences. Network evening news audiences are substantial, according to Pew. A combined average nightly audience for ABC, CBS and NBC evening news is 24 million Americans.\(^4\) Most popular National Public Radio shows, like the Morning Edition, average audiences of almost 15 million listeners a week, and NPR in general

\(^3\) [http://www.journalism.org/fact-sheet/cable-news/](http://www.journalism.org/fact-sheet/cable-news/)

has seen record breaking audiences tune in to its programming. Top newspapers enjoy daily print circulation of 2 million copies, with millions more viewing the content online. Analyses of people’s web browsing patterns reveal that most people, contrary to the claim of pervasive “echo chambers,” obtain their news from mainstream, centrist sources (Flaxman et al. 2016; Guess 2016; but see Petersen et al. 2017 for a different view). For example, in 2009, websites like Yahoo News, AOL News, msnbc.com, and cnn.com collected more than half of news views in the United States and Yahoo News remains the most popular news site among Americans, with nearly 90 million unique visitors each month (Stephens-Davidowitz 2017). In short, focusing on partisan cable outlets means focusing on a relatively small aspect of the media environment, as most Americans don’t get their news from these sources.

Since the media play an important role in influencing the public, it is reasonable to expect that the news media contributed to the phenomenon of polarization. Furthermore, there are reasons to expect that different features of news content could influence different forms of polarization. Below, I outline relevant academic work highlighting several different features of news and how they might contribute to ideological polarization, partisan sorting, and affective polarization.

### 2.2.1 Mass media and ideological polarization

A rich literature in political science shows that citizens will pay attention to easily accessed information, like cues from elites and opinion leaders that they trust (Lupia & McCubbins 1998; Zaller 1992; Berinsky 2009; Nicholson 2012). Political leaders serve as

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important sources of information as citizens have especially strong attachments to political parties which form an important part of their identity, and colors their processing of political information (Bartels 2002; Green et al. 2002).

It therefore matters which political elites appear in the media and whether the news amplifies the voices of the most extreme politicians at the expense of the more conciliatory, moderate ones. There is some evidence that the news media cover extreme politicians more prominently than moderate ones (Wagner & Gruszczynski 2017). Specifically, the extreme members of the House of Representatives receive more than 3 times the attention than their moderate colleagues. This finding, however, is limited to a small number of news sources and a relatively short time frame (Wagner & Gruszczynski 2017). Other evidence, however, points to the generalizability of this finding. A detailed analysis of Facebook profiles by the Pew Research Center, for example, found that the more extreme a member of Congress is, the more Facebook followers they have (Hughes and Lam 2017).

In short, it seems that the coverage of politics increasingly highlights extreme politicians. The changing dynamics of the news media environment discussed above makes clear that the competition for news consumers is fierce, and the likelihood of a journalist obtaining a controversial, emotionally charged statement is likely higher from an extreme member of Congress than a moderate one, since that will likely a story that will generate views or clicks.

If the mass media contributed to ideological polarization, I should find an increased reliance of the news on extreme sources relative to the moderate ones. Politicians from the fringes are on the fringes for the reason - they hold views that are more extreme than those of their peers and the prominence of these politicians indirectly means an exposure of news consumers to these extreme policy views. It is hard to imagine how else the media could ideologically drive
Americans apart if it did not involve an increased focus on the most ideological voices within each party.

### 2.2.2 Mass media and partisan sorting

Beyond the specific nature of which politicians are likely to get mentioned and featured in the news, it is worth highlighting the likely increase in politicization of the news in general. First, empirical work has shown that the number of political cues has been increasing over time, at least in the coverage of climate change (Merkley & Stecula 2018). Climate change, however, is a fairly specific issue, one that migrated from the world of science to politics as policies needed to address it were increasingly discussed in the press.

That being said, there are reasons to expect an increased politicization of the news beyond just climate change. The news media tend to index their news coverage to the elite debates from Washington (Bennett 1990) and they rely on government officials and politicians to contribute to their coverage. As the media landscape has been transformed by the internet, the advertising revenue has been declining, and has done so fairly steeply since the early 2000s.\(^6\) Newspaper circulation has also been steadily declining since the early 1990s.\(^7\) And finally, the industry as a whole has been suffering, with newsroom positions consistently being cut since their peak in the year 1990, over a quarter century ago.\(^8\) In other words, news outlets are asked to do more with less, with an increasing number of competitors in a segmented industry. Scholars have found that journalistic sourcing tends to be influenced by ease of access and a force of habit (Gans 2004; Shoemaker & Reese 2013). As a result, it is reasonable to expect there to be an

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\(^6\) [http://www.pewresearch.org/fact-tank/2017/06/01/circulation-and-revenue-fall-for-newspaper-industry/]  
\(^7\) [http://www.journalism.org/fact-sheet/newspapers/]  
\(^8\) [http://newsonomics.com/newsonomics-the-halving-of-americas-daily-newsrooms/]
increase in a reliance on politicians as sources, as this type of “access journalism” is likely benefiting both sides: the journalists job is easier, and the politician gets access to a wide audience.

If the news media contributed to the phenomenon of partisan sorting, I should see an increase in the number of politicians mentioned in the news over time. Research has found that most Americans don’t follow the news very attentively, and most don’t hold coherent ideological beliefs (Delli Carpini & Keeter 1996; Achen & Bartels 2016). If the media aided in the process of sorting, therefore, it was likely through the sheer volume of partisan cuing. By making the nature of partisan divisions salient, through an increased reliance on political sources in the news stories, the media could communicate “what goes with what” and allow people to become aware of what policy positions are acceptable to hold for members of each party.

2.2.3 Mass media and affective polarization

Lastly, the news media could also contribute to the fueling of affective polarization. Findings from political communications research suggest that the news has become more affectively charged, less civil, and more negative. As the news environment has been focusing more on generating what many scholars have called “infotainment,” or news that promote personalization of stories, sensationalization, and promotion of human interest stories over sensible policy discussions, these discussions are likely expressed using language that is more affectively charged (Bennett 2003; Prior 2007). Hamilton (2004) argues that this is largely due to the audience fragmentation resulting from the changing structure of the news markets, in which the producers of news content don’t seek to attract general, or even the largest, audiences but instead demographics that advertisers are willing to pay the most to reach. It is not hard to
imagine that as the competition for views, clicks and subscriptions continues, the resulting news are enveloped in a more charged, emotional language.

The news media, furthermore, has always been attracted to negativity and recent shifts in the media environment should only exacerbate these trends. There are many forms of negativity in the news, but in general the media focus on negative events, conflict, and emotions like anger and fear (Soroka et al. 2015a). Traditionally, the media overemphasize the prevalence of violent crime (see, for example Altheide 1997), and generally events involving conflict or crisis receive a greater degree of media attention than more positive developments (Soroka 2014; Bagdikian 1987; Herman & Chomsky 1988; Patterson 1997; Shoemaker et al. 1991). As Altheide (1997) notes, the media choose to present most news using the “problem frame,” highlighting distress, suffering, or conflict. Furthermore, in the partisan politics context, what tends to get highlighted are gridlock, antagonisms, and policy battles (Jamieson & Cappella, 2008; Mutz & Reeves, 2005; McLaughlin 2016). Interviews with journalists also tend to demonstrate that they take an active role in creating conflict frames in the coverage of politics (Bartholomé et al. 2015). All of this suggests that the news are prone to highlighting the negative over the positive, and in most cases that translates to focusing on some sort of conflict over examples of cooperation. As comedian Jon Stewart put it, the media have become “the country’s 24-hour politico-pundit-perpetual-panic-‘conflictinator’” (Freeman 2015). This focus on conflict might indeed promote polarization. Recent experimental work suggests that aggressive rhetoric in political stories highlighting conflict does polarize Americans (Kalmoe et al. 2017).

Somewhat separately from that work, a research program on incivility in politics has been gathering steam (see, for example, Jamieson & Hardy 2012; Maisel 2012; Shea & Sproveri 2012; Anderson et al. 2018; Muddiman & Stroud 2017). Incivility has been a difficult concept to
define, since it is subjective and tends to depend on time and context (Gervais 2017). A simple definition states that incivility involves “communication that violates the norm of politeness” (Mutz 2006). Politeness is itself not easy to define, but incivility in the political context tends to involve claims that are inflammatory and superfluous (Jordan Brooks & Geer 2007), such as name-calling or usage of swear words (Muddiman & Stroud 2017).

The work on incivility has focused broadly on the decline of the quality of political discourse in the United States, though there has also been an analysis of the “new incivility” in the news media (Berry & Sobieraj 2011). That, however, has primarily focused on partisan media like Fox News or conservative talk radio, with a special focus on Rush Limbaugh, although the authors also examine a broader swath of select media data. Their findings suggest that there has in fact been a nearly 100-fold increase in usage of outrage among newspaper columnists between 1955 and 2009 (Berry & Sobieraj 2011). Scholars have also found evidence of pervasive incivility in political discussions on social networks like Reddit (Nithyanand et al. 2017) or in the New York Times comment sections (Muddiman & Stroud 2017). In sum, many commentators and researchers perceive there to be a strong uptick in incivility in recent years (Strachan & Wolf 2012; Patterson 2017). The problem has also been recognized in Congress, where, in the late-1990s, both a “civility retreat” and a hearing on incivility were held. However, although there is a lot of evidence of incivility in American culture, whether the media contributed to this phenomenon systematically is unclear (Jamieson et al. 2017).

If the news media contributed to affectively polarizing Americans, I expect to find several dynamics in the analysis of media tone, in line with the literature review above. First, I

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would expect to find news content to become increasingly more affective over time, with language focusing on emotional content. The media should also grow increasingly negative in their portrayal of politics. Furthermore, I examine the degree to which the news media focus on conflict in reporting political news by examining tone of the news through the prism of words associated with political conflict and compromise. Highlighting partisan conflict is to be expected if the media amp up affective polarization among Americans. Lastly, the news should become increasingly more reliant on uncivil language to fuel disagreement between social groups.

3 Data and methods

To test the above expectations thoroughly, I would ideally be able to examine all of the news coverage of the past several decades. That is, unfortunately, impossible, for various logistical, financial, and computational reasons. As an alternative, to ensure that I examine a wide swath of issues, I chose to analyze the news coverage of issues that vary in terms of their salience, difficulty, and the level of partisan polarization. They include social issues on which the public is highly polarized, like gun control and abortion, science based issues like childhood vaccinations, genetically modified organisms, and net neutrality, which are not salient to the public, environmental issues like fracking and climate change, as well as broad policy issues like entitlement reform, immigration reform, and international trade, which experience varying levels of salience and partisan animus depending on the period. The point is to ensure that I examine not only articles and transcripts covering the most salient issues, but also other issues that make up the contents of the newspaper or an evening news broadcast over the past several decades.
I also expand on the traditional source selection of work in political communication, which mostly tends to focus on only a few news sources, especially the major national newspapers like The New York Times. Although undoubtedly important, there are other relevant national and regional sources that millions of Americans consume regularly, and, in many cases, trust more than the national press. As a result, I also analyze news content from a wide array of television, print, radio, and online sources. In terms of TV, I examine television broadcast networks ABC, NBC and CBS, as well as PBS NewsHour, a premier news broadcast of PBS. I also include cable news channels CNN, Fox News, and MSNBC. Newspapers are represented by the highly circulated dailies: New York Times, Washington Post, and USA Today, and, for the first two, I also analyze their online-only blog content from the past several years. Regional newspapers are represented by the Denver Post and Tampa Bay Times, primarily due to their availability in the LexisNexis database. I do not claim that these two papers represent all of the regional papers throughout the United States, but one (Tampa Bay Times) tends to be solidly liberal, while the other (Denver Post) much less so, endorsing three Republicans in the last nine presidential elections.\textsuperscript{10} I also examine news coverage from the nation’s two most prominent tabloids: New York Post and New York Daily News. Both are primarily available in New York City, although the Post has an extensive national distribution network\textsuperscript{11}, and both websites enjoy over 100 million visitors each month.\textsuperscript{12} Additionally, I look at NPR’s popular Morning Edition show as well as content from the highly conservative newspaper the Washington Times and the liberal website salon.com. In total, this represents a significant portion of the media environment in the United States over the past several decades.

\textsuperscript{10} https://noahveltman.com/endorsements/
\textsuperscript{12} https://www.similarweb.com/website/nypost.com?competitors=nydailynews.com
The data collected features all of the articles and transcripts available from the earliest possible year (which varies by source, but for most sources it’s at some point in the 1980s/90s) until the end of 2016. The articles and transcripts were downloaded from the LexisNexis database and from Lexis.com. The specific search queries for each issue are detailed in Appendix A. In general, I attempted to ensure that I capture every relevant story on every topic. For example, on the issue of immigration, the terms included “immigration reform,” “reforming immigration,” “immigration system,” and “immigration law.” In total, this paper examines nearly 600,000 articles and transcripts. As it is often the case, many articles and transcripts are not exclusively about a particular topic, i.e. an article referencing climate change might only mention it in passing and not focus the entirety of the article on it. However, that is not a concern given that my aim is to explore news coverage in general and is less about examining news coverage focused on a specific topic. In short, the goal is to focus on the content of the news in general and the type of language and content that Americans have been exposed to in the past several decades. A detailed breakdown of article numbers by both issue and the source are in the Appendix B.

In the analysis below, I examine news content in several ways, utilizing previously developed, and verified, dictionaries, in addition to some original ones that I put together for the purpose of this paper.13 To examine sentiment of the news, I rely on the Lexicoder Sentiment Dictionary (LSD) assembled by Soroka and Young and implement it in Lexicoder.14 LSD is composed of 4,567 positive and negative words and phrases and has been successfully verified several times (Young & Soroka, 2012). To calculate tone, I simply subtract the number of

13 All of the content analysis in this paper has been automated. It will be verified by hand coding at a later stage of the research, prior to publication.
14 http://www.lexicoder.com/
negative words from the positive words and divide by the total number of words, then multiply
the result by 100, which is a common, and robust, measure of sentiment (Young & Soroka, 2012;
Soroka et al. 2015b).

To measure total affect of an article or transcript, I use an affective measure from the
Linguistic Inquiry and Word Count (LIWC), assembled by Pennebaker.\textsuperscript{15} It is composed of 1393
words, measuring positive and negative emotions, such as anxiety, anger or sadness. The
resulting measure of affect measures the number of affective terms per 500 words of news
content.\textsuperscript{16}

To test the prevalence of phrases and words related to conflict and cooperation, I have
inductively assembled dictionaries of relevant words using the Roget’s Thesaurus (Kipfer 2011).
I supplemented this work with key terms from other relevant research focusing on political
conflict, especially Azzimonti’s “Partisan Conflict” index (2013). The resulting conflict
dictionary consists of 354 words and phrases, such as “adversary” or “divisiveness,” which are
frequently used to frame a story in terms of political conflict. The cooperation dictionary consists
of 148 words and phrases like “across the aisle” or “coalition.” Clearly, these are not exhaustive,
but the corpus should be large enough to successfully capture any media focus on that dimension
of the political process. The resulting measures of conflict and cooperation each measure the
number of key terms that appear per 500 words of news content.

The concept of incivility is notoriously difficult to measure. Here, I combine both
existing dictionaries with additional original work to assemble a comprehensive measure of

\textsuperscript{15} https://liwc.wpengine.com/
\textsuperscript{16} 500 words is about an average length of a newspaper article, and the resulting measure should therefore have an
intuitive interpretation.
incivility that encompasses foul and angry language, insults, and name calling, which, based on previous work, seem to be the key components of incivility (Berry & Sobieraj 2014; Muddiman & Stroud 2017; Brooks & Geer 2007). I capture the prevalence of anger and swear words in news media using pre-assembled, and tested, dictionaries available in LWIC 2015. I add to this a dictionary of 125 name calling terms and phrases that are frequently used in political context, like “liar” or “unethical.” Furthermore, I also counted any references to Hitler or the Nazis in the news over the time period using Lexicoder, since that type of name calling frequently enters the political arena and is generally frowned upon by the political elites. The resulting index of incivility measures the number of key terms that appear per 500 words of news content.

All news content data was analyzed with Lexicoder and LWIC 2015. The data was appropriately pre-cleaned using the Predelex\(^{17}\) scripts developed by Mark Daku specifically for use with Lexicoder. This procedure involved routine cleaning of text, including making all text lowercase and removing punctuation. Details in all of the dictionaries can be found in Appendix C.

To measure political sources, I take a two-pronged approach. First, I utilize a generic dictionary of references to “politicians” and “representatives” along with names of prominent party leaders. That dictionary has been used, and manually verified, in other research and performed well (Merkley & Stecula 2018). To examine the coverage of specific politicians, I then supplement the initial approach with original dictionaries based on the DW NOMINATE datasets containing the names of all Representatives and Senators from both parties (I only focus on partisans: Republicans and Democrats, excluding Independents) going back to the 96th

\(^{17}\) Available at https://github.com/mdaku/predelex-v1
Congress, which convened in January of 1979. I complement this data with the inclusion of the Bipartisanship Index to determine whether the degree of bipartisanship of a legislator is rewarded by news coverage. Bipartisanship Index is a standardized measure of the frequency with which a legislator co-sponsors a bill introduced by the opposite party and the frequency with which a legislator’s own bills attract co-sponsors from the opposite party. It has been developed by the Lugar Center.\textsuperscript{18}

It is worth highlighting the difference in the measures of tone and sources. Measures of tone, such as affect or incivility, rely on large, existing dictionaries that encompass hundreds, and sometimes thousands, of words and phrases. As a result, these measures are expressed as proportions of the total news story. For example, nearly all news stories and transcripts in the sample contain at least a single affectively charged word. What matters is the proportion of these words in relation to the general language in which the story is written. Political sources, however, are not ultimately about proportions, but about whether a story involves a reference to a politician or not. And when news references a politician, that frequently becomes the center of the news story, including what that politician said or did. As a result, measures of sentiment and tone are expressed as proportions in this paper, while partisan sources are expressed as indicator variables.

4 Analysis

I begin my analysis with a focus on some of the most prominent news media outlets, grouped into several key domains. I examine mainstream news outlets, which are the ones most

\textsuperscript{18} More details on the exact methodology of the index are available at http://www.thelugarcenter.org/ourwork-Bipartisan-Index.html
likely to be consumed by the general public according to regular surveys by the Pew Research Center. These sources include the top circulating national newspapers: USA Today, New York Times, and the Washington Post; the three broadcast television networks: ABC, CBS, NBC, public television news broadcast PBS NewsHour, and the public radio news program NPR Morning Edition. I also examine cable news (MSNBC, Fox News and CNN), tabloid newspapers (New York Daily News and the New York Post) as well as Regional papers (Denver Post and the Tampa Bay Times). I exclude the issues of fracking and net neutrality since they are relatively new compared to the other issues in the sample. This results in the corpus of 501,030 articles and transcripts.

Figure 1.1 Tone in the news. All series lowess smoothed at a 0.2 bandwidth.
Figure 1.1 demonstrates the shifts in the average sentiment, or tone, each year, of the news media coverage of all the issues I described above. Few things are obvious from the figure: the news coverage tends to be slightly negative in general, but that negativity peaked in the mid-1990s, and not recently. In fact, news coverage in the 1990s was more negative in general than it has been at any point in the past 40 years in the mainstream news. It was the Gingrich Revolution in 1994 and 1995 that registers the peak negativity of the mainstream news media. In fact, the tone of the news was three times more negative in 1994 than it was in 2016.

Looking at the different source types, tabloid newspapers are consistently the most negative in their coverage of news and have been getting even more negative since the election of Barack Obama. Tabloids are also much more negative than the mainstream news sources. The mean tone of the tabloids in 2016 was four times more negative than the mean tone of the mainstream news sources that year. The first year of the tabloid data, 1995, was also the most negative on record, consistent with the story that the media were the most negative in coverage during the Gingrich Revolution.

The pattern of cable news is somewhat surprising. The sentiment of cable transcripts tends to be more positive than other news sources, which might be a function of the difference between spoken words expressed as transcripts and written word produced as an article. Further research should examine whether transcribed television news do, in fact, vary in sentiment from news articles.

In terms of positivity, the mainstream news was net-positive only in a two year period around The Great Recession, in 2008 and 2009, as well as in 2000. That might be surprising, but previous work suggests that news might turn positive during times of economic downturn, as it tends to focus on the future (Soroka et al. 2015b). Even the tabloids were substantially more
positive, on average, during the Great Recession. Overall, however, the data tells a story of mostly stable, slightly negative tone with little differences between types of media outlets, only with the tabloids being distinctly more negative.

Figure 1.2 Affect in the news. All series lowess smoothed at a 0.2 bandwidth.

Affect has been more stable than net negativity, but clear patterns still emerge, as is shown in Figure 1.2. For the mainstream media, affective language has been creeping up steadily since the late 1970s. Affect in the mainstream news sources was the highest in 2016, the year of the Trump presidential campaign, as well as in the 2000-2001 period. Cable news have consistently provided more affectively charged coverage of politics, and that gap was the highest during George W. Bush’s first term. Since that peak, however, affect in cable has decreased somewhat, and tabloid press has surpassed cable as the purveyor of the most
affectively charged news. There has been an uptick in affective language during the Obama presidency, especially among tabloids, but also in the mainstream news and regional newspapers.

Despite popular claims of an increase in incivility in the news, the patterns have been relatively flat for most news sources excluding tabloids, as is shown in Figure 1.3. Since 2009 there has been a substantial increase in incivility across all media types, but these levels are not historic (with the exception of recent news coverage in the tabloid press). In terms of magnitude, this change amounts to roughly one additional incivil word per 500 words of text, which is close to an average length of a newspaper article. In the mainstream media, the largest increase happened in the late 1980s and early 1990s. Between 1988 and 1989, incivility in mainstream news jumped by 17% and continued to rise throughout the Gingrich Revolution. The highest recorded period of incivility in mainstream news is 1994, the year Republicans took control of the House and Senate under the leadership of Newt Gingrich. Somewhat surprisingly, cable is not the most uncivil media type. On the contrary, the levels of incivility in cable transcripts are similar to that in mainstream news sources.

To examine the prevalence of language related to political conflict and cooperation, I restrict the sample to transcripts and stories which only mention politicians of both parties, since these are the stories of most theoretical relevance here. In other words, I’m only looking for language related to conflict and cooperation if both a Republican and a Democrat are mentioned in a given news story, considering that only such news stories will likely discuss political conflict. It would not be informative to examine, for example, the content of the stories that do not mention politicians of either party, since any references to conflict in such instances would likely not be related to politics. I also exclude PBS transcripts from the analyses, since they
aren’t broken down by news segments when indexed by LexisNexis. This results in the total of 190,376 articles and transcripts being analyzed below.

Contrary to expectations, there is no evidence of increase in the usage of general words and phrases associated with conflict in the media over the past few decades, with the levels remaining relatively unchanged throughout the past four decades. If anything, the focus on conflict slightly declined in the news in recent years.

This finding stands in sharp contrast to other work, in particular Azzimonti (2013), who shows that the number of articles in the news dedicated to covering partisan conflict has

Figure 1.3 Incivility in the news. All series lowess smoothed at a 0.2 bandwidth.

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19 This means that politicians of both parties are likely to be found, but it might be in the different news segments occurring during the same broadcast of the NewsHour, which would be misleading.
increased since 2009 relative to other news stories. My findings do not dispute that there has been an increased coverage of deadlock and polarization in Congress in the press. In fact, in the news, the number of raw references to conflict has skyrocketed, especially in cable, but also in mainstream news. However, when examined in the context of the total language, the proportions have been relatively stable. In short, when reading news stories dedicated to various types of important issues, there has not been any discernible movement in the proportion of the language that focuses on political conflict, as Figure 1.4 indicates. One possible explanation of that phenomenon is the fact that there has been a sharp increase in coverage of political conflict as a substantive topic itself, especially in the aftermath of the election of Barack Obama (Azzimonti 2013). As a result, journalists and editors do not include mentions of political conflict in discussions of other topics, since it is already extensively covered on its own.

Figure 1.4 Conflict frames in the news. All series lowess smoothed at a 0.2 bandwidth.
The same can be said of cooperation. There are no differences in the language highlighting political cooperation across the different news media types in the past 40 years, as Figure 1.5 shows. In other words, the focus on conflict seems to have been limited to specific stories dedicated to covering political conflict, but has not really seeped into the coverage of other issues, in general.

![Figure 1.5 Cooperation frames in the news. All series lowess smoothed at a 0.2 bandwidth.](image)

So far, the analysis suggests that the tone of the news does not vary much depending on the source type, regardless whether it is mainstream news, regional newspapers, cable or even tabloids. Contrary to conventional wisdom, there has also not been a staggering increase in negativity, incivility, or a general focus on conflict. The next step in the analysis is examining a
different aspect of news coverage, namely, the degree to which politicians feature in the news, and, more importantly, which ones.

As Figure 1.6 below shows, there has been a major politicization of news taking place over the past 40 years. In 1977, a third (34 percent) of mainstream news stories mentioned a politician. By 1997, this percentage rose to 53 and reached its peak in 2016, at 67 percent. Fully two thirds of mainstream news stories features political actors. The regional newspapers follow the exact same trend, and so do the tabloids, although tabloid press has been catching up with the rest from a slightly lower level.

Cable news outlets, however, are in a league of their own. Throughout the 1990s, with CNN being the only game in town, politicians were mentioned in between 70 and 80 percent of coverage. Starting in the late 1990s, however, with the entrance of Fox News into the market, the politicization of the cable news reached new highs, routinely exceeding 90 percent of coverage. The peak was year 2016, where 94 percent of the transcripts referenced a political actor. That cable news would feature more politicians than other media types is not surprising, given that they have 24 hours of coverage to fill and most cable programming involves guests, and prominent political figures are often eager to participate. The degree of politicization of cable news, however, is simply overwhelming, with nearly all coverage either featuring or mentioning a prominent politician.

The emergence of cable in 1990 coincided with a subsequent politicization of mainstream news sources. In 1989, 45 percent of the mainstream news stories made a reference to a politician. By 1992, it increased to 63 percent, likely due to the entry of cable with a highly politicized content. This dynamic is consistent with previous work (Prior 2007), suggesting that the increase of choice in the news media environment allowed the specialization of the news
audiences. As people tuning into the news become the ones more interested in the news, they were also increasingly likely to be served political content. That being said, it cannot all be explained by cable, since mainstream news media has been consistently politicizing its coverage throughout the 1980s as well.

![Figure 1.6 Politicization of news content. All series lowess smoothed at a 0.2 bandwidth.](https://www.theatlantic.com/politics/archive/2013/10/a-bountiful-harvest-of-false-equivalence-analyses/280452/)

Several scholars and commentators have lamented the rise of balance in the news.\(^{20}\) I examine partisan balance in the news by analyzing the proportion of the news stories that feature a reference to politicians of both parties among the stories that feature any political reference. Results are presented in Figure 1.7. The changes have been steep. In 1977, 17 percent of mainstream news stories featured politicians of both parties in coverage that mentioned any

politician, adhering to the journalistic norm of balance. By 1997, nearly half of mainstream news did. By 2016, 61 percent of mainstream news stories referenced politicians of both parties. The regional papers, again, follow the same pattern, while the tabloids do not exhibit any consistent over time pattern.

Cable, once again, is in the league of its own. In 1990, CNN referenced politicians of both parties in about a half of their news segments mentioning any politician. By 2000, with the cable landscape transformed by the arrival of Fox News and MSNBC, that percentage increased to 85. In 2016, 87 percent of the cable news coverage featured politically “balanced” stories, where politicians of both parties were either featured or discussed. It is also worth noting that on cable, balance tends to peak during presidential election years, which is not surprising as that is the time period when news outlets want to avoid any accusation of being politically biased.

Of course this measure of balance does not necessarily indicate that a given story’s motivation was indeed driven by the journalistic norm of balance, but instead it might be to highlight and deride the “other” side. For example, Fox News has disproportionately focused on covering Nancy Pelosi at the expense of other Democrats, between the 109th and 113th Congress. In the decade between 2005 and 2014, Fox News covered virtually no other Democratic members of the House of Representatives other than Nancy Pelosi. Although the focus on Pelosi was also there among other media outlets, the gap between her and other Democrats, as well as the sheer volume of references to Pelosi, was not as high in other sources as it was on Fox. Further work, therefore, is needed to unpack the true nature of politically “balanced” news coverage in the media.
The coverage of politics has therefore undeniably politicized, but who exactly are the politicians mentioned in the news? Are the ideologically extreme ones dominating coverage? To examine that question, I counted which politicians get mentioned in the news. Nearly all members of Congress, as relatively high profile individuals, get mentioned in the news at least once, but a few mentions in the news over the course of two years of a given Congress does not amount to any real visibility. Since the distributions of mentions are highly skewed, I first examine the politicians to whom the media pay the most attention - the 95th percentile, the top 5 percent, in each House and Senate - or the politicians that feature in the news most prominently.
Figure 1.8 below presents the average DW NOMINATE\textsuperscript{21} score for the most prominently covered Senators in each Congress, starting with the 96th, which began in January of 1979. Among Democrats, the media disproportionately focused on the most liberal among Senators in the most recent Congress (113th) but over the entire multi-decade period, the ideological composition of the most mentioned Democratic senators did not deviate much from the Democratic floor average. Among Republicans, the media spotlighted Senators that were considerably more conservative than the Republican floor average throughout the 1980s into the early 1990s, but that focus on the more extreme elements of the Republican caucus subsided for over two decades, until the most recent Congress, where it simply exploded.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure18.png}
\caption{Ideology of Senators with most media exposure.}
\end{figure}

\textsuperscript{21} The focus of this analysis is the 1st dimension of DW NOMINATE, which is traditionally considered the left-right dimension.
Members of the House of Representatives, in general, receive much less attention from the press than Senators. In the 113th Congress, for example, the median number of mentions in all of the news media in the sample was 255 for Senators, but only 22 for Representatives. In the 96th Congress, in the years 1979-1981, these numbers were 4 for Senators and 0 for Representatives, respectively. Despite this imbalance in media attention, the general patterns of ideology are also somewhat different than in the Senate, as is shown in Figure 1.9. Historically, the Democratic Representatives that received the most attention from the media were slightly more liberal than the Democratic floor average, but the difference is relatively small in magnitude. Among Republicans, the more extreme enjoyed more media attention in recent years, but that trend dissipated in the 113th Congress. There are no discernable differences among the news outlets on their focus on ideology of politicians.

Figure 1.9 Ideology of Representatives with most media exposure.
Examining the specific Representatives and Senators that received the most attention from the press, it is, unsurprisingly, the presidential candidates that receive the most coverage during periods of campaigning. Outside of these periods, leadership tends to dominate the news coverage, especially for Democratic Senators, where Harry Reid, and before that, Tom Daschle, were the Senators receiving the most media attention. Among Republicans, however, these patterns are somewhat different, with John McCain totally dominating news coverage between 1999 and 2012. In the House, on the other hand, leaders of both parties tend to get the most attention. More details on which Senators and Representatives received the most media mentions are available in the Appendix D.

To explore the relationship between ideological extremity and media attention, I run negative binomial models, appropriate for count data, for each Congress, starting with the 96th, following the lead of Wagner and Gruszczynski (2017). Similarly to them, I control for leadership positions, given that leaders are disproportionately likely to receive media attention. Furthermore, since the DW NOMINATE measure (1st dimension) ranging from about -1 to 1, I transform it into an absolute value to obtain comparable effects for Republicans and Democrats (Wagner and Gruszczynski 2017). Table 1.1 presents the results of these models, broken down by party and chamber. Since coefficients from negative binomial models are difficult to interpret, I present risk ratios instead.

Among Senators, between 1979 and 1991, the more ideologically extreme Republicans received much more attention than moderate Republicans. In the 96th Congress, for example (1979-1981), incident rate of total news mentions for the most extreme Republicans was 74 times that of the most moderate ones. For Democrats, that ratio was 257 times. Recent years,
however, show lack of evidence of the media rewarding extremists at the expense of moderates in the Senate, either among Republicans or Democrats.

The evidence of the media focus on extremists, however, is much clearer in the House. Throughout the past several decades, the media rewarded more liberal Democrats with news coverage at the expense of moderates, but it tended to be the opposite for Republicans, since it was the moderates that were more likely to be rewarded with news coverage (controlling for leadership positions). However, since the beginning of the 110th Congress in January of 2007, the media overwhelmingly focused on extreme politicians of both parties and continues to do it to this day. Contrary to expectations, then, there is no clear relationship between ideological extremity and media attention attributed to specific politicians of both parties. It has been certainly true in recent years in the House, but not so in the Senate.

![Figure 1.10 Relationship between bipartisanship and news mentions in the 113th Senate.](image)

The graphs are marginal plots based on negative binomial regression, controlling for ideology.
Lastly, I examine whether bipartisanship in the 113th Congress is rewarded with media coverage utilizing the Bipartisanship Index composed by the Lugar Center. Perhaps it is the ideologically extreme politicians in the House who get in the news, however it is not because of their ideology but because of their legislative efforts. The results, both for the Senate (Figure 1.10) and the House (Figure 1.11) demonstrate that there is no statistically significant relationship between bipartisanship and news media exposure. The figures plot the predicted amount of news coverage based on a simple negative binomial regression of news coverage on bipartisanship score interacted with party and controlling for ideology. Politicians like Senator Collins (R) and Manchin (D), deemed the most bipartisan in the Senate, received no additional news coverage for their efforts. In the House, the Representative with the highest Bipartisanship
Index score in the 113th Congress, Chris Gibson (R) of New York, was mentioned in exactly zero news articles in the corresponding time period.

<table>
<thead>
<tr>
<th>Congress</th>
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<th>House Democrats</th>
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<th>Senate Democrats</th>
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<td>96</td>
<td>1979-80</td>
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<td>5.38</td>
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<td>2013-14</td>
<td>5.94**</td>
<td>5.68***</td>
<td>0.56</td>
<td>7.55**</td>
</tr>
</tbody>
</table>

**Table 1.1 Effect of ideology on news exposure of politicians.** Cell entries are incident risk ratios from negative binomial regressions. The models control for top party leadership positions (Speaker, Leader, Whip). * p<0.1, ** p<0.05, ***p<0.01.
5 Discussion and conclusion

Taken together, these results provide some initial evidence that the news media might have played a role in the process of political polarization of Americans and contributed to the polarized climate in the United States.

Of the several features of news coverage examined in this paper, several have been remarkably stable over time. Affective language, for example, saw the highest increase in the mainstream news throughout the 1980s, but not recently. There has been a closing of the gap between cable news and mainstream news, however, as both now exhibit similar levels of affective language. The news isn't particularly negative recently, either. In fact, news coverage was much more negative in the mid-1990s during the Gingrich Revolution than it has been during the polarized presidency of Barack Obama. And incivility, although increasing recently, has also been relatively stable in the mainstream news sources.

Despite expecting to find a disproportionate focus on political conflict, I find little change in the news media usage of that frame over time. Other scholars found that there is a growing number of articles themselves dedicated to highlighting partisan conflict, and that might be the case why a broader set of articles dedicated to a particular set of issues did not find a clear increase in the focus on conflict, since there are separate, and growing number of stories written about conflict itself.

What has changed is the degree to which politicians feature in the news. We have seen a massive increase in politicization of news, with the proportion of news stories in the mainstream news mentioning a politician doubling between 1977 and 2016. A feature of that politicization seems to be the idea of balance, or the desire of journalists to present “both sides” in order to adhere to the important journalistic norm of objectivity. Politically balanced news coverage
featuring politicians of both parties has skyrocketed, and makes up nearly half of the mainstream news media coverage, while dominating nearly all of the cable news coverage.

The results also suggest that the media have recently been giving a disproportionate amount of attention to the most extreme politicians at the expense of their moderate colleagues in the House, but not in the Senate. It might be partly due to the fact that the coverage in the Senate has been dominated by John McCain among Republicans and the Democratic leadership that has not been on the ideological fringe of the party. That might be changing, however, with an increased media attention given to Elizabeth Warren as well as Ted Cruz and Rand Paul. As a result, coverage of the most recent Senate, which was not part of this study, might also reward ideological extremism, like it does in the House.

This dramatic increase in the politicization of news coverage likely contributed to partisan sorting of the American electorate over the past four decades. People are increasingly likely to receive partisan cues from the news environment and that likely contributes to promoting ideological consistency: it’s much easier to know where your party stands on issues now than in was in the 1980s, for example, since there is now always a politician in the news to tell you where each party stands. This is consistent with recent work demonstrating that the news media choice plays a role in helping people identify the ideological orientation of the major parties and candidates (Darr & Dunaway 2017).

Furthermore, as Smidt (2015) points out, even Americans who ignore politics are aware of the differences between the political parties in the current political climate. In fact, the inattentive voters of today display the same levels of perception of partisan differences as the informed voters in the late 1970s (Smidt 2015). That is likely due to the fact that media coverage
has provided everyone with more opportunities to be aware of these differences by amplifying the voices of political actors dramatically over the past four decades.

In addition to sorting, there is some evidence that the media might have contributed to the affective polarization of Americans. Although there is no evidence that the news coverage in general is more affectively charged, it has been getting slightly more uncivil since the beginning of the Obama presidency. Furthermore, although the emphasis on partisan conflict did not trickle down to the news coverage of the set of issues discussed here, other scholars found an increase in the volume of news articles dedicated to covering partisan conflict since 2010 (Azzimonti 2013). That focus has very likely contributed to the increase in the dislike of “the other party,” a key component of affective polarization. As Levendusky and Malhotra (2016) show, such coverage increases citizens’ beliefs that the electorate is polarized and increases their dislike of the opposing party. And lastly, over the past decade, there has been an imbalance in the attention given to the most ideologically extreme politicians in the House on both sides. As a result, news media consumers were not only increasingly exposed to politicians, but the most ideologically extreme ones. It can reasonably be argued that exposure to the ideological fringe of each side of the political spectrum likely fueled dislike of the other side, as Democrats and Republicans were exposed to the politicians from the other side that they most likely strongly disagree with. This was not the case in the Senate, with the press focused mostly on McCain, though that has recently changed with an increased focus on Ted Cruz and Rand Paul.

The results presented here are primarily descriptive and by no means conclusive. Future work should build on these findings to examine the causal relationship between politicization of news and polarization, to give the results presented here more analytical power. These approaches should involve experimental work. Future work should also look more carefully at
different types of news coverage examining if there are any meaningful differences, specifically whether there are differences in opinion writing, or in the coverage of specific issues, as well as whether online news in general differ from news from either print or television sources, since previous work indicated heterogeneous effects from exposure to print vs. online sources (Althaus & Tewksbury 2002). Lastly, the examination of the online news environment, and the role of social media should be examined, particularly as it might pertain to affective polarization. Even though the traditional media do seem to play some role in affective polarization, the changing media landscape and the increasing reliance on social media in recent years to obtain news among Americans suggests that perhaps that is the main source of affective polarization in the electorate and a factor that will only grow in importance.
Paper II

Party cues in the news: Explaining the dynamics of climate change polarization

with Eric Merkley

1 Introduction

American public opinion is highly polarized on the issue of climate change. Surveys continue to show that an overwhelming majority of Democrats believe climate change is happening, while less than 50 percent of Republicans concur. This proportion is even lower among the most conservative supporters of the GOP. Partisanship even colors how energy scientists think about climate change. This polarization mirrors where Democratic and Republican elites stand on the issue. President Donald Trump argues that climate change is perfectly explained by “just weather.” Prominent Democrats, such as former presidential candidate Hillary Clinton, on the other hand, believe that climate change is “the most consequential, urgent, sweeping collection of challenges we face as a nation and a world.” Republican and Democratic elites, in other words, are worlds apart on climate change.

It was not always this way. There was a time when party elites were not as polarized on climate change. President George H.W. Bush was by no means an environmentalist, but he, and many of his advisors, tried to balance industry concerns with a need to tackle climate change, and at times spurned their industry allies. He attended the Rio Summit and signed the first

22 See, for example http://www.people-press.org/2013/11/01/gop-deeply-divided-over-climate-change/
international agreement on climate change. The general public was also far from polarized on climate change in the 1990s. A Gallup poll from 1997 shows that 44 percent of Republicans believed that scientists thought of global warming as a serious threat, slightly higher than the proportion of Democrats sharing the view (39 percent). That year, the gap between strong partisans on whether global warming was real was only 5 percent, with 73 percent of Democrats and 68 percent of Republicans believing that global warming had been happening (Krosnick et al. 2000). Furthermore, and perhaps more importantly, there is nothing inherently conservative in the position of climate change skepticism. Most conservative parties around the world align their position with the views of climate scientists (Batstrand 2015). What exactly happened in the United States that promoted the polarization on global warming and the embrace of climate skepticism by a non-trivial part of the public?

In this paper, we provide evidence that party elite cuing through the mass media help us understand the dynamics of polarization of global warming attitudes among Americans. First, using a combination of automated and manual content analysis, we examine the nature of the news coverage of global warming and its dynamics over time, with a particular focus on the sources of political persuasion that are carried in climate change coverage, such as party elites, ideological groups, and organized climate skeptics that have been the previous focus of literature. In doing so, we draw comparisons across news mediums and outlet ideology, and illustrate how coverage has changed over time across those dimensions. Second, we provide tentative evidence that party elites played a role in fomenting climate skepticism through their

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25 In this paper, we use the terms global warming and climate change interchangeably.
increasing presence in the news media’s coverage of climate change, utilizing an original measure of latent climate change skepticism.

2 Mass media and the determinants of climate change attitudes

Many explanations of climate change polarization and Republican skepticism are rooted in the nature of news media coverage of the issue. There is a vast literature on the role that the media play in shaping public opinion. Its importance lies in the fact that the mass media have a virtual monopoly on the presentation of many kinds of information, especially in non-salient and specialized policy areas where the public may lack in-depth knowledge (Nisbet & Myers 2007). Since most people do not have the latest copy of *Nature Climate Change* on their nightstand and do not dedicate their lives to conducting rigorous scientific research, the media play a big role in educating the public and shaping opinions on difficult, science-based issues such as climate change (Kahlor & Rosenthal 2009; O'Neill & Nicholson-Cole 2009; Jang 2014; Ho et al. 2008; Lee & Scheufele 2006; Zhao et al. 2011).

There have been four main threads in the scholarship attempting to explain how Americans form their views on climate change. Each of these factors likely make their influence on the public through their reflection in the media. Our starting point is a well-established model of public opinion formation in political science literature. The public might have polarized on climate change due to the increasing availability of partisan cues in the coverage of the topic. Top-down persuasion from party elites happens for two reasons. First, many people use party elite cues as cognitive short cuts to make decisions in a low information context (Berinsky 2009; Cohen 2003; Conover & Feldman 1989; Kam 2005; Lupia 1994; Lupia & McCubbins 1998; Nicholson 2012; Popkin 1991). Second, their strong affect-oriented attachments to parties guide
their information processing (Iyengar et al. 2012; Lodge and Taber 2013). They are instinctively persuaded by elites they trust and dissuaded from those they do not, which is why both in-group and out-group party elites have been shown to have tremendous persuasive power (Berinsky 2009; Cohen 2003; Nicholson 2012; Lenz 2012). It is the mass media that communicates these signals when it indexes elite debate (Althaus et al. 1996; Bennett 1990; Dalton et al. 1998).

There are some signs that partisan cuing may play a central role in polarization on climate change specifically. First, surveys have shown that the gap between Democrats and Republicans on their beliefs on the seriousness of climate change is highest among politically attentive respondents and those with greatest knowledge of the issue. Although not incompatible with an explanation centered on ideology, we would expect partisan cuing to be more influential among politically sophisticated citizens because they are most attuned to signals from elites (Berinsky 2009; Zaller 1992). Second, research has found that concern about climate change varies based on legislative activity like congressional roll call votes and committee hearings – behavior that is to some degree covered by the media (Carmichael & Brulle 2017). There is also general evidence that party cues have increased in print, broadcast, and cable media (Merkley & Stecula 2018). Finally, there is some experimental evidence that softening Republican elite positions on climate change would change Republican attitudes towards climate science (Tesler 2018).

Furthermore, there are grounds to expect that Republican elites aren’t the only partisan actors that may be influential in shaping Republican attitudes about climate change. We have seen the rise of affective polarization where partisans increasingly dislike the opposing party (Iyengar et al. 2012). Thus, out-group partisan cues can be (negatively) persuasive in their own right (Berinsky 2009; Nicholson 2012). Examinations of climate change media content also give
us grounds to expect Democratic elites may have been more influential than Republican officials in fostering climate skepticism among Republicans. It is primarily cues from Democrats that have been increasingly over time and these cues have a consistent orientation in favour of climate mitigation, unlike the mixed message coming from Republican elites (Merkley & Stecula 2018).

Partisan elites, however, have been awarded only a trivial focus in the climate change literature. More prominent have been theories that emphasize the role of ideology and motivated reasoning in shaping political attitudes. The policy implications of climate change are not easily compatible with free market orthodoxy, since global warming represents a clear case of a market failure – the costs of climate change are not reflected in the price of carbon. Government intervention is required for a solution, particularly if emissions are to be reduced in time to prevent runaway warming (Conway & Oreskes 2010). As a result, citizens interpret certain facts, like the existence of expert consensus, through the lens of their ideological preferences and social group membership (Kahan 2013). They are moved by information from experts and other actors who share their preferences, and reject information from those that do not. They may even seek out information from contrarian sources to bolster their prior attitudes (Kahan et al. 2012).

It is important to note that ideological roots to resistance to climate science are not a given. There are market-friendly approaches to climate mitigation, like carbon taxes and emissions trading that command the support of most economists and many environmentalists. Indeed, there is some evidence that emphasizing this can lower conservative resistance to climate science (Campbell & Kay 2014; Dixon et al. 2017). It is also clear that a large majority of Americans do not think about politics in strict ideological terms. Most do not possess consistent and constrained ideological predispositions (Converse 1964; Achen & Bartels 2016; Kinder &
Kalmoe 2017). If it matters, it likely only does so for a small slice of the Republican electorate – those most closely engaged in politics who can easily identify a linkage between matters of science, its policy implications, and their own values. More fundamentally, though, such theories are static in nature. In their current formulation, they do not easily explain dynamics in partisan beliefs on climate change. In any case, research has not examined how common ideological cuing is in mass media coverage of climate change.

One of the linchpins of scholarly and activist exploration of climate change beliefs has focused on the role of an interconnected web of fossil fuel industry-supported advocacy groups and think tanks - the infamous “Merchants of Doubt” (Oreskes & Conway 2010). In this account, a well-financed network of conservative groups resistant to the ideological implications of climate change, allied with industry groups concerned about their bottom line under meaningful climate mitigation policy, and use their combined organizational clout to support certain contrarian scientists to cast doubt on climate science in their research and in the media (Farrell 2016a, 2016b; Dunlap & McCright 2011; Dunlap & Jacques 2013; Jacques, Dunlap & Freeman 2008).

In this theory, the Merchants of Doubt are unwittingly aided by journalists when they attempt to satisfy a professional norm of providing balanced coverage. There are several reasons for why that might be present in climate change coverage. First, this technique is employed to prevent being labeled as biased in political coverage. Second, there is a tendency to focus on conflict and disagreement in general reporting (Bennett 2007; Zehr 2000; Antilla 2005; Ward 2008), which the balance norm also helps to satisfy when people holding diametrically different positions are pitted against each other. Third, the mass media resort to framing climate change as uncertain in some cases by emphasizing controversy or disagreement among scientists or by
following the lead of organizations with a track record of skepticism towards climate science (Zehr 2000; Farrell 2016a). This disagreement, under the guise of journalistic objectivity, allows voices not aligned with the scientific consensus to be heard disproportionate to their influence in their own discipline, often creating an impression that scientific opinion on the topic is more divided or unsettled than it really is (Antilla 2005; Ward 2008).

This practice has been shown experimentally to sow doubt on issues of expert consensus (Koehler 2016). The result is unrepresentative “balance” in the news media’s coverage of climate change (Boykoff & Boykoff 2004; Boykoff 2007; Boykoff & Boykoff 2007). There are good reasons to suspect the fossil fuel industry and allies in the conservative movement have played an important role in pressuring Republican lawmakers to reject measures to curb greenhouse gas emissions, and perhaps even outright reject climate science. But there has been little evidence mustered to examine the prominence of their messages in the information environment or whether their messages are linked to aggregate climate polarization.

Finally, researchers attempted to link climate change attitudes to economic conditions. This line of inquiry is rooted in the psychological concept of the “hierarchy of need” (Maslow 1943), where economic security is a more important need than abstract, long term concerns about the environment. Scholars in this research program found a negative correlation between the state of the national economy and public willingness to tackle the problem of climate change (Elliott et al. 1997; Guber 2013; Brulle et al. 2012; Scruggs & Benegal 2012; Carmichael & Brulle 2017). Furthermore, public commitment to climate change mitigation seems to be conditioned by cost of the proposed reforms (Bechtel & Scheve 2013; Ansolabehere & Konisky 2014). In other words, it is not only the national economy that matters, with support for climate action dipping during recessions, but also more personal circumstances that affect daily
expenses, like energy prices (Scruggs & Benegal 2012). A recent analysis of longitudinal data, however, found no evidence that changes in personal economic well-being or the state of the local economy were correlated with belief in climate change or prioritization of climate policy (Mildenberger & Leiserowitz 2017). It is still plausible that cost considerations related to proposed climate change mitigation policies, like higher energy prices resulting from carbon taxes, for example, might still affect aggregate climate skepticism.

Whether or not there is a direct link between economic circumstances and support for climate mitigation it is certain true that political actors believe this to be the case. In hoping to undermine climate action, critics may try to frame the issue as one of economic cost – these can be Republican elites or organized skeptics (Nisbet 2009). In the course of a policy debate where costs and benefits are debated these frames will almost certainly appear with some regularity. Although scholars have drawn attention to the potential importance of these frames, empirical work has not actually measured their prevalence of these frames in coverage across outlets and over time.

There has been very little work examining the reflection of our four potential polarizing factors in media coverage in the form of cues and frames. This omission is deeply problematic because the news media are the primary avenue for information for most citizens on abstract and complex policy topics, such as climate change. This fuels our five major research questions for the remainder of paper of which we have some general expectations:

I. **How prevalent in coverage are the cues or frames related to our four potential polarizing factors?** Important influences on climate polarization should be reflected in a reasonable degree of climate coverage. At a minimum they need to be readily available for news consumers to be influential.
II. How has frequency of coverage of polarizing cues or frames changed over time?

*Important influences on climate polarization have likely increased over time. This is a weak expectation because overall salience has not been constant across time.*

III. Is there an association between these polarizing cues or frames and climate change salience?

*Public opinion crystalizes in periods of high salience because members of the public are exposed to a higher volume of news content about a subject.*

*Important influences on climate polarization are likely associated with higher levels of issue salience.*

IV. Are there differences in the frequency of coverage of polarizing cues or frames across medium and outlet ideology?

*We expect that cable news will more readily carry potentially polarizing cues due to the medium’s emphasis on conflict.*

*Conservative media should also be more likely to carry cues and frames clearly geared towards undermining climate science, like cues from organized skeptics and frames that emphasize economic costs of climate mitigation.*

V. Is there an association between the dynamics of our polarizing cues or frames and aggregate climate skepticism after controlling for other factors?

*The across time dynamics in polarizing cues and frames should be associated with climate skepticism if they are a significant influence in the polarization of aggregate public opinion.*

These five questions guide the analyses that follow. We start by introducing our media sample and examining changes in the volume of coverage over time. We then introduce our measures of four potential polarizing influences in media coverage and explore their prevalence across media and over time. Finally, we examine potential associations between our measures and aggregate levels of climate skepticism in the American public. All stages of our analysis
point very strongly to the role of party elites in polarizing the American public on climate

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<td>1,613,865</td>
<td>4,190</td>
</tr>
<tr>
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<td>1980</td>
<td>Left</td>
<td>462,228</td>
<td>3,488</td>
</tr>
<tr>
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<td>1983</td>
<td>Right</td>
<td>250,678</td>
<td>1,068</td>
</tr>
<tr>
<td>Los Angeles Times</td>
<td>1985</td>
<td>Left</td>
<td>641,369</td>
<td>2,653</td>
</tr>
<tr>
<td>Chicago Tribune</td>
<td>1986</td>
<td>Right</td>
<td>411,960</td>
<td>1,767</td>
</tr>
<tr>
<td>Houston Chronicle</td>
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<td>Right</td>
<td>325,814</td>
<td>1,461</td>
</tr>
<tr>
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<td>Right</td>
<td>2,293,798</td>
<td>1,200</td>
</tr>
<tr>
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<td>1989</td>
<td>N/A</td>
<td>1,713,833</td>
<td>1,009</td>
</tr>
<tr>
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<td>Right</td>
<td>410,130</td>
<td>590</td>
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<tr>
<td>Detroit Free Press</td>
<td>1994</td>
<td>Left</td>
<td>215,401</td>
<td>543</td>
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<tr>
<td>CNN</td>
<td>1990</td>
<td>Left</td>
<td>868</td>
<td></td>
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<tr>
<td>Fox News</td>
<td>1997</td>
<td>Right</td>
<td>661</td>
<td></td>
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<td>MSNBC</td>
<td>2000</td>
<td>Left</td>
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<tr>
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<tr>
<td>CBS</td>
<td>1990</td>
<td>N/A</td>
<td>461</td>
<td></td>
</tr>
<tr>
<td>NBC</td>
<td>1997</td>
<td>N/A</td>
<td>504</td>
<td></td>
</tr>
<tr>
<td>Associated Press</td>
<td>1980</td>
<td>N/A</td>
<td>5,385</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>28,029</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Table 2.1 News media sources.* Newspaper circulation numbers gathered from a report from the Alliance of Audited Media. Newspaper ideology categorized based on Gentzkow and Shapiro (2010) slant scores.
3 Climate change coverage in the news media

We believe an examination of the climate change media environment is essential in understanding American climate change polarization, so we gathered all stories from the sources listed in Table 2.1 that referenced climate change or global warming in the LexisNexis subject tags and in the body of the text. In an effort to examine a broad slice of the news media environment, we focus not only on major daily newspapers, but also the Associated Press (AP), the largest newswire service in the U.S., several high-circulation regional papers, network television and cable news transcripts. We ensured that all the articles and transcripts were relevant (i.e. were explicitly focused on climate change) through a combination of hand coding and machine learning using RTextTools. Since many cable transcripts in LexisNexis were of entire broadcasts, not just segments dedicated to climate change, we developed a Python script to trim each transcript to contain only the relevant parts.26 All told, the resulting dataset included 1,564 broadcast transcripts, 1,695 cable transcripts, and 19,385 newspaper articles. Though we certainly have not covered the news media environment in its entirety, these 17 sources are popular and highly influential. They also represent a mix of conservative and non-conservative media. In all, we cover a substantially larger swath of the news media landscape than any previous examination of the topic.

Figure 2.1 paints a detailed picture of the annual coverage of climate change in both television news as well as in the high circulation daily newspapers. Coverage of the topic was trivial until the late 1980s. It was at this time that NASA climatologist James Hansen testified before Congress to warn of the reality and dangers of a warming climate. Controversy arose

26 Each transcript was trimmed to exclude any content three sentences before the first reference to global warming or climate change and three sentences after the last reference to global warming or climate change and related keywords to ensure that content analysis was only conducted on the news segment of interest.
when the White House Office of Management and Budget secretly edited his testimony to weaken his conclusions. The White House held a conference on climate change in 1990 and agreed to sign on to the Framework Convention on Climate Change, which was signed in Rio in 1992. Coverage dropped until conferences, like Kyoto in 1997 and Bonn in 2001, drew the press’s attention. The biggest increase in coverage came in the midst of two relatively simultaneous events: the release and promotion of *An Inconvenient Truth*, and the Democratic takeover of Congress in the 2006 midterm elections. These events massively increased the salience of climate change. Coverage remained high as a unified Democratic government, ultimately unsuccessfully, tried to pass a cap-and-trade program in 2010. Coverage then fell as the Republicans took over the House, but has rebounded in the last couple of years as President Obama has opted to bypass Congress and use regulations through the Clean Air Act to combat climate change.

![Figure 2.1 Total climate change coverage. A) Newswire; B) Print; C) Cable; D) Broadcast television. All series lowess smoothed at a 0.05 bandwidth.](image)
The patterns in coverage are similar across news medium, with two notable exceptions. First, the AP newswire and broadcast television producers at ABC, NBC and CBS showed little interest in covering the topic in the early 1990s, unlike newspapers and cable (which, at this point, consisted solely of CNN), which devoted considerable attention to the issue. Climate change captured the interest of network TV journalists only on the eve of the Kyoto conference. Secondly, the peak attention to the issue has lasted considerably longer on cable and in newspapers than in broadcast news and newswire, where it was largely limited to an explosion of coverage in 2007 and 2009.

4 The (potential) polarizers

A number of explanations for climate change polarization have been advanced by scholars. We have made an effort to generate measures that capture these influences in news coverage – the venue that most Americans will use to learn about climate change. First, our primary focus is on the role of party elites. We constructed an original dictionary designed to capture references to parties and their elites in coverage, such as names in each party’s national leadership – presidents and presidential nominees, vice presidents, speakers of the House, and Senate and House majority and minority leaders – along with generic terms like senator and governor.\(^{27}\) Second, we captured ideological group cuing by a dictionary build with ideological terms like liberal, conservative, and right-wing. Third, we built dictionaries of organizations linked to climate change skepticism and over 500 contrarian scientists based on lists previously

\(^{27}\) Detailed dictionaries can be found in Appendix F.
compiled by scholars (Anderegg et al. 2010; Farrell 2016b). We further subdivided this list into its component parts: industry groups, conservative movement think tanks and advocacy associations, organizations dedicated to climate denial, and contrarian scientists. For our purposes we will be focusing on the combined measure, and the dedicated climate denial organizations and contrarian scientists that form the core of the climate change countermovement, hereafter termed denialists.

Finally, we identify stories with economic cost frames with supervised machine learning. We hand coded 1,500 articles stratified by three time periods to identify such frames in coverage. Articles and transcripts were coded as “1” if they had discussion of the cost of climate change mitigation, such as higher energy prices, a weaker economy, fewer jobs, declining competitiveness against developing countries, and general costs of regulatory compliance. We used the maximum entropy classification algorithm to generate predictions for our sample of articles. Our algorithm was trained, tested and used to predict articles for each time period independently to ensure adequate performance across our entire time period. Our recall and precision scores range from 0.74 to 0.76, and 0.78 to 0.80 respectively, across our three periods indicating pretty solid performance.

The percentage of coverage with each potentially polarizing cue or frame is shown in Figure 2.2. As a point of reference, we have also included the percentage of our news stories that feature a mention of experts. As is clear, experts dominate coverage (89%), but party elites are also featured in a substantial amount of coverage (53%), of which Democrats tend to be more common (31%) compared to Republicans (23%). Economic cost frames are perhaps not as

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28 More details on how these scholars built their lists can be found in their respective works.
common as we might expect given the salience of economic concerns to policy discussion of climate change (26%). Ideological cuing and messages from organized climate skeptics are very uncommon. Conservatives are only cited in 8% of coverage and liberals in 5%, while the combined weight of the climate change countermovement is only featured in 15% of coverage, and dedicated climate denialists and contrarian scientists are only present in 4% of coverage. Consequently, explanations of climate change polarization centered on ideology and organized climate skeptics have to deal with the fact that these signals are simply not very common in the information most Americans are consuming about climate change.

Figure 2.2 Percentage of all news stories with polarizing information source or frame.
Salience of this topic, however, has increased substantially, especially since 2006, so these figures may tell us more about the media environment recently than in the past. The percentage of coverage with each of our potentially polarizing news sources and frames are plotted over time in Figure 2.3. Panel A demonstrates that party cues are increasingly common in coverage, rising from 25% when the issue first emerged on the political scene in the late 1980s to close to 70% at present. Party cues increase, unsurprisingly, with notable events like the Rio conference in 1992, Kyoto in 1997, and Bonn in 2001. Democratic and Republican cues have not moved in sync. Only Democratic cues have steadily increased over time, while Republican cues have been on the decline since 2001. Combined with rising salience since 2006, messages from Democratic elites, in particular, are increasingly reaching the public in a consistent way.

In stark contrast are the results for other cues. Liberal and conservative ideological cuing has been rare in coverage, though has seen a sharp uptick in the past few years. They each have
not breached 20% of coverage. Organized skeptics, despite their considerable financial clout, have also failed to receive much traction in the press. They have, if anything, been on the decline since the Kyoto debate. Since then, they have not breached 20% of coverage. The core of the countermovement, for its part, barely register in coverage. This flies against the conventional wisdom about the power of these groups and the tendency of journalists to engage in false balance. Economic cost frames, however, have been reasonably prominent and consistent in coverage, rising periodically with notable events and policy debates.

### 4.1 Comparisons across media and over time

Our large database of news media coverage on climate change gives us a unique opportunity to look for differences over time and across media and outlet ideology. We might be interested descriptively in whether there has been statistically significant trends in media coverage with our cues and frames of interest, and the degree to which they track with the overall salience of climate change – as operationalized with the total number of climate change articles in our media sample. To do this, we estimate the following two equations to measure the association between each variable and a linear trend (1), and the association between each variable and salience independent of the trend (2) controlling for cross-sectional fixed effects ($\mu$). We use Prais-Winsten regression to correct for autocorrelation, and panel-corrected standard errors (PCSE) to adjust the standard errors for inevitable cross-sectional correlation.

\[
%\text{cue/frame}_{n,t} = \alpha + \beta_1 \text{trend}_t + \mu_n + \epsilon_{n,t} \tag{1}
\]

\[
%\text{cue/frame}_{n,t} = \alpha + \beta_1 \text{salience}_{n,t} + \beta_2 \text{trend}_t + \mu_n + \epsilon_{n,t} \tag{2}
\]
\( \beta_1 \) in equation 1 tells us the effect of an increase of a quarter on the percentage of cues or frames in coverage. \( \beta_2 \) in equation 2 gives us the effect of one additional news article on climate change on the percentage of cues of frames in coverage after controlling for the trend. Likely influences on climate polarization should have positive and significant coefficients. These coefficients are given in Table 2.2. We take this coefficients to be simply descriptive and not reflecting any causal associations.

We might also be interested in variation across media and outlet ideology controlling for common shocks through time. On the one hand, broad similarities across very different media can give us confidence that the findings above generalize across a wider swath of the media environment. On the other hand, we have reason to expect some differences may exist. First, scholars have shown that cable news tends to cater to partisan and politically engaged audiences (Prior 2013; Levendusky 2013). Thus, these sources are probably more likely to carry partisan and ideological cues. Second, cable news is more orientated towards conflict, and so may be inclined to cite opposing climate skeptics (Sobieraj & Berry 2011; Feldman et al. 2012). The television format may also be more conducive to providing “balance” (Bennett 2007), so broadcast news may also feature more climate skeptics. Third, scholars have emphasized the role of conservative media in the climate change countermovement (Dunlap & McCright 2011), and thus they may be more likely to cover climate skeptics and denialists. Finally, we know that economic frames are prevalent in climate change discourse, and opposing actors have used discussion of costs to stir opposition to mitigation policy (Nisbet 2009). Conservative media may be more likely to carry such themes in their coverage.

We can gain leverage over these questions by estimating models that predict the quarterly proportion of articles with different groups of climate change skeptics with news medium (print,
cable, broadcast), outlet conservatism (conserv), controlling for a linear time trend (trend), quarter (qt), and yearly fixed effects (δ) as shown below in equation 3. These equations are again estimated with Prais-Winsten regression and PCSEs.

\[
\%\text{cue/frame}_{n,t} = \alpha + \beta_1 \text{print}_n + \beta_2 \text{cable}_n + \beta_3 \text{broadcast}_n + \beta_4 \text{conserv}_n + \text{trend}_t + \text{qt}_t + \delta_t + \epsilon_{n,t}
\]  

(3)

The coefficients of interest are shown below for each model in Table 2.2. Coefficients \(\beta_1\) through \(\beta_3\) provide us the effect of each medium on the percentage of our cues or frames in coverage compared to the AP newswire after controlling for outlet ideology. We expect \(\beta_2\) to be negative across the board. \(\beta_4\) gives us the effect of conservative outlet slant after controlling for medium on the percentage of our cues and frames in coverage. We expect this coefficient to be negative for organized climate skeptics and economic cost frames.

We begin by describing the time varying results from left to right in the table. First, as illustrated in Figure 2.3, there is significant positive trending for cues from party elites – specifically Democrats. For every quarter that passes, on average cues from parties and those from Democrats increase by 0.17 (\(p<0.001\)) and 0.15 points of coverage (\(p<0.001\)), such that every five years the share of coverage with party elites and Democrats is expected to rise 3.4 and 3 points, respectively. Republican cues, however, show no evidence of an upward trend. Liberal and conservative group cues are also trending upward over time, but at a more modest rate. For every quarter the share of coverage with conservative or liberal cues is expected to rise 0.06 (\(p<0.001\)) and 0.07 points (\(p<0.001\)), such that every five years the share of coverage with liberal and conservative cues is expected to increase 1.2 and 1.4 points, respectively. In contrast, there is no evidence of a trend for organized skeptics, while dedicated climate denial organizations and contrarian scientists have been declining in their share of coverage (\(p<0.001\)). For every quarter,
their share of coverage has declined by 0.07 points, such that over five years their share of coverage is expected to decrease by 1.4 points. There is no evidence of trending for economic cost frames. In sum, it is party cues, particularly from Democrats, that have been sharply increasing over time, possibly providing the fuel for polarization.

We might also be interested in how each of our polarizing cues or frames tracks with overall salience. It appears that party cues, particularly from Democrats, are most strongly associated with overall media salience. After controlling for the trend, a one article increase in salience is associated with a 0.18 point increase in the share of coverage with party elites \((p<0.001)\), a 0.14 point increase in the share of coverage with Democratic cues \((p~0.004)\), and a 0.1 point increase in the share of coverage with Republicans \((p~0.06)\). More substantively, this means that every standard deviation increase in salience (about 25 articles) is associated with a 4.5, 3.5, and 2.5 point increase in the share of coverage with cues from all parties, Democrats, and Republicans, respectively. In contrast, both liberal and conservative ideological group cues are not associated with salience after controlling for a linear trend, while the share of coverage with organized skeptics is negatively associated with salience \((p~0.06)\). A one article increase in salience is associated with a decrease in the share of coverage with skeptics of 0.04 points, such that an increase in salience of one standard deviation is expected to reduce their coverage share by 0.8 points. Coverage of denialists, however, is not associated with salience. Finally, economic cost frames are unsurprisingly associated with salience. A one article increase in salience is associated with a 0.09 point increase in the share of coverage with economic cost frames, such that a one standard deviation increase in salience is associated with a 2.25 point increase. If we expect drivers of polarization to be increasing in the media over time and associated with periods of high issue visibility, cues from parties, particularly Democrats, are the most likely culprits.
For our cross-sectional comparisons, as expected, cable news is much more likely to cover party elites compared to other media (Newswire, 9.27, p~0.02; Print, 15.82, p<0.001; Broadcast, 23.24, p<0.001). And this applies to both Democratic (Newswire, 18.61, p<0.001; Print, 26.04, p<0.001; Broadcast, 31.23, p<0.001) and Republican cues (Newswire, 10.04, p<0.001; Print, 12.05, p<0.001; Broadcast, 18.97, p<0.001), though the tendency for the former is stronger than the latter. These differences are substantively large. Anchoring the other extreme is broadcast news, which features party elites the least (Newswire, -13.96, p<0.001; Print, -7.42, p<0.001; Cable, -23.24, p<0.001), which is consistent for Democratic (Newswire, -13.96, p<0.001; Print, -5.19, p<0.004; Cable, -31.23, p<0.001) and Republican cues (Newswire, -8.93, p<0.001; Print, -6.92, p<0.001; Cable, -18.97, p<0.001). These differences are also substantively meaningful. Print, for its part, lies somewhere between the AP newswire (-6.55, p<0.001) and broadcast (7.42, p<0.001) in its politicization, which is again consistent for Democrats (Newswire, -7.43, p<0.001; Broadcast, -5.19, p~0.004) and Republicans (Newswire, -2.01, p~0.07; Broadcast, 6.92, p<0.001), but these differences are more modest. The big takeaway is that cable, by far, offers the most politicized coverage of climate change, and broadcast news the least. The partisan and ideological slant of the outlet does not appear to matter once medium is taken into account.

Ideological cuing, unsurprisingly, shows many of the same patterns as the coverage of party elites. Cable carries both liberal (Newswire, 7.68, p<0.001; Print, 6.37, p<0.001; Broadcast, 8.18, p<0.001) and conservative cues (Newswire, 5.77, p<0.001; Print, 3.01, p<0.04; Broadcast, 5.75, p~0.005) more often than other media. Again, broadcast is the least polarizing, featuring fewer liberal (Print, -1.82, p~0.004; Cable, -8.18, p<0.001) and conservative (Print, -2.74, p~0.06; Cable, 5.75, p~0.005) ideological group cues. But, it is joined this time by the AP
newswire as there is no meaningful difference between them for either liberal (-0.51, p~0.43) or conservative cues (0.02, p~0.98). Print falls in between cable (Liberal Cues, -6.37, p<0.001; Conservative Cues, -3.01, p~0.04) and the others (Newswire (Lib/Con): 1.30/2.76, p~0.004/p<0.001; Broadcast (Lib/Con): 1.81/2.74, p~0.004/p~0.06), but is closer to the latter. These differences, however, are modest. There also appears to be some very slight differences across outlet ideology, with conservative outlets more likely to bring in liberal cues (1.31, p~0.02), and less likely to make references to conservatives (1.09, p~0.09) – a sign such cues are perhaps often used derogatorily in coverage. All told, however, cable stands out as having the most ideological coverage. It is important to contextualize this information, however. The newswire baseline is an average of 4.2 points and 7 points for liberal and conservative cues respectively. Ideological group cues are simply not all that common in content across media.
<table>
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<th>GOP</th>
<th>Lib.</th>
<th>Con.</th>
<th>All Skeptics</th>
<th>Denialist</th>
<th>Cost Frame</th>
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<td>0.15**</td>
<td>0.00</td>
<td>0.06***</td>
<td>0.07***</td>
<td>-0.02</td>
<td>-0.07***</td>
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<tr>
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<td>0.10*</td>
<td>0.01</td>
<td>0.00</td>
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<td>0.09*</td>
</tr>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>104</td>
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<th>Con.</th>
<th>All Skeptics</th>
<th>Denialist</th>
<th>Cost Frame</th>
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<tbody>
<tr>
<td>Medium – Baseline (Wire)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Print</td>
<td>-6.55***</td>
<td>-7.43***</td>
<td>-2.01†</td>
<td>1.30**</td>
<td>2.76***</td>
<td>0.12</td>
<td>1.62*</td>
<td>-15.24***</td>
</tr>
<tr>
<td>Cable</td>
<td>9.27*</td>
<td>18.61***</td>
<td>10.04***</td>
<td>7.68***</td>
<td>5.77***</td>
<td>1.59</td>
<td>3.91***</td>
<td>-15.78***</td>
</tr>
<tr>
<td>Broadcast</td>
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<td>-12.62***</td>
<td>-8.93***</td>
<td>-0.51</td>
<td>0.02</td>
<td>-5.47**</td>
<td>2.60*</td>
<td>-27.97***</td>
</tr>
</tbody>
</table>

| Ideology – Baseline (All) |       |      |     |      |      |              |           |            |
| Conservative      | 0.98  | 1.50 | 0.15| 1.31*| -1.09†| 5.18***      | 2.36***   | 3.08**     |
| Quarter FE        | Yes   | Yes  | Yes | Yes  | Yes  | Yes          | Yes       | Yes        |
| Yearly FE         | Yes   | Yes  | Yes | Yes  | Yes  | Yes          | Yes       | Yes        |
| Trend             | Yes   | Yes  | Yes | Yes  | Yes  | Yes          | Yes       | Yes        |
| Panels            | 17    | 17   | 17  | 17   | 17   | 17           | 17        | 17         |
| T (Min)           | 44    | 44   | 44  | 44   | 44   | 44           | 44        | 44         |
| T (Max)           | 104   | 104  | 104 | 104  | 104  | 104          | 104       | 104        |

Table 2.2 Polarizing cues and frames in climate coverage, Prais-Winsten regression with PCSEs.
† p<0.1, * p<0.05, ** p<0.01, *** p<0.001
Our expectations for organized skeptics are only partially met. First, conservative media are more likely to use these sources (5.18, p<0.001) and this is equally true for dedicated climate denialists (2.36, p<0.001), but these differences are small, and must be considered with the baseline in mind – 11.8 points and 3.9 points, respectively. Surprisingly, cable’s coverage of organized skeptics is indistinguishable from the newswire (1.59, p~0.52) and print (1.47, p~0.47). Broadcast stands alone for its notable avoidance of organized skeptics compared to other media (Newswire, -5.47, p~0.008; Print, -5.59, p<0.001, Cable, -7.06, p~0.002). The story changes somewhat when focusing on dedicated climate denial organizations and contrarian scientists. For this group, cable is more likely to give them coverage (Newswire, 3.91, p<0.001; Print, 2.29, p~0.05; Broadcast, 1.31, p~0.37), but these differences are small. The AP newswire is also less likely to cover denialists (Print, -1.62, p~0.02; Cable, -3.91, p<0.001; Broadcast, -2.60, p~0.03), but these differences are slight. All told, while there is evidence that conservative media are modestly more likely to cover skeptics, there is minimal evidence to suggest cable news fares worse on this dimension after controlling for ideology. There is also little indication that this is due to the fit between the television medium and the presentation of balanced coverage. Differences across media in their coverage of skeptics are very modest and they don’t take away from the general finding that their influence in the media is very limited. The “false balance” dreaded by critics of the media seems to be a very rare phenomenon.

Finally, our findings for economic cost frames line up with our expectations. Conservative media are more likely to use such frames in content, but this difference is modest (3.08, p~0.004). More substantive are differences across format, which we had few prior expectations. The AP newswire is much more likely to use economic cost frames in content (Print, 15.24, p<0.001; Cable, 15.77, p<0.001; Broadcast, 27.97, p<0.001), while broadcast news
is less likely to do so (Newswire, -27.97, p<0.001; Print, -12.73, p<0.001, Cable, -12.19, p<0.001). Print and cable are virtually indistinguishable from each other on this dimension (0.54, p~0.75).

All told, some of our expectations were met. Cable is by far the most politicized medium across both partisan and ideological dimensions, though they were perhaps less associated with coverage of climate skeptics than we might expect, after controlling for news outlet ideology. Additionally, the limited coverage of organized skeptics by broadcast news suggests any link between the television medium and “false balance” is overstated at best. Conservative media are also more likely to cite skeptics, but the differences are substantively modest. Of all news sources, broadcast news performed the best in limiting exposure of viewers to polarizing sources and frames. They were less likely to carry party and ideology cues, and messages from organized skeptics. They were also least likely to focus on economic cost in climate mitigation. But, on balance, the media are more similar in their coverage of climate change on these dimensions than they are different.

4.2 Messages by polarizing actors

The above analysis gives us a very good idea of which sources of cues appear in which news media and the dynamics of that coverage, but it does not address in detail what kind of signal these actors send in relation to climate change. In this section, we report the results of a content analysis of the types of messages that each of these actors were sending on climate change.

At some level, our surface descriptive data doesn’t do justice to the large discrepancy in the prominence of party elites compared to the organized climate skeptics many scholars and
commentators have spent a great deal of energy criticizing. This dictionary is comprised of four different sets of actors: dissenting scientists, organizations dedicated to casting doubt on climate change, conservative think tanks and advocacy groups, and industry organizations. We cannot simply assume that the latter two groups propagate climate denialism when they get media attention. We hand coded a random sample of 500 articles each with references to these industry groups and think tanks, and found that only 18 percent and 37 percent of articles with references to these groups, respectively, represent messages that cast doubt on the science of climate change. The remainder are largely focused on messages dealing with the consequences of mitigation policy for economic competitiveness and energy prices.

We also cannot assume that parties are sending clear and consistent signals on climate change to their supporters. It certainly seems plausible that these cues from party elites are driving increased climate skepticism. One big question that is difficult to address with a dictionary approach is the direction of party cues. We cannot assume that all Republican cues are stances opposed to the scientific consensus or Democratic cues are in support, even though recent comments from members of both parties would support such a claim. Muddled signals from party elites, on the other hand, are unlikely to contribute to public opinion polarization. For the television broadcasts, we manually coded all of the transcripts containing references to party elites. For the newspapers, however, we took a random sample of 350 articles that were coded as having Republican references, and another 350 articles that were coded as having Democratic references for manual coding. This sample was stratified by presidential administration. This served two purposes. This allowed us to code for the direction of the cue, and the message of anti-climate cues from the parties to check for whether they were giving consistent signals on climate change to their supporters over time.
Articles were first coded for whether a cue was present in the article. We define cue as a stance by a party or particular party official on climate science or policy action on climate change. All told, approximately 70 percent of our identified cues via automated coding held up, although this varies over time. Accuracy improves in later administrations. Of our identified cues, we coded them as either pro-climate consensus, anti-climate consensus, or ambiguous. They were coded pro-climate if the politician or party was linked to a stance in support of the scientific consensus on climate change and/or implicitly adopted that consensus by supporting policy action on climate change. Cues were coded anti-climate if they either rejected the climate science consensus by denying or expressing uncertainty in the science, and/or they rejected policy action on climate change. Pro-climate messages could not have any traits of anti-climate
messages and vice versa. Ambiguous messages contained elements of both.\textsuperscript{30} We made additional note of anti-climate messages that focused on the supposed uncertainties of climate science or allegations that climate change is a hoax.

Figure 2.4 shows the proportions of the coded articles with cues that were either pro- or anti-climate for Democrats and Republicans in broadcast television (top row), newspapers (middle row), and cable news coverage (bottom row). Two things become immediately apparent. First, the Democrats took a consistently pro-climate stance in the news over the entire timeframe. Between 90 and 100 percent of cues were coded as pro-climate consensus. The remaining 10 percent were mainly references to the reluctance of coal-state Democrats to support climate initiatives on economic grounds. Secondly, Republican cues, contrary to likely expectations of most, have been extremely ambiguous over time, with a non-trivial proportion of both pro-climate and ambiguous messages, in addition to strong anti-climate positions. The right panels also demonstrate that of the GOP cues, the majority are not ones that express uncertainty in climate science. Republican climate denial has increased in the press relatively recently, during the Obama administration. This shift in Republican messaging might be partly explained by the lobbying efforts of the fossil fuel industry and their efforts to target relevant Republican politicians. We are unable, however, to determine the validity of that argument here and future work will be needed to examine the influence of the industry on the GOP.

\textsuperscript{30} We had an undergraduate research assistant code a random sample of 100 articles with Democratic references and 200 articles with Republican references to validate our coding. There was a 90 percent agreement on the presence of Democratic cues, and a Krippendorff’s Alpha score of 1 for agreement on the direction of Democratic messages. We had 93 percent agreement on the presence of Republican cues, and a Krippendorff’s Alpha of 0.83 for the direction of Republican messages. Coding instructions can be found in Appendix G.
Is party elite debate driving climate skepticism?

Our analysis so far clearly demonstrates that the news media have increasingly carried cues from party elites about climate change to voters. There was increasing politicization before 2001, and a massive increase in salience since then. Voters are exposed to more party cues on the topic than ever before. These cues are uniformly consistent for Democrats and more ambiguous for Republicans, though anti-climate messages have become dominant for the party in recent years. Do these party elite cues have a role in persuading largely Republican portions of the public to turn against climate science and policy action? Republican voters could learn the appropriate position to take on climate change from the elites they trust. This explanation seems wanting on its own given remarkable ambiguity in Republican messages on climate change. It is also possible Democratic leaders are persuading Republican voters to take positions opposite to themselves. Both Berinsky (2009) and Nicholson (2012) have noted the importance of out-group cues in persuasion. A similar dynamic may well be occurring with climate change.

However, to examine the forces driving skepticism, we first need a measure of it. Despite a seeming abundance of public opinion polling on a major issue like climate change, we lack reliable time series opinion measures that extend through most of the time frame of concern. For this reason, many studies that want to look at long-term opinion dynamics and how they feed into public policy focus on macro policy indicators like policy mood, a measure first developed by Stimson (1999).

In his work, Stimson was interested in combining results from disparate survey questions to capture the general left-right mood of the American public over the entire postwar era. To do so, he developed a method of standardizing results from different survey questions, and then extracting the general underlying trend in those standardized responses over time. We use a
similar approach here, by combining 172 different poll questions from the Roper Center archive at Cornell University, which is a repository of a wide selection of polls addressing climate change attitudes since the early 1990s. This approach has been used by other researchers studying climate change opinion data (Brulle et al. 2012; Carmichael et al. 2017; Carmichael & Brulle 2017).

![Climate change skepticism](image)

**Figure 2.5 Climate change skepticism.** A) Annual, 1991-2014, B) Quarterly, 2001-2014.

The questions varied from asking whether climate change is happening or not, how serious of a problem is climate change, how worried the respondent is about global warming, and
whether climate change is caused by humans. We excluded policy related questions.\textsuperscript{31} After ensuring all of the questions were coded in the same direction, we used them to extract a latent measure of public skepticism on climate change. It is important to remember that the extracted measure does not have levels that are easily interpretable. That is not a concern for us, however, as we are interested in the variation of public opinion on climate change over time and not interpreting the levels of skepticism at specific points in time. Based on the availability of polling we were able to construct an annual measure beginning in 1991 and a quarterly measure starting in 2001. Our mood measures are presented in Figure 2.5.

We use our climate skepticism mood measure (mood) as our dependent variable of interest. We expect skepticism to be a function of the salience of the issue, operationalized by the total climate change article count in a period (salience), and the proportion of Democratic (\%dem) and Republican (\%gop) cues in the media. We also account for other possible explanations of climate skepticism, such as ideological cuing (\%ideology), and economic cost frames (\%cost). These measures are based on the coverage of the \textit{New York Times}, as the source most likely to serve as an agenda setter for the broader media environment. Finally, we include a measure of cues from organized climate skeptics (\%skeptic). Our measure of climate skeptics is constructed as an average of cues in \textit{Fox News} and the \textit{Wall Street Journal} to account for the fact these sources typically come from conservative media and are covered in a comparatively more charitable fashion.\textsuperscript{32}

\textsuperscript{31} The data presented in the paper is based on the broadest set of questions that we found, coupled with the questions shared by Carmichael, Brulle and Huxster. This measure excludes outliers, though they do not substantively change the results. More information on the mood measure can be found in Appendix E.

\textsuperscript{32} Our denial measure is comprised of cues from corporations (like Exxon), think tanks (like Cato Institute), dedicated climate denial organizations (like Science & Environmental Policy Project) and contrarian scientists tied to climate denial (like Fred Singer).
Other factors may simultaneously influence party and denial cues in the press and aggregate climate skepticism in the public. Following Carmichael and Brulle (2017) we account for four sets of these factors: congressional activity, climate changes, economic changes, and events. First, as noted above, Republican messages are mixed. So a raw count of Republican messages may not adequately measure over time variance in Republican opposition to climate change. If the dynamics in their opposition are correlated with Democratic messages on climate change it may serve as a confounder. So, we include a measure that captures Republican positions on climate change, operationalized by roll call scores from the League of Conservation Voters (GOP LCV, scaled 0 to 100). We also include a measure of general congressional activity on climate change, operationalized by the number of House and Senate congressional hearings on climate change per period (hearings).33

Second, we constructed a standardized index of two factors from the NOAA climate extremes index that have been found by Carmichael and Brulle (2017) to drive media coverage of climate change: percentage of days below the average temperature in the continental United States, and percentage of days with drought conditions. Abnormal weather can be seen as focusing events that bring attention to an issue (Weber & Stern 2011), which can influence the number of party cues in the media environment and directly affect climate change attitudes.

Third, skepticism of climate change and general antipathy towards environmental policy tends to increase as the economy sours or energy prices increase (Scruggs & Benegal 2012). Party elites, for their part, will choose to push or dial back environmental messaging as a result. We will construct a standardized economic index comprised of crude oil prices, changes in

33 We are very grateful to Jo Huxster, Robert Brulle, and Jason Carmichael for generously sharing their data with us and answering all of our questions so patiently.
unemployment, and economic growth taken from the FRED database of the St. Louis Federal Reserve. Finally, we may expect high profile events to affect skepticism and elite cues, such as major international climate change conferences, the release of IPCC reports, and potentially the release of the blockbuster documentary *An Inconvenient Truth*. Party elites are often quoted and cited in response to these events, but they may also have their own effects on climate change attitudes. Our independent variables are all trend stationary.

Our main model is a standard lagged dependent variable model (LDV) run annually from 1991 to 2014 and quarterly from 2001 to 2014. We have theoretical reason to expect memory in our dependent variable – climate skepticism at t-1 is likely to partially cause its value at t because there tends to be stickiness in public opinion. Not including a lagged dependent variable in these circumstances will lead to biased coefficients. The inclusion of the lagged dependent variable does change the interpretation of the coefficients, which represent the effect of a one unit change in the independent variable on the dependent variable at time t. We can also calculate the cumulative effect of a given independent variable across the current period and all possible lags of climate mood with simple arithmetic ($\beta X/(1 - \text{mood}_{t-1})$). More formally, the model is represented as follows in equation 4:

$$
\text{mood}_t = \alpha + \delta \text{mood}_{t-1} + \beta_1 \text{dem}_t + \beta_2 \text{gop}_t + \beta_3 \text{ideology}_t + \beta_4 \text{cost}_t + \beta_5 \text{skeptic}_t + \beta_6 \text{congress}_t + \beta_7 \text{climate}_t + \beta_8 \text{econ}_t + \beta_9 \text{events}_t + \epsilon_t
$$

(4)

Our four potential polarizing influences are represented by $\beta_1$ through $\beta_5$. If they are linked to climate skepticism, they should have significant positive coefficients. Stata’s *nlcom* feature can be used to calculate the cumulative long-run effects of each independent variable and
their standard errors. We do not include a trend variable because we do not think it is theoretically defensible. Ultimately, we are interested in accounting for any trends in aggregate climate skepticism.

We are stretching the data pretty thin annually with 24 data points (since the Wall Street Journal enters the sample in 1991), so we introduce each set of variables independently and only include our significant and borderline insignificant variables (p<0.15) in the final model. We do include quarter dummies in all quarterly models to control for seasonality.

The annual results are presented in Table 2.3. First, there does appear to be a relationship between salience and climate skepticism (Model 1). An increase of one hundred articles per year – approximately a standard deviation in the measure – is expected to increase skepticism by 0.5 points or 0.17 standard deviations (p~0.05). Across all lags this effect grows to a total of 0.81 standard deviations (p~0.05). Second, Democratic cues are having the expected effect, but not Republican ones (Model 2). A 10 percent increase in the proportion of coverage featuring Democrats is expected to increase skepticism by 0.5 points or 0.17 standard deviations (p~0.01). This effect grows to a total of 0.81 standard deviations across all lags (p~0.05). None of other media variables come close to statistical significance (Models 3-5).

Third, it appears that Republican elites have their own influence on climate skepticism through their behavior in Congress (Model 6). A decrease of a point in their average League of Conservation Voters score increases climate skepticism by 0.22 points or 0.08 standard deviations (p~0.02). Across all lags this effect grows to a total of 0.21 standard deviations (p<0.001). Finally, an increase in 10 congressional hearings is expected to increase climate skepticism by 0.29 points or 0.12 standard deviations (p~0.03). This effect grows to 0.34 standard deviations cumulatively across all lags (p~0.03). Our additional controls for climate, the
economy, and events were non-significant (Model 7). Our final model shows that our results for Democratic cues and Republican roll call voting are robust and remain strongly significant. However, overall salience and congressional hearings no longer seem to be important once we add controls for our other factors.

We also constructed a mood measure using quarterly data. There are not enough polls available early in our period of study, so these analyses are limited to the years 2001-2014. The result, however, is still a doubling of our sample size. The results are also reasonably similar to our annual models. First, there appears to be no association between quarterly salience and our measure of climate skepticism. Second, Democratic cues appear to be strongly related to climate skepticism (Model 2). An increase in the proportion of coverage with Democratic elites by 10 points is expected to increase skepticism by 0.23 points or 0.10 standard deviations (p~0.04). Across all lags this effect grows to 0.36 standard deviations (p~0.03). None of our other media variables are statistically significant (Models 3-5) in addition to most of our variables related to congressional behavior (Model 6), climate, and events (Model 7). Our economy index is close to significance (p~0.11), so is retained for the final model. The association between Democratic cues and skepticism remains robust once controlling for the economy (Model 8), but the economy index itself falls away from statistical significance (p~0.52).
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Table 2.3 Determinants of aggregate climate skepticism, annual. Standard errors in parentheses
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<td>2.63</td>
<td>2.56*</td>
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<td>R²</td>
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Table 2.4 Determinants of aggregate climate skepticism, quarterly. Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01
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<th>Cost Frame</th>
<th>Skeptics</th>
<th>Congress</th>
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| \( R^2 \)               | 0.21     | 0.29    | 0.22     | 0.30       | 0.21     | 0.36     | 0.26                   | 0.45

Table 2.5  Perceptions of climate severity among GOP identifiers, quarterly. Standard errors in parentheses

* p<0.1, ** p<0.05, *** p<0.01
The mood measures used thus far measure aggregate levels of climate skepticism in the public in general, but they don’t tell us what is happening with Republicans specifically. The number of polls containing partisan breakdowns is smaller than the overall sample of polls, but Carmichael and Brulle (2017) were able to construct a quarterly measure for Republicans starting in 2001. Their climate severity index uses a slightly different set of climate change questions than our mood measure – it focused exclusively on those questions touching in perceptions of climate change severity, but it still can be useful in understanding the drivers of Republican attitudes. For this measure higher values on the dependent variable mean stronger perceptions that climate change is a serious issue. The results are shown in Table 2.5.

First, there appears to be no relationship between overall salience and GOP attitudes towards climate severity (Model 1). Second, again there appears to be an association between Democratic cues and attitudes. A 10 point increase in the percentage of Democratic elites in coverage is expected to reduce Republican perceptions of climate severity by 0.8 points or 0.22 standard deviations (p~0.06). This increases to an effect of 0.33 standard deviations across all lags (p~0.07). Again, none of the other media variables are significant (Models 3-5), but GOP behavior in Congress also appears to matter (Model 6). A one point decrease in the GOP’s average League of Conservation Voters score reduces perceptions of climate severity by 0.5 points or 0.14 standard deviations (p<0.01). This effect increases to 0.15 standard deviations cumulatively across all lags (p<0.01). Finally, none of the predictors relating to climate, the economy, or events are related to Republican climate severity perceptions. After all significant predictors are included in the final model, Democratic cues and Republican roll call voting on the environment both have strong and significant influences on Republican perceptions of climate severity. Our economic cost frame variable falls out of significance.
In sum, using two different approaches to measuring climate skepticism and two different levels of aggregation, the most consistent factor that appears to drive climate skepticism and Republican attitudes towards climate science is the prominence of Democratic cues in coverage. While Republican cues in the media were non-significant, this is likely due to the fact this measure doesn’t account for the nature of the message, which we have shown to be mixed. Republican roll call voting on the environment also appears to be linked to skepticism and Republican attitudes on climate change, and this measure tracks nicely with our estimates of Republican messages on climate change across different presidential administrations.

Democratic and Republican elites, together, appear to have played a role in polarizing Americans. Ideological cuing, organized skeptics, and even cost frames mattered little after controlling for party elites.

6 Discussion and conclusion

Climate change is one of the biggest challenges the global community faces moving forward. Tackling the problem is complicated by tremendous collective action problems. Solutions have lagged in no small part because of obstinate refusal, until recently, of the United States to be a part of the answer. Climate scientists, international politicians and political scientists alike have been perplexed that a reasonably large, and seemingly growing, portion of the American public rejects climate science, particularly among Republican voters.

There have been a lot of theories and conjectures about why this is the case. Some have pointed to the influence of Big Oil and their financing and peddling of misinformation about the science of climate change, others to the role of ideology or media framing, and more recently to influence of party elites. All of these factors could very well influence climate attitudes in the
isolation of a survey experiment, but this does not mean they are meaningful drivers of the dynamics of American polarization on climate change. To examine this question we believe scholars need to examine the information environment itself over time, which has been neglected thus far in research. Somewhat relatedly, there has been a common thread through most explanations of climate change polarization that it is a special case. As a result, research that does exist is somewhat disconnected from what we know about opinion formation and persuasion on other political issues.

This paper addresses both of these problems by situating climate change polarization in the larger literature on citizen cue-taking, media indexing, and opinion formation and persuasion, while examining an original dataset of nearly 30,000 news stories from a large and diverse sample of media outlets. This allows us to draw several important conclusions about the nature and dynamics of climate change coverage and its implications for public attitudes on the topic.

First, we identified four primary factors that, if communicated through the media, are likely to play a role in shaping public opinion on climate change: partisan cues, ideological cues, economic cost frames, and organized climate skeptics. We found party cues to dominate. In total, over half of the news stories in our sample featured a political cue. Unlike our other sources of polarization, party cues are both increasing in their share of coverage over time and linked to periods of high salience, particularly those from Democratic elites. Party cues have been increasingly available to form American attitudes on climate change. The results of our manual coding of party messages also provide suggestive evidence of a Democratic role in climate polarization. Their cues, in addition to being more voluminous, are far more consistent. Republican cues have been mixed on climate change until recently. In contrast, ideological cues and messages from organized climate skeptics are rare. The former has only become more
frequent in recent years, while the latter’s share of coverage has generally been in decline since
Kyoto.

Second, using two different approaches to measuring aggregate climate skepticism, at both annual and quarterly levels of analysis, we find that the most consistent factor driving climate skepticism and Republican attitudes towards climate change is the prominence of Democratic cues in coverage. That is not to say that Republican cues did not matter. Our measure of Republican cues in the press reflects a mixture of messages from Republican elites. A more fine-grained measure of the dynamics of cues clearly against the climate consensus may have produced a different result. A possible role of Republican elites is hinted at by the fact we find some evidence that their activity in Congress affects skepticism. In short, we show that the story behind climate change polarization is likely no different from any other salient political issue of the day: members of the public were exposed to a large volume of partisan messages on climate change, primarily from Democrats, as the issue grew in salience and formed their opinions accordingly. We need not focus on unique attributes of climate change as an issue to understand why polarization occurred.

The growth of climate change skepticism in the Republican Party is a concern. It has prevented the development of a consensus necessary for the United States and its large number of veto-points, to take aggressive action on climate change. We must, however, resist the temptation to conclude that the presence of a scientific consensus makes this topic fundamentally different than other political issues. Party elites have the ability to persuade like-minded voters on particular issues to serve their interests, and the ability to repel partisans that oppose them. An ambivalent public that only peripherally pays attention to many issues often take their cues from their parties on how to form opinions. Politically sophisticated voters, for their part, tend to form
highly charged positive and negative affective attachments to parties and their leaders, and this likewise guides their opinion formation process. They are also more likely to be exposed to elite debate in the media environment. It is really not a puzzle why the most educated are the most polarized on climate change. This is the case with most political issues. Party elites have persuaded the public on climate change through their cues in the media.

There are three major implications of our finding. First, party elites who strongly identify with the scientific consensus on climate change or other issues must weigh the costs and benefits of aggressively communicating their stance in the press. Although the politicization of coverage on climate change was inevitable at some level because of the need for large-scale policy action, Democratic elites should perhaps resist the urge to turn climate change into a political bludgeon. On other issues, like GMOs and vaccines, little policy action needs to be taken and likely should be avoided. Efforts by pro-GMO groups to block state labelling efforts, or by the medical community to curb conscience-based vaccine exemptions with legislation may lead to unanticipated consequences. The recent trend of Republican elites backing parental exemptions for childhood vaccines, and questioning the safety and efficacy of vaccines is deeply troubling.

Second, emphases on ideology and motivated cognition, while important to understanding why persuading Republicans and conservatives about the perils of climate change is a tough task at present, is perhaps of more limited utility in helping us explain how we got to this point in the first place. Democratic and Republican identifiers were not always so divided on climate change. They listened to, and formed opinions based on, signals from trusted elites. By viewing the roots of climate change skepticism primarily in deep-seated ideological and value constructs, we minimizes the degree to which elites can shape those constructs. It also means that these elites can turn the tide by taking climate change out of the realm of hyper-partisan conflict.
Lastly, literature and public scholarship on the role of nefarious conservative and industry organizations in polarizing the American public are, at best, missing the mark, and at worst, making the problem worse. There is very little evidence that these organizations have played the outsized role that has been claimed in sowing the seeds of doubt in the public, nor does it seem that mainstream conservative media have been unapologetic purveyors of these actors’ messages. More importantly, this line of attack against conservative movement groups heightens the partisan and ideological divides in current climate change politics. We need to find ways to depoliticize and depolarize climate change, not pour gasoline on the fire. Only then can we find ways to mobilize societal consensus for meaningful action on climate change.
Paper III

Media diets and climate change attitudes: Does Fox News turn Americans into climate skeptics?

1 Introduction

Fox News is the “the main source of global warming misinformation” according to the popular “Climate Consensus” blog on the Guardian newspaper. That view is widely shared among journalists, commentators, and even scientists studying climate change communication. This conventional wisdom suggests that it is Fox News, as a prominent news source for many conservatives, that bears the brunt of responsibility for polarizing the public opinion on climate change and turning conservatives into climate skeptics.

Popular accounts of this dynamic highlight two points: the prominence of Fox News as a source of information for conservatives, and the misleading nature of its coverage of climate change. A recent study by the Pew Research Center found that while liberals tend to consume a variety of mainstream sources, conservatives tend to be clustered around Fox News. And, Fox’s coverage of climate change apparently leaves a lot to be desired. According to one analysis by the Union of Concerned Scientists, 72 percent of Fox News’s 2013 climate related segments included inaccurate or misleading representations of climate science, compared to 30 percent on CNN and only 8 percent on MSNBC. If that figure is at all representative of Fox’s coverage of

34 https://www.theguardian.com/environment/climate-consensus-97-per-cent/2014/jul/14/rupert-murdoch-doesnt-understand-climate-basics
35 http://www.journalism.org/2014/10/21/political-polarization-media-habits/
this topic, it is not surprising that consumers of Fox News content would turn against the findings of climate scientists. There are, however, problems with this narrative.

First, the focus on Fox News as a primary news source for Republicans neglects the fact that most people rely on mainstream news media sources for their information, not cable news. Although Fox News is, in fact, the most successful cable news channel, most people don’t frequently watch cable news. The small exception is the most politically involved partisans, those who are more likely to cocoon themselves with ideologically congruent news media sources.

Secondly, even people who watch Fox News also frequently turn to other news sources, where the coverage of climate change might be entirely different from Fox and reflective of the climate science consensus. What is the effect of Fox in an information environment in which the misleading content from cable news are confronted with more scientifically accurate ones from other outlets?

This paper examines a relationship between news media consumption and climate change attitudes. Although this has been a topic previously explored in the literature, I build here on the idea that most people consume news from a diverse pool of media outlets. Effects of exposure to particular outlets, like Fox News, should be examined in the context in which they are actually consumed by the public. Accordingly, I provide an overview of several popular news media diets: news outlets that tend to be consumed together. I then examine the relationship between news media diet and climate change skepticism using two approaches. First, a standard regression analysis, and then, in an effort to alleviate selection issues associated with the cross-sectional nature of my data, matching analysis.


2 Cable news and climate change attitudes

It is understandable that scholars would seek to understand the role of the news media on climate change attitudes in light of findings in political communication literature that the media do help shape public opinion, especially on complex issues. Climate change certainly fits that characterization, considering that the public is lacking in-depth scientific knowledge necessary to make sense of the problem (Nisbet & Myers 2007).

Research in the field so far has found that the media play a large role in educating the public about climate change (Kahlor & Rosenthal 2009; O’Neill & Nicholson-Cole 2009) and that paying attention to the news is related to the public’s knowledge about climate change (Jang 2014; Ho et al. 2008; Lee & Scheufele 2006; Zhao et al. 2011). Unsurprisingly, the content of the news reporting matters as well. For example, news coverage of climate change that was dismissive in nature had negative effects on belief in global warming (Feldman et al. 2012).

Focusing specifically on cable news and Fox News has been the subject of a growing body of work (Feldman et al. 2012; Mayer 2012; Carmichael et al. 2017). In a meta-analysis of existing research, Feldman (2016) notes that,

“[…] the three leading cable news outlets — CNN, Fox News, and MSNBC — do indeed cover climate change in distinctive ways, and these differences are reflected in their audience’s beliefs about climate change. Through a reinforcing dynamic of selective exposure and partisan media effects, cable news shapes and polarizes public opinion about climate change.[…] Overall, Fox News paints a very different picture of climate change than CNN and MSNBC. This creates the opportunity for exposure to distinctive messages that are a prerequisite for observing persuasive media effects.”

There are issues, however, with some of the work that produced these findings. Hmielowski et al (2014), for example, find a mediating effect of trust in scientists in the relationship between news media use and perceptions of climate change. Their findings suggest that “conservative media use decreases trust in scientists which, in turn, decreases certainty that
global warming is happening. By contrast, use of non-conservative media increases trust in scientists, which, in turn, increases certainty that global warming is happening.” One problem, however, is that their models do not control for partisanship, and it is not difficult to imagine why trust in scientists might be in some way a function of one’s party loyalties, especially in the context of climate change attitudes. It is entirely possible that the trust in science question in their survey was affected if climate change attitudes were primed (Nisbet & Garrett, 2015). Partisanship, therefore, needs to be a crucial element in any analyses of any potential media effects.

Another issue with this body of work is the focus on selective exposure and the supposed echo chambers that news consumers create to protect themselves from ideologically cross-cutting information. These echo chambers are information environments in which individuals only select sources of information that are likely to confirm their opinions. The rise of echo chambers has been predicted by scholars like Sunstein (2009), who saw the rise of the internet, and personalized news consumption specifically, as a catalyst for the process. Experimental work suggests that echo chambers might be real, as participants are likely to choose news sources from news outlets that are ideologically aligned with them (Iyengar & Hahn 2009). Furthermore, the rise of Google, news aggregators, and social networks, driven by algorithms, might only exacerbate this process (Pariser 2011).

The logic of the echo chambers has also been explored in the context of climate change, where informational content from Fox News drives confirmation bias and avoidance of news from other news media sources. Feldman et al (2014) discuss a cyclical process that sustains like-minded media usage and thus polarizes attitudes. Feldman (2016) envisions the process in which “Fox News audiences see messages that challenge the reality of global warming and warn
that any contrary information from scientists or the mainstream media should be questioned or dismissed, this reinforces their current beliefs about global warming and encourages them to ignore disconfirming evidence from the scientific community, while driving them back to Fox News for more of the same.”

The weight of the evidence in political communication research so far, however, does not support the claim of the existence of a sizable echo chamber. Instead, those most engaged in selective exposure to like-minded media are the most politically engaged and partisan members of the public. Interesting new work that tracked people’s online news consumption, rather than relying on traditional self-reported survey measures, found that most people, across the political spectrum, have centrist media diets which are primarily composed of mainstream news portals like MSN News and Yahoo News (Guess 2016; Flaxman et al. 2016). There is also evidence that most people tend to avoid partisan media like cable news (Prior 2013; Arcenaux & Johnson 2013). Additionally, tracking data reveals that all political websites attract ideologically diverse visitors, regardless of their political slant (Nelson & Webster 2017). As a result, previous work suggesting that conservatives only cluster around Fox News, likely overlooks a considerable group of people who watch Fox while also consuming other, ideologically diverse news.

Furthermore, the sheer size of the cable news audience, and Fox’s audience in particular, has been overestimated. Fox News, as the cable news leader, attracts nearly 2 million viewers a night in prime time, according to the Pew Research Center. But cable news in general has been in decline for several years now (though that dynamic has been potentially reversed during the last presidential election), and the viewership of Fox News, MSNBC and CNN combined has

37 http://www.pewresearch.org/fact-tank/2014/01/14/five-facts-about-fox-news/
dropped to around 3 million viewers in prime time and around 2 million viewers in the daytime, according to data from 2013. 38 In a country of over 243 million adults, that is a very small audience, regardless of the potential influence of that group. As a point of comparison, it is worth highlighting that a combined average nightly audience for ABC, CBS and NBC evening news is about 24 million Americans in prime time. 39

As a result, existing work is not entirely convincing in demonstrating that it has been cable news, and Fox News in particular, that has had such a polarizing effect on climate change attitudes in the U.S. public. In light of this research, I focus on two guiding questions in this paper: what kinds of news consumption patterns are common, and what is the relationship between news media diet and climate change attitudes. To gauge news consumption patterns, I develop measures of news media diets, based on original set of media usage questions developed for this purpose.

Based on previous work, I expect to find that most Fox News viewers do not cocoon themselves in conservative media coverage and will actually use other mainstream media sources as well. That expectation is based on several studies tracking Americans’ media habits as well as viewership numbers of cable news versus traditional network news broadcasts tracked by the Pew Research Center. I also expect that the relationship between news media diets and climate change attitudes will not be uniform, and those whose media diet includes Fox News in combination with ideologically cross-cutting sources will hold different climate change attitudes than those who consume Fox News in combination with other right-wing news outlets.

38 http://www.journalism.org/2016/06/15/cable-news-fact-sheet/
39 http://www.journalism.org/2016/06/15/network-news-fact-sheet/
3 Data and methods

The data analyzed in this paper comes from an online survey conducted in March and April of 2018. Respondents were drawn from an internet panel study conducted by YouGov and are broadly representative of the U.S. population on major demographic categories, such as gender, race and education, as presented in Table 3.1. A total of 1,253 respondents completed the survey.

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Table 3.1 Sample characteristics. ACS is the US Census Bureau’s 2012-2016 American Community Survey 5-Year Estimates.

The primary dependent variables in this paper attempt to measure climate skepticism. Three questions were asked on the survey gauging the respondents’ beliefs about climate change:

1. You may have heard about the idea that the world's temperature may have been going up slowly over the past 100 years. What is your personal opinion on this? Would you say global warming is (certainly happening; probably happening; probably not happening, certainly not happening).
2. Assuming it is happening, do you think a rise in the world's temperatures has been caused mostly by human activity or mostly by natural causes?
3. Assuming it is happening, how serious a problem is the warming of the earth's climate? (very serious; somewhat serious; not very serious; not at all serious).

The first measure is a dichotomous measure of climate skepticism. For the purpose of this study, I classify the respondent as a climate skeptic if they believe climate change is driven primarily by natural causes, is not a serious problem (not very serious or not at all serious), and is not
happening (either probably not or certainly not). In other words, a climate skeptic has to hold positions that are consistently opposed to the scientific consensus on climate change on all three questions. People might select answers that are not consistent with climate science on one or two questions for various reasons, including lack of certainty, or simple error. However, those respondents who pick a consistently skeptical answer on all three questions are presumably the ones who actually hold this position, and these attitudes are what I’m interested in explaining.

In total, 19 percent of the sample are classified as skeptics, 2 percent of Democrats and 39 percent of Republicans. It is worth noting that the majority of the respondents believe in climate change. 74 percent believe that climate change is happening (45 percent are certain of it), 73 percent think that climate change is a problem (43 percent believe it to be a very serious problem), and 61 percent believe climate change is occurring mainly due to human causes.

The second measure of climate change attitudes is a climate denial scale. It is an ordinal variable ranging from 0 to 4. Respondents are classified into each category based on their answers to the three climate change questions outlined above. Respondents are coded as 0 (strong believers) if they say that climate change is certainly happening, and is human caused, and is a very serious problem. Respondents are coded as 1 (believers) if they believe in climate change but exhibit less certainty than those in category 0, meaning they may choose probably happening instead of certainly happening on the question of whether they believe global warming is happening; and they can select the somewhat serious option instead of the very serious option on the question of how serious of a problem is global warming. They must, however, indicate that it is man-made. Similarly, respondents are coded as 4 (deniers) if they indicate that climate change is occurring for natural causes, and they are certain it is not happening, and they believe it is not at all a serious problem. Those less entrenched in their
climate denial position are coded as 3 (skeptics). They must indicate that climate change is occurring for natural causes, but they may indicate that it is probably not happening (instead of certainly not happening) and that it is not a very serious problem (instead of not at all serious). Respondents who are not in any of these four categories are coded as 2 (inconsistent), since they provide a combination of responses that send mixed signals with regards to their beliefs on climate change. Categories are mutually exclusive. A detailed breakdown of the coding is available in Appendix I.

The plurality of the sample, 35 percent, strongly believe in climate change, coded as 0 on the ordinal variable, while 20 percent express a small amount of doubt, but are nonetheless believers. 26 percent are somewhere in the middle, presenting an incoherent mix of responses to the climate change questions. Only 8 percent are full denialists. Among partisans, 60 percent of Democrats are in category 0, while only 6 percent of Republicans are. A full 17 percent of Republicans are climate deniers.

To determine each respondent’s news media diet, I rely on two sets of measures, the second of which is used for the validity check, and is discussed in more detail below. Each respondent was asked: “On an average day, how likely are you to turn to the following news outlets?” The list of twelve outlets was randomized, and included: local television news, network news (ex. NBC Nightly News), national newspapers (ex. USA Today), regional and local newspapers (ex. Detroit Free Press), National Public Radio, conservative talk radio (ex. The Rush Limbaugh Show), liberal websites (ex. The Huffington Post), conservative websites (ex. Breitbart.com), social networks (ex. Facebook), CNN, MSNBC, and Fox News. The response

40 The exact question wording can be found in Appendix H.
options included very likely, somewhat likely, not very likely, and never. My assumption is that if a respondent indicated either very likely or somewhat likely, then they have affirmed that they frequently use that news source. Indicating never and not very likely was the equivalent of not frequently using a given outlet.

This approach allows me to go beyond a traditional battery of news questions and get a sense of a typical individual’s news information environments. Traditional ways of asking about news consumption has many flaws (Althaus & Tewksbury 2011; Tewksbury et al. 2011). On most surveys, media questions rarely feature more than a handful of popular outlets, like the New York Times or the cable news networks. This set of questions, on the other hand, asks about a detailed list of outlets, from partisan to nonpartisan ones, that constitutes sources that most Americans turn to for news. Furthermore, by allowing respondents to indicate that they never choose a particular outlet, I am able to examine not only what news they consume, but which sources they actively avoid, which is a major improvement to most survey questions which do not specifically ask about news source avoidance.

Additionally, traditional self-reported media usage surveys tend to produce inflated estimates. As Prior (2009) points out, people tend to greatly overestimate their media exposure in surveys, sometimes even by a factor of three. Unlike traditional questions that ask the respondent to estimate a specific amount of time that they have devoted to consuming news from a specific television source, I simply ask about how likely they are to consume a given outlet on an average day. As a result, my measure seeks to avoid any exaggeration of time in news consumption and instead focuses on whether a given outlet is consumed by the respondent on an average day, which is less taxing on the memory of the respondent and aims to reduce biases in self-reported news consumption.
Using the media questions outlined above, I construct several measures of media diets. These are meant to group the respondents by common news media consumption patterns. Details behind media diet are discussed in the next section.

4 Media diets

Primary motivating factors behind construction of each news media diet are previous research findings and the theoretical interest of this paper, which examines the effect of Fox News viewership on climate change attitudes. Media diets are mutually exclusive, meaning that each individual can only be classified into one media diet.

I start by developing a measure for the left and right-wing echo chambers, namely people who tend to cocoon themselves in ideologically congruent news media outlets. For the purposes of this study, the group I label *left wing echo chamber* consists of viewers of MSNBC and readers of liberal websites like Salon.com. These respondents also declare not reading conservative websites, not tuning into Fox News, and not listening to conservative talk radio like The Rush Limbaugh Show. They also avoid centrist mainstream news outlets, like national newspapers, CNN, and network news. Beyond these news sources, consumers of this media diet might still consume other outlets, like the local television news or news on social media.

The media diet I categorize as *right-wing echo chamber* follows the same logic. For a respondent to be classified into this media diet, they must be a viewer of Fox News, and they also could be a reader of conservative websites like Breitbart.com, as well as listeners of conservative talk radio. These respondents also have to declare not reading liberal websites and not tuning in to MSNBC, as well as centrist mainstream news outlets, like national newspapers, CNN, and network news.
To account for the people who watch Fox News, but do not insulate themselves exclusively in conservative content, I group them into a news media diet I label *Diverse with Fox*. These respondents declare watching Fox News together with any of the following outlets: CNN, MSNBC, network news, or national newspapers. In short, their media diet is diverse, including not only Fox, but also another mainstream news outlet.

I classify people into a news media diet labeled *Diverse/Centrist*, which is the equivalent of the above diet, but for people who explicitly avoid Fox News.

For those who avoid national news altogether, I classify them into a news media diet labeled *No national news*. These respondents must not obtain news from any of the cable news outlets, network television news, or national newspapers. They may, however, get their news from local channels, like television or newspapers, as well as NPR.\(^\text{41}\)

Lastly, the respondents who do not fit into any of the above media diets above are labeled as *unclassified*. These are the people who consume various combinations of the twelve news sources that do not easily fit into any of the above description. There are only seven people like that in the sample. A detailed description of the composition of each diet can be found in Appendix I. Figure 3.1 displays the frequency of each news media diet in the sample, while Figure 3.2 provides more details on news consumption among respondents of each of the media diet.

Figure 3.1 presents the breakdown of the sample to show the frequencies of the several types of media diets. The echo chamber is highly asymmetrical: 13 percent of the sample consumes the right-wing echo chamber media diet, while 3 percent consumes the left-wing echo

\(^{41}\) NPR is distributed through the local radio stations that contain a fair amount of local reporting. These stations, however, also broadcast national news and syndicated NPR shows, which is a limitation of this classification system.
chamber. That asymmetry might be due to the fact that, as several Pew reports have shown, liberals tend to consume a variety of sources, and many of the mainstream outlets like the New York Times, for example, are considered to have a moderate liberal bent. As a result, relatively few liberals avoid the mainstream sources to cocoon themselves in only the most partisan of news outlets. Meanwhile, conservatives are more likely to distrust mainstream outlets, and they are therefore more likely to avoid them.

![Figure 3.1 Breakdown of media diets.](image)

Respondents who consume the Diverse with Fox media diet constitute 21 percent of the sample, while the equivalent media diet that explicitly avoids Fox makes up 40 percent of the sample. 15 percent of the respondents avoid national news altogether and 6 percent avoid all news.
Figure 3.2 News consumption habits, by news media diet. The plots represent the percentage of the respondents, in each news media diet, who are either somewhat or very likely to consume the given news outlet. For the purposes of the graph, several categories where collapsed: liberal cable merges CNN and MSNBC; partisan websites merges left and right-wing conservative websites.

A detailed breakdown of news media consumption patterns by news media diet group are presented in Figure 3.2. Recall that some of these are due to the definition of the group, as was described above. By construction, respondents who consume the right-wing echo chamber media diet do not watch liberal cable, don’t read liberal websites, national newspapers, and watch network news. In addition, they report being unlikely to consume news outlets like NPR, presumably due to their perceived liberal bias. A substantial proportion of these respondents, however, declare getting news on social media (49%), watching local television news (59%), or reading regional or local newspapers (40%).

Those who consume Fox News as part of a diverse media diet are most keen on watching local television news (89%), network news (80%), and regional or local newspapers (75%). In general, they are fond of a wide array of news outlets, as indicated by Figure 3.2. Those with the
Diverse/Centrist media diet display similar media consumption patterns, with the exception of a fondness of Diverse with Fox to listen to conservative radio.

Table 3.2 provides more details about respondents who consume each media diet. Both respective ideological echo chamber media diets are made up of mostly strong partisans. There is more partisan diversity in the Diverse with Fox group, with more balanced ratio of strong Republicans to strong Democrats. People with that media diet tend to lean conservative, based on the ideological self-placement of the respondents, but there are three times as many people identifying as moderates in the Diverse with Fox group than in the right-wing echo chamber. People who consume Fox News together with other diverse sources exhibit considerably higher levels of trust in the news media than those in the ideological echo chamber. Their level of trust in the news media is actually on par with those in the left wing echo chamber, and nearly 1-in-4 has a great deal of trust in the local news. On the flip side, they also exhibit considerably lower levels of trust in Fox News and Breitbart than those in the right-wing echo chamber, although they trust Fox News more than they trust news media in general. Furthermore, they are more likely to believe in climate change, with only 15 percent being classified as climate skeptics, compared to 71 percent of those in the right-wing echo chamber.

For respondents who are Democrats, 63 percent are classified as consuming the Diverse/Centrist media diet, 15 percent consume the Diverse with Fox media diet, 11 percent avoid national news, 5 percent is in the echo chamber, and 6 percent avoid any news. Among Republicans, 30 percent consume the Diverse with Fox media diet, 33 percent are in the echo chamber, 16 percent consume the Diverse/Centrist media diet, 16 percent avoid national news, and 4 percent avoid any news.
<table>
<thead>
<tr>
<th></th>
<th>Echo chamber (left)</th>
<th>Diverse/ Centrist</th>
<th>Diverse w/Fox</th>
<th>Echo chamber (right)</th>
<th>No national news</th>
<th>No news</th>
</tr>
</thead>
<tbody>
<tr>
<td>Politics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% strong Dem</td>
<td>50</td>
<td>38</td>
<td>15</td>
<td>1</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>% strong Rep</td>
<td>0</td>
<td>4</td>
<td>26</td>
<td>48</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Interest in politics (0-10 scale)</td>
<td>7.3</td>
<td>7.3</td>
<td>7.5</td>
<td>8.3</td>
<td>5.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Average ideology (5 pt L-R scale)</td>
<td>2.0</td>
<td>2.5</td>
<td>3.5</td>
<td>4.3</td>
<td>3.4</td>
<td>2.9</td>
</tr>
<tr>
<td>% moderate</td>
<td>25</td>
<td>34</td>
<td>32</td>
<td>11</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% higher education</td>
<td>34</td>
<td>34</td>
<td>22</td>
<td>25</td>
<td>23</td>
<td>13</td>
</tr>
</tbody>
</table>
| A great deal of trust in... (%)

| Scientists               | 61                  | 44                | 20            | 4                    | 15               | 8       |
| News media               | 18                  | 10                | 14            | 1                    | 3                | 1       |
| Local media              | 5                   | 15                | 24            | 7                    | 8                | 1       |
| Fox News                 | 0                   | 3                 | 23            | 44                   | 1                | 3       |
| Breitbart                | 0                   | 1                 | 8             | 14                   | 3                | 1       |
| Global warming           |                     |                   |               |                      |                  |         |
| Certainly happening (%)  | 74                  | 70                | 29            | 3                    | 37               | 36      |
| Very serious problem (%) | 76                  | 66                | 29            | 5                    | 34               | 32      |
| Mostly human caused (%)  | 92                  | 84                | 51            | 9                    | 53               | 60      |
| Climate skeptic (%)      | 0                   | 3                 | 15            | 71                   | 23               | 15      |
| Climate denial scale (0-4) | 0.4                 | 0.65              | 1.63          | 2.99                 | 1.58             | 1.52    |
| N                       | 38                  | 500               | 259           | 167                  | 189              | 80      |

Table 3.2 Characteristics of respondents broken down by media diets.

To ensure that people who consume the Diverse with Fox media diet actually have different news preferences than respondents with the right-wing echo chamber media diet, I
presented all survey respondents who were very likely to consume any conservative media (either Fox News, conservative talk radio, or conservative websites) with five further questions on their news preferences. This second measure of news consumption is primarily meant as a validity check on the primary measure of media diets. Each of the five questions presented the respondent with a pair of different news media outlets and asked, if they had to choose, which one of would they rather be exposed to. In Table 3.3 I present the results, broken down by two media diets that involve conservative news.

<table>
<thead>
<tr>
<th>Prefers...</th>
<th>Diverse w/Fox</th>
<th>Echo chamber (right)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network news or Fox News</td>
<td>Fox News (65%)</td>
<td>Fox News (98%)</td>
</tr>
<tr>
<td>USA Today or Breitbart.com</td>
<td>USA Today (71%)</td>
<td>Breitbart.com (83%)</td>
</tr>
<tr>
<td>Fox News or Breitbart.com</td>
<td>Fox News (80%)</td>
<td>Fox News (92%)</td>
</tr>
<tr>
<td>Fox News or Rush Limbaugh</td>
<td>Fox News (77%)</td>
<td>Fox News (60%)</td>
</tr>
<tr>
<td>NPR or Huffington Post</td>
<td>Huffington Post (55%)</td>
<td>NPR (69%)</td>
</tr>
</tbody>
</table>

Table 3.3 News preferences among conservative news consumers. Numbers in parentheses are the percent of respondents in each group that prefers a given news outlet.

The goal was to determine whether news preferences vary by media diet, and particularly whether people who consume conservative news outlets always prefer ideological sources. The results indicate that those in the right-wing echo chamber are more likely to engage in selective exposure: they prefer Breitbart to USA Today, Fox to Breitbart, and Fox News to Rush Limbaugh. They also declare more willingness to listen to NPR than be exposed to more left leaning Huffington Post. Those in the Diverse with Fox group, however, are less committed to ideological content. They prefer Fox News to network news, for example, but they also prefer
the somewhat centrist USA Today to the far-right Breitbart, and Fox News to either Breitbart or Rush Limbaugh. This highlights that not every consumer of conservative news outlets is the same, and not everyone is fully committed to ideologically driven content over any other media outlet. In other words, people who proclaim to watch Fox News on the survey are not all the same, and it would be a mistake to treat them as such, since Fox News viewers with diverse media diet have different preferences than Fox News viewers with the right-wing echo chamber media diet.

5 Media diets and climate skepticism

I begin the examination of the relationship between climate change attitudes and news media diets by focusing specifically on Fox News, as it has been the focus of so much of the literature. Panel A of Figure 3.3 shows a powerful effect of Fox News exposure on climate skepticism. The more likely one is to watch Fox News, the more likely they are to be a climate skeptic, consistently with conventional wisdom. That marginal plot, however, not only does not include any controls that might also determine climate skepticism, like partisanship or ideology, but it does not take into account the different media diets that Fox News might be incorporated into. Panel B of Figure 3.3 presents the marginal plot of the same regression model, except instead of likelihood of watching Fox News, media diets were included as the only determinant of skepticism. Panels C and D present the same marginal plots, except for the ordinal logistic regression with the climate denial scale as the dependent variable. The same pattern emerges.
Figure 3.3 Media diets and climate attitudes. A) Probability of being a climate skeptic based on logistic regression of skepticism on Fox News viewership without controls; B) Probability of being a climate skeptic based on logistic regression of skepticism on media diets without controls. C) Probability of being a category 4 (full climate change denier) on the climate denial scale based on ordered logistic regression of denial on Fox News viewership without controls. D) Probability of being a category 4 (full climate change denier) on the climate denial scale based on ordered logistic regression of denial on media diets without controls.

People who watch Fox News as part of their general commitment to the right-wing echo chamber have a very high probability of being a climate skeptic, over 70 percent. They also have a high probability of being climate change deniers (category 4 on the climate denial scale), 39 percent. Those whose media diet includes Fox among other news outlets, however, are considerably less likely to be skeptics than respondents in the echo chamber. That being said, people with the Diverse with Fox media diet still have a 15 percent chance of being a skeptic, which is much higher than those who consume the Diverse/Centrist media diet. They also have a 6 percent chance of being a climate change denier, compared to the 1 percent chance of those
with the Diverse/Centrist media diet. Fox News viewership does, therefore, seem associated with climate skepticism, but other determinants of climate attitudes need to be accounted for.

To do that, I run regression models with the determinants of climate skepticism, including the prominent media diets of: right-wing echo chamber, Diverse with Fox, and No national news. The baseline category for each news media dummy is the Diverse/Centrist media diet. I exclude the left-wing echo chamber since exactly zero respondents in that group are classified as climate skeptics. I also include common factors related to climate beliefs in the academic literature, including partisanship and ideology, basic demographics, religiosity, and trust in scientists. The results are presented in Table 3.4.

<table>
<thead>
<tr>
<th>DV</th>
<th>Effect of…</th>
<th>Estimated marginal effect</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skepticism</td>
<td>No national news</td>
<td>0.16***</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Diverse w/Fox</td>
<td>0.05*</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Echo chamber (right)</td>
<td>0.29***</td>
<td>0.05</td>
</tr>
<tr>
<td>Denialism scale</td>
<td>No national news</td>
<td>0.04***</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Diverse w/Fox</td>
<td>0.03***</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Echo chamber (right)</td>
<td>0.15***</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Table 3.4 Relationship between media diets and climate attitudes. Cell entries are estimated marginal effects based on the regression models with all the controls. The baseline category are the people with the Centrist/Diverse media diet. Full regression output for each model are presented in Appendix J. *** p<0.01, ** p<0.05, * p<0.1

Being inside of the right-wing echo chamber is associated with an increase in probability of being a climate skeptic in a magnitude of 29 percent, compared to the baseline of the Diverse/Centrist media diet, even after controlling for other drivers of climate change beliefs. Exposure to Fox News, however, in the context of other diverse news sources, seems to have a much more muted effect. Consuming the Diverse with Fox media diet is associated with a 5 percentage point increase in probability of being a climate skeptic compared to those consuming the Diverse/Centrist media diet. That effect is significant at the 90% level, however. There is no
relationship between avoiding national news and climate skepticism. Those who avoid national news altogether are also more likely to be climate skeptics than those with the Diverse/Centrist media diet. It is worth highlighting, however, the very low baseline levels of climate skepticism among consumers of the Diverse/Centrist media diet compared to those with any other news media diet, outside of the left-wing echo chamber. Estimates based on the model that uses the ordinal climate denial scale display very similar results. The effect of the right-wing echo chamber remains strong, while the effect of Fox in context of other news media is small in magnitude.

One of the major problems with trying to disentangle media effects in this context is the nature of cross-sectional setup, which makes it very difficult to establish any sense of causality in the data that is potentially rife with selection effects. This is not a problem specific to this paper, but a universal issue of trying to estimate media effects from cross-sectional data. It might be that the self-reported exposure to a given news outlet is the reason behind climate skepticism, but it could also be the case that it is climate skepticism that determines news media choice to begin with, independent of ideology and partisanship. For example, if Feldman (2016) is correct, then the feedback loop of Fox News induced climate skepticism might drive people's media selection, so that they continue to choose Fox and ignore other outlets. It is impossible to completely resolve this problem here without long-term panel data, which unfortunately does not exist on this topic. However, the problem might be partly alleviated by the method of matching, which tends to eliminate some endogeneity, and generally provides somewhat more conservative estimates of media effects (Soroka et al. 2013).

The logic of propensity score matching is fairly simple. First, the likelihood of being a member of a specific news media diet is estimated based on a number of background
characteristics. Then, based on proximity, respondents in a given media diet are matched to the closest otherwise similar respondents who are not part of that media diet. The idea is to estimate randomization in treatment, by producing two groups that are very similar based on a set of covariates, except one is exposed to a “treatment” and the other is not. The average treatment effect is then the difference in outcomes between these two groups (for an example, see Barabas 2004 or Soroka et al. 2013).\footnote{There are several different algorithms used to match. Here, I employ the most straightforward and flexible, nearest-neighbor approach.}

It is important to acknowledge that matching is not a silver bullet. The process of matching is subject to the same problems as the regression model specified in Table 3.4, although to a lesser degree. Much turns on the availability of proper covariates, since significant omissions might result in biased assessment. An incorrectly specified matching model likely does not alleviate the problem of endogeneity that was present in the original logistic regression. Furthermore, some methodologists contest the notion that matching techniques are an adequate tool in dealing with endogeneity altogether, since respondents are being matched on observed covariates (Miller, nd). In absence of better data, like a panel or an experiment, however, matching offers an opportunity to address selection issues that the original regression model cannot account for.

Results of the matching analysis are presented in Table 3.5.\footnote{The results presented here are based on Stata’s teffects nnmatch command, with the default 1 match per observation. Since nearest-neighbor matching does not guarantee exact matching on all the covariates, I force the exact matching option on both partisanship (Republicans) and strength of partisanship (Strong Republican).} The effect of the right-wing echo chamber media diet remains powerful. The chance of being a climate skeptic is higher by 55 percent for those in the right-wing echo chamber, compared to those who consume Fox News as part of a diverse media diet. When the baseline is changed to the Diverse/Centrist media diet,
the effect of the echo chamber remains strong, with the chance of being a climate skeptic increasing by 45 percent. There is no effect of Fox News on climate skepticism, however, when it is consumed with a more diverse media diet.

<table>
<thead>
<tr>
<th>DV</th>
<th>Effect of...</th>
<th>Baseline</th>
<th>Average treatment effect</th>
<th>Standard error</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skepticism</td>
<td>Diverse w/Fox</td>
<td>Diverse/Centrist</td>
<td>0.03</td>
<td>0.03</td>
<td>664</td>
</tr>
<tr>
<td></td>
<td>Echo chamber (right)</td>
<td>Diverse w/Fox</td>
<td>0.55***</td>
<td>0.05</td>
<td>361</td>
</tr>
<tr>
<td></td>
<td>Echo chamber (right)</td>
<td>Diverse/Centrist</td>
<td>0.45***</td>
<td>0.14</td>
<td>601</td>
</tr>
<tr>
<td>Denialism scale</td>
<td>Diverse w/Fox</td>
<td>Diverse/Centrist</td>
<td>0.39***</td>
<td>0.12</td>
<td>664</td>
</tr>
<tr>
<td></td>
<td>Echo chamber (right)</td>
<td>Diverse w/Fox</td>
<td>1.2***</td>
<td>0.12</td>
<td>361</td>
</tr>
<tr>
<td></td>
<td>Echo chamber (right)</td>
<td>Diverse/Centrist</td>
<td>1.5***</td>
<td>0.40</td>
<td>601</td>
</tr>
</tbody>
</table>

Table 3.5 Results of matching analysis. Models control for the same covariates as the main model in Table 3.4. *** p<0.01, ** p<0.05, * p<0.1

When examining the same results of matching with the climate denial scale used as a dependent variable, the results change slightly. The effect of the right-wing echo chamber remains very powerful, with the shift towards denialism on the four-point ordinal scale in the magnitude of 1.5, when compared to those with a Diverse/Centrist media diet. Fox News, however, also seems to be moving people in the direction of climate denial. Those with Diverse with Fox media diets have climate denialism scale values higher by 0.39 than those who consume the Diverse/Centrist media diet. It seems that Fox News does play a role in making people more skeptical, but it does not necessarily turn them into full blown climate skeptics or climate deniers.

As was indicated above, these results do not necessarily establish a clear causal linkage between different news media diets and climate change skepticism. Since the analysis is ultimately based on cross-sectional data, these results might still suffer from omitted variable bias. However, the weight of evidence, from both a traditional regression approach and
matching, suggest that Fox News is related to climate skepticism, but the effect is not homogenous for everyone. The relatively small number of people in the right-wing echo chamber experience more powerful effects of Fox News than the larger number of people who consume Fox News along with other ideologically cross-cutting news media. Furthermore, it is worth highlighting that the selection effects in this particular case likely exaggerate the effects of Fox News. Therefore, the above findings showing that these effects are mostly limited to those in the right-wing echo chamber should be taken seriously.

6 Discussion and conclusion

The results presented above shed more light on the relationship between news media diet and climate change attitudes. People consuming news in a conservative echo chamber are much more likely to be climate skeptics than those that have more diverse news media consumption habits. However, this group is fairly small in magnitude, consisting of about 14 percent of the population, which is only slightly smaller than the proportion of people who avoid national news altogether. A much larger group of people consume a wide variety of news media outlets. Even people who enjoy watching Fox News frequently do include other, ideologically cross-cutting news sources as part of their media diet. To assume that everyone who watches Fox News is the same would therefore be a mistake.

This also has consequences for studying media effects. Assuming that most people exposed to Fox News are strong partisans who are primarily ideologically driven would mask the fact that many of these people regularly consume news sources from prominent mainstream, and sometimes even liberal, news outlets.
One of goals of this study was to demonstrate the need to think about media diets more broadly, not just in terms of whether people consume the news from a given news outlet or not. The majority of Americans do not consume news from a single outlet. In an era of a fragmented media landscape, understanding the clusters of sources that tend to be consumed together would be beneficial to researchers studying political communication.

Furthermore, this paper has shown that for a substantial proportion of Americans, independent of the ideological lean of their news media diet, local news is an important source of information. And it is a source of information that they trust more than news media in general. Yet, local media receive relatively little attention from researchers. Recent series of acquisitions by the Sinclair group and the nationalization of local news, however, should serve as a call for an examination of the role local news play in shaping public attitudes on important national issues, including climate change. A detailed analysis of broadcasts from stations taken over by Sinclair found large increases in coverage of national politics at the expense of local politics, and a rightward shift in coverage (Martin & McCrain 2018). Additionally, recent reports indicate that Sinclair stations might be applying pressure on their journalists to cover stories in a more conservative fashion. For example, a reporter was recently ousted by a Sinclair station for failing to provide “balance” in a climate change story by not mentioning potential natural causes of global warming.\footnote{https://www.buzzfeed.com/stevenperlberg/sinclair-climate-change?utm_term=.nqRdpoBl4#.vkbYazk9N} Trust in local news is much higher than trust in the news in general, and this trust might play a role in the potentially persuasive power of local news coverage going forward. Understanding the content and the effects of local news is therefore of prime importance to researchers.

Taken together, these results suggest that the role of Fox News in turning Republicans into climate change skeptics has probably been overstated. The assumption that most Republicans get their news inside a conservative echo chamber does not seem to be supported by evidence. Consistent with previous findings, the group of Republicans that is ideologically motivated in their news selection is quite small in size, around 33 percent. Most Republicans still tune in to a broad mixture of news outlets. And these other sources contain climate change reporting that barely covers skeptical and denialist messages.

This does not mean that Fox News did not contribute to the polarization of the public or that somehow the stories that actively promoted a false sense of scientific debate, doubt, or flat out climate denial should not be condemned. But a narrow focus on Fox News as the vehicle of opposition to climate change mitigation policies among Republicans limits our understanding of the issue and fails to explain how less politically interested Republicans, people who are not committed to Fox News as their primary news source, also polarized on the issue of climate change. As I demonstrated in Paper II of this dissertation, Americans didn’t need denialist Fox News coverage to polarize on climate change, Republicans were able to become climate skeptics by being increasingly exposed to partisan cues on the topic from other news sources.
Conclusion

In this thesis, my goal was to highlight the role of the news media in political polarization and to challenge some of the conventional wisdom surrounding the current state of the news media landscape in the United States.

The first paper examined how the news media coverage of several issues changed over time, finding that the news have not become more affectively charged, dramatically more negative or uncivil, nor have they featured more frames highlighting political conflict over cooperation. What has changed, however, is the presence of partisan sources in the press, with a dramatic increase in the politicization of the news. Furthermore, the politicians that are featured in the news most frequently are also increasingly more likely to be more ideologically extreme, suggesting that Americans are not only much more likely to encounter a politician in the news, but also a rather ideologically extreme one. That has likely contributed to partisan sorting of the American public and might have contributed to affective polarization.

The second paper situated climate change polarization in the larger literature on citizen cue-taking, media indexing, and opinion formation and persuasion. Along with my co-author, I found that through the transmission of partisan cues, the media helped to polarize the public on the issue and helped to turn Republicans into skeptics.

The third paper utilized an original survey to examine the relationship between news consumption patterns and climate change attitudes. It finds that most people who are likely to consume Fox News do not consume it within the right-wing ideological echo chamber, but instead it tends to be a part of a rather balanced news media diet. When the relationship between news media diets and climate skepticism is examined, in two different ways, it is clear that the
effect of Fox News on climate skepticism is not as clear cut as previously thought. Fox News matters in the context of the echo chamber, but its effect in a more diverse news media diet is much more muted.

Several implications are worth highlighting, in light of these findings. First, the dynamics of climate change polarization highlight the way in which other scientific issues might become politicized and polarized with an increased salience in the news, specifically the safety of childhood vaccinations and genetically modified organisms. Furthermore, it is likely that the public will polarize on climate change even further, unless Republican elites begin to send a loud and consistently pro-scientific consensus signal to its base. The findings also highlight the need to consider the effects of broader media diets, beyond just a focus on specific news outlets.

In terms of changes in the news media over the past few decades, the findings here demonstrate that the news has been relatively stable in how it covers different topics. Not only that, there are surprisingly little changes between the types of news sources, whether popular mainstream ones like network news or national newspapers, regional papers, cable news, or even tabloid press. This suggests a relatively homogenous nature of news coverage among most professional, mainstream news outlets. These findings are in stark contrast to much of the popular understanding of the current media landscape, where it is assumed that content varies by source and that it is dramatically different from the past.

Parts of this dissertation, especially the first paper, are primarily descriptive, and therefore lack the analytical punch needed to make strong claims about the relationship between the news media and political polarization. Future work should carefully consider a causal relationship between politicization of news coverage and political polarization of the United States. Considering the difficulty of studying media effects using observational data, the focus
should be on panel studies and experimental work determining the way in which the presence of politicians in the news affects political attitudes.

Furthermore, more research needs to be directed at studying the role of the social media in political polarization. In 2017, majority of Americans got news on social media, and that proportion is likely to increase in the coming years, as websites like Facebook and Twitter play an increasingly important role in how Americans access the news. With its algorithmic promotion of content that is negative, controversial, and otherwise emotional, it is likely that social media fuel partisan sorting, affective polarization, and ideological polarization. Determining whether they do, however, will require more cooperation from these platforms, especially in the domain of sharing their data with researchers. This is something that, at the moment of this writing, Facebook does not actively engage in.
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Appendices

Appendix A  Search protocol

Search protocol to retrieve articles, by topic.

Global warming

global warming OR climate change

Entitlement reform - broad

entitlement reform OR Medicare reform OR medicare reform OR Social Security reform OR social security reform OR Medicaid reform OR medicaid reform OR food stamps reform OR reforming entitlements OR reforming Medicare OR reforming medicare OR reforming Social Security OR reforming social security OR reforming medicaid OR medicaid OR medicare OR social security OR food stamps

Entitlement reform

entitlement reform OR Medicare reform OR medicare reform OR Social Security reform OR social security reform OR Medicaid reform OR medicaid reform OR food stamps reform OR reforming entitlements OR reforming Medicare OR reforming medicare OR reforming Social Security OR reforming social security OR reforming medicaid

Immigration

immigration reform OR reforming immigration OR immigration system OR immigration law OR immigration laws

GMOs (food)

GMOs OR GMO OR gmos OR gmo OR G.M.O.s OR G.M.O. OR g.m.o.s OR g.m.o OR genetically modified organisms OR genetically modified organism OR genetically engineered food OR genetically modified food OR genetically engineered foods OR genetically modified foods

Childhood vaccinations

childhood vaccines OR childhood vaccinations OR vaccinate children OR vaccinate kids OR childhood immunization OR immunizing children OR immunizing kids OR immunized children OR immunized kids OR child inoculation OR childhood inoculation OR inoculate children OR inoculate kids OR unvaccinated child OR unvaccinated children OR unvaccinated kids OR anti-vaccine OR anti-vax OR vaccine skeptic
International trade

international trade OR free trade OR free trade agreement OR open trade OR open market OR open markets OR common market OR trade pact OR tariff OR tariffs OR trade barrier OR trade barriers OR NAFTA OR Trans Pacific Partnership OR TPP OR TAFTA OR CAFTA OR Trans Atlantic Free Trade Area OR Free Trade Agreement OR FTA

Gun control

gun rights OR gun control OR 2nd amendment OR right to bear arms

Abortion

abortion

Net Neutrality

net neutrality

Fracking

hydraulic fracturing OR fracking OR fraccing OR hydrofracturing OR hydrofracking
## Appendix B  News items breakdown

<table>
<thead>
<tr>
<th>Topic</th>
<th># news stories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion</td>
<td>161,521</td>
</tr>
<tr>
<td>Gun rights</td>
<td>77,194</td>
</tr>
<tr>
<td>International trade</td>
<td>173,859</td>
</tr>
<tr>
<td>Entitlement reform</td>
<td>15,475</td>
</tr>
<tr>
<td>Immigration reform</td>
<td>61,917</td>
</tr>
<tr>
<td>Climate change</td>
<td>83,029</td>
</tr>
<tr>
<td>Fracking</td>
<td>6,038</td>
</tr>
<tr>
<td>Vaccines</td>
<td>3,962</td>
</tr>
<tr>
<td>Net Neutrality</td>
<td>2,118</td>
</tr>
<tr>
<td>GMOs</td>
<td>4,342</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>589,074</strong></td>
</tr>
</tbody>
</table>

*Table B.1 News stories by issue.*
<table>
<thead>
<tr>
<th>Source</th>
<th>Source type</th>
<th># of stories</th>
<th>First available year</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>Broadcast television</td>
<td>10,603</td>
<td>1980</td>
</tr>
<tr>
<td>CBS</td>
<td>Broadcast television</td>
<td>15,339</td>
<td>1990</td>
</tr>
<tr>
<td>NBC</td>
<td>Broadcast television</td>
<td>7,239</td>
<td>1997</td>
</tr>
<tr>
<td>PBS (NewsHour)</td>
<td>Public television</td>
<td>5,098</td>
<td>1977</td>
</tr>
<tr>
<td>NPR (Morning Edition)</td>
<td>Public radio</td>
<td>8,978</td>
<td>1984</td>
</tr>
<tr>
<td>CNN</td>
<td>Cable television</td>
<td>77,623</td>
<td>1990</td>
</tr>
<tr>
<td>Fox News</td>
<td>Cable television</td>
<td>18,011</td>
<td>1997</td>
</tr>
<tr>
<td>MSNBC</td>
<td>Cable television</td>
<td>10,179</td>
<td>1999</td>
</tr>
<tr>
<td>USA Today</td>
<td>National newspaper</td>
<td>26,777</td>
<td>1989</td>
</tr>
<tr>
<td>Denver Post</td>
<td>Regional newspaper</td>
<td>21,962</td>
<td>1993</td>
</tr>
<tr>
<td>Tampa Bay Times (formerly St. Petersburg Times)</td>
<td>Regional newspaper</td>
<td>31,315</td>
<td>1987</td>
</tr>
<tr>
<td>Washington Times</td>
<td>Conservative newspaper</td>
<td>52,769</td>
<td>1989</td>
</tr>
<tr>
<td>Salon.com</td>
<td>Liberal website</td>
<td>4,493</td>
<td>1999</td>
</tr>
<tr>
<td>New York Times Blogs</td>
<td>Online blog</td>
<td>8,841</td>
<td>2004</td>
</tr>
<tr>
<td>Washington Post Blogs</td>
<td>Online blog</td>
<td>15,981</td>
<td>2012</td>
</tr>
<tr>
<td>New York Post</td>
<td>Tabloid</td>
<td>9,450</td>
<td>1997</td>
</tr>
<tr>
<td>New York Daily News</td>
<td>Tabloid</td>
<td>14,581</td>
<td>1995</td>
</tr>
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</table>

*Table B.2 News stories by source.*
Appendix C  Dictionaries, paper I

Automated content analysis in Paper I has been implemented in Lexicoder 3.0 and LIWC2015.

<table>
<thead>
<tr>
<th>dishonest</th>
<th>rash</th>
<th>ridiculous*</th>
<th>deranged</th>
<th>unscrupulous</th>
<th>sacrilegious</th>
</tr>
</thead>
<tbody>
<tr>
<td>lie</td>
<td>daft*</td>
<td>laughable</td>
<td>demented</td>
<td>unprincipled</td>
<td>irrational</td>
</tr>
<tr>
<td>liar</td>
<td>dumb</td>
<td>asinine</td>
<td>crazed</td>
<td>amoral</td>
<td>illogical</td>
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<tr>
<td>unprincipled</td>
<td>dim</td>
<td>mad*</td>
<td>unhinged</td>
<td>untruthful</td>
<td>intolerant</td>
</tr>
<tr>
<td>insensitive*</td>
<td>dimwitted</td>
<td>crazy</td>
<td>insane</td>
<td>deceitful</td>
<td>racist</td>
</tr>
<tr>
<td>coward*</td>
<td>halfwitted</td>
<td>doped</td>
<td>silly</td>
<td>deceiving</td>
<td>bigot*</td>
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<td>heartless*</td>
<td>crack-brained</td>
<td>nutty</td>
<td>senseless</td>
<td>mendacious</td>
<td>narrow-minded</td>
</tr>
<tr>
<td>brainless*</td>
<td>crackpot</td>
<td>nutjob</td>
<td>kooky</td>
<td>crooked</td>
<td>shameless</td>
</tr>
<tr>
<td>stupid*</td>
<td>pea-brained</td>
<td>nut-job</td>
<td>corrupt</td>
<td>shady</td>
<td>outrageous</td>
</tr>
<tr>
<td>fool*</td>
<td>wooden-headed</td>
<td>nutcase</td>
<td>fraudulent</td>
<td>bastard</td>
<td>disgraceful</td>
</tr>
<tr>
<td>immoral</td>
<td>bone-headed</td>
<td>fruitcake</td>
<td>swindl*</td>
<td>degenerate</td>
<td>scandalous</td>
</tr>
<tr>
<td>mindless*</td>
<td>vapid</td>
<td>head case</td>
<td>cheat*</td>
<td>ungodly</td>
<td>atrocious</td>
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<tr>
<td>idiotic</td>
<td>imbecile</td>
<td>crank</td>
<td>double-dealing</td>
<td>sinful</td>
<td>appalling</td>
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<tr>
<td>half-baked</td>
<td>moron*</td>
<td>crackpot</td>
<td>treasonous</td>
<td>sinner</td>
<td>monstrous</td>
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<tr>
<td>thoughtless*</td>
<td>dumbass</td>
<td>weirdo</td>
<td>treacherous</td>
<td>pervert*</td>
<td>heinous</td>
</tr>
<tr>
<td>unintelligent</td>
<td>dumb-ass</td>
<td>screwball</td>
<td>dirty</td>
<td>evil</td>
<td>wicked</td>
</tr>
<tr>
<td>unwise</td>
<td>nonsens*</td>
<td>loony</td>
<td>unethical</td>
<td>unholy</td>
<td>abominable</td>
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<tr>
<td>reckless</td>
<td>insane*</td>
<td>lunatic</td>
<td>immoral</td>
<td>godless</td>
<td>chauvinist*</td>
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<tr>
<td>ill-advised</td>
<td>absurd*</td>
<td>madman</td>
<td>dishonorable</td>
<td>impious</td>
<td>sexis*</td>
</tr>
<tr>
<td>ill-considered</td>
<td>ludicrouses</td>
<td>madwoman</td>
<td>untrustworthy</td>
<td>blasphemous</td>
<td>jingois*</td>
</tr>
<tr>
<td>xenophob*</td>
<td>prejudice*</td>
<td>hypocr*</td>
<td>unconstitutional</td>
<td>vitriol*</td>
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Table C.1 Incivility dictionary. This list of words have been used in conjunction with counting references to Adolf Hitler and Nazis, as well as LIWC’s anger and swear word dictionaries.
<table>
<thead>
<tr>
<th>democrat*</th>
<th>joe biden</th>
</tr>
</thead>
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<tr>
<td>d-</td>
<td>dick geffhardt</td>
</tr>
<tr>
<td>president clinton</td>
<td>majority leader reid</td>
</tr>
<tr>
<td>bill clinton</td>
<td>harry reid</td>
</tr>
<tr>
<td>barack obama</td>
<td>tom daschle</td>
</tr>
<tr>
<td>president obama</td>
<td>george mitchell</td>
</tr>
<tr>
<td>speaker o'neill</td>
<td>robert byrd</td>
</tr>
<tr>
<td>tip o'neill</td>
<td>alan cranston</td>
</tr>
<tr>
<td>speaker wright</td>
<td>wendell ford</td>
</tr>
<tr>
<td>jim wright</td>
<td>michael dukakis</td>
</tr>
<tr>
<td>speaker foley</td>
<td>walter mondale</td>
</tr>
<tr>
<td>tom foley</td>
<td>john kerry</td>
</tr>
<tr>
<td>speaker pelosi</td>
<td>minority leader schumer</td>
</tr>
<tr>
<td>nancy pelosi</td>
<td>chuck schumer</td>
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<tr>
<td>vice president g.</td>
<td>majority whip durbin</td>
</tr>
<tr>
<td>al gore</td>
<td>dick durbin</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>senator</th>
<th>lt. governor</th>
</tr>
</thead>
<tbody>
<tr>
<td>representative</td>
<td>rep</td>
</tr>
<tr>
<td>congressman</td>
<td>sen</td>
</tr>
<tr>
<td>congresswoman</td>
<td>majority leader</td>
</tr>
<tr>
<td>state senator</td>
<td>minority leader</td>
</tr>
<tr>
<td>state representative</td>
<td>majority whip</td>
</tr>
<tr>
<td>governor</td>
<td>minority whip</td>
</tr>
<tr>
<td>gov.</td>
<td>speaker of the house</td>
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</table>

**Table C.2 General Democratic dictionary.**

**Table C.3 General political dictionary.**
<table>
<thead>
<tr>
<th>Republican*</th>
<th>Vice President Bush</th>
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</thead>
<tbody>
<tr>
<td>GOP</td>
<td>Vice President Quayle</td>
</tr>
<tr>
<td>R-</td>
<td>Dan Quayle</td>
</tr>
<tr>
<td>President Reagan</td>
<td>Vice President Cheney</td>
</tr>
<tr>
<td>President Bush</td>
<td>Dick Cheney</td>
</tr>
<tr>
<td>Ronald Reagan</td>
<td>Majority Leader McConnell</td>
</tr>
<tr>
<td>George Bush</td>
<td>Majority Whip Cornyn</td>
</tr>
<tr>
<td>George H W Bush</td>
<td>John Cornyn</td>
</tr>
<tr>
<td>George W Bush</td>
<td>Bill Frist</td>
</tr>
<tr>
<td>Speaker Boehner</td>
<td>Jon Kyl</td>
</tr>
<tr>
<td>John Boehner</td>
<td>Don Nickles</td>
</tr>
<tr>
<td>Speaker Hastert</td>
<td>Alan Simpson</td>
</tr>
<tr>
<td>Dennis Hastert</td>
<td>Ted Stevens</td>
</tr>
<tr>
<td>Speaker Gingrich</td>
<td>Howard Baker</td>
</tr>
<tr>
<td>Newt Gingrich</td>
<td>Trent Lott</td>
</tr>
<tr>
<td>Speaker Ryan</td>
<td>Bob Dole</td>
</tr>
<tr>
<td>Paul Ryan</td>
<td>Howard Baker</td>
</tr>
<tr>
<td>Bob Michel</td>
<td>John McCain</td>
</tr>
<tr>
<td>John Rhodes</td>
<td>Mitt Romney</td>
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<tr>
<td>Donald Trump</td>
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</table>

Table C.4 General Republican dictionary.

<table>
<thead>
<tr>
<th>Adversarial</th>
<th>Bone to Pick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adversary</td>
<td>Brawl</td>
</tr>
<tr>
<td>Adversative</td>
<td>Breach</td>
</tr>
<tr>
<td>Adverse</td>
<td>Break</td>
</tr>
<tr>
<td>Afront</td>
<td>Break with</td>
</tr>
<tr>
<td>Aggressive</td>
<td>Brouhaha</td>
</tr>
<tr>
<td>Aggressiveness</td>
<td>Bucking</td>
</tr>
<tr>
<td>Aggressor</td>
<td>Call into question</td>
</tr>
<tr>
<td>Alien</td>
<td>Call to arms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cross</th>
<th>Enemy</th>
<th>Lambaste*</th>
<th>Pugnacity</th>
<th>Standing against</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross fire</td>
<td>Enmity</td>
<td>Lash out at</td>
<td>Pull* the trigger</td>
<td>Stiff opposition</td>
</tr>
<tr>
<td>Crosscurrent</td>
<td>Entrench</td>
<td>Line in the sand</td>
<td>Quarrel*</td>
<td>Strained relations</td>
</tr>
<tr>
<td>Crossfire</td>
<td>Estrange</td>
<td>Militarism</td>
<td>Raid</td>
<td>Strike at</td>
</tr>
<tr>
<td>Crossing</td>
<td>Estrangement</td>
<td>Militarization</td>
<td>Rallying cry</td>
<td>Strive against</td>
</tr>
<tr>
<td>Crow to pluck</td>
<td>Face up to</td>
<td>Militancy</td>
<td>Rebellion</td>
<td>Struggle against</td>
</tr>
<tr>
<td>Crusade</td>
<td>Faction</td>
<td>Mischief</td>
<td>Rebut</td>
<td>Swordplay</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>Factiousness</td>
<td>Rebuttal</td>
<td>Take a swing</td>
<td></td>
</tr>
<tr>
<td>Dead set against</td>
<td>Falling-out</td>
<td>Misunderstanding</td>
<td>Take issue with</td>
<td></td>
</tr>
</tbody>
</table>
alienation calls into question
defiance feistiness negativist recalcitrance take on
tender spot
altercation clash* delicate issue fight against noncooperati
defiance noncooperati on recalcitrance refractoriness thin skinned
tiff
antagonism cleavage denial fighter noncooperat or take on
altercate
call* challenge
defy feud noncooperati on recalcitrant
call to question
defiance
defiant
defiantly
defiantly noncooperati ve noncooperat or repent
negativist
calls to question
defiance
defiant
defiantly
defiantly noncooperati ve noncooperat or repent
calls into question
defiance feistiness negativist recalcitrance
tender spot
antagonist
cleft deny firefighter
defiant
defiant noncooperati ve
defiantly
defiantly noncooperati ve noncooperat or repent
calls into question
defiance feistiness negativist recalcitrance
altercation
call* challenge
defy feud noncooperati on recalcitrant
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defiance feistiness negativist recalcitrance
tender spot
antagonistic
collide deride fight against
delicate issue
altercat
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calls into question
defiance feistiness negativist recalcitrance
tender spot
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delicate issue
altercat
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calls into question
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Table C.5 Conflict dictionary.
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<td>partner</td>
<td>in consensus</td>
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<td>do business</td>
<td>patch things up</td>
<td>in partnership</td>
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<td>in unison</td>
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<td>integration</td>
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<td>join</td>
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<td>pull together</td>
<td>join together</td>
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<td>joining of forces</td>
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<td>truce</td>
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<td>with one voice</td>
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**Table C.6 Cooperation dictionary.**
Appendix D  Politician news mentions

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<td>Jesse Helms</td>
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Table D.1 Total news media mentions for the top three Republican Senators, by Congress.
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<td>599</td>
</tr>
<tr>
<td>107</td>
<td>2001-2002</td>
<td>Tom Daschle (Leader)</td>
<td>3387</td>
<td>Hilary Clinton</td>
<td>1068</td>
<td>Ted Kennedy</td>
<td>774</td>
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<tr>
<td>109</td>
<td>2005-2006</td>
<td>Hilary Clinton</td>
<td>4396</td>
<td>John Kerry</td>
<td>3313</td>
<td>Harry Reid (Leader)</td>
<td>3012</td>
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<tr>
<td>110</td>
<td>2007-2008</td>
<td>Barack Obama</td>
<td>77404</td>
<td>Hilary Clinton</td>
<td>44877</td>
<td>John Kerry</td>
<td>3738</td>
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<td>111</td>
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<td>Harry Reid (Leader)</td>
<td>7250</td>
<td>Arlen Specter</td>
<td>2620</td>
<td>Ben Nelson</td>
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<td>112</td>
<td>2011-2012</td>
<td>Harry Reid (Leader)</td>
<td>3822</td>
<td>John Kerry</td>
<td>1709</td>
<td>Claire McCaskill</td>
<td>789</td>
</tr>
<tr>
<td>113</td>
<td>2013-2014</td>
<td>Harry Reid (Leader)</td>
<td>5572</td>
<td>Elizabeth Warren</td>
<td>1750</td>
<td>Claire McCaskill</td>
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Table D.2 Total news media mentions for the top three Democratic Senators, by Congress.
<table>
<thead>
<tr>
<th>Congress</th>
<th>Years</th>
<th>Most mentions</th>
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<th>2nd most mentions</th>
<th>#</th>
<th>3rd most mentions</th>
<th>#</th>
</tr>
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<tbody>
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<td>96</td>
<td>1979-1980</td>
<td>John Anderson</td>
<td>240</td>
<td>Barry Goldwater</td>
<td>58</td>
<td>Jack Kemp</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barry Goldwater</td>
<td>119</td>
<td>Millicent Fenwick</td>
<td>59</td>
<td>Jack Kemp</td>
<td>48</td>
</tr>
<tr>
<td>97</td>
<td>1981-1982</td>
<td>Jack Kemp</td>
<td>69</td>
<td>Trent Lott (Whip)</td>
<td>44</td>
<td>Newt Gingrich</td>
<td>31</td>
</tr>
<tr>
<td>98</td>
<td>1983-1984</td>
<td>Jack Kemp</td>
<td>168</td>
<td>Newt Gingrich</td>
<td>42</td>
<td>John McCain</td>
<td>34</td>
</tr>
<tr>
<td>99</td>
<td>1985-1986</td>
<td>Jack Kemp</td>
<td>318</td>
<td>Dick Cheney</td>
<td>219</td>
<td>Connie Mack</td>
<td>79</td>
</tr>
<tr>
<td>100</td>
<td>1987-1988</td>
<td>Newt Gingrich (Whip)</td>
<td>173</td>
<td>Lynn Martin</td>
<td>125</td>
<td>Claudine Schneider</td>
<td>82</td>
</tr>
<tr>
<td>103</td>
<td>1993-1994</td>
<td>Newt Gingrich (Whip)</td>
<td>7282</td>
<td>Susan Molinari</td>
<td>797</td>
<td>Dick Armey (Leader)</td>
<td>691</td>
</tr>
<tr>
<td>104</td>
<td>1995-1996</td>
<td>Newt Gingrich (Speaker)</td>
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<td>Dick Armey (Leader)</td>
<td>683</td>
<td>Henry Hyde</td>
<td>661</td>
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<tr>
<td>105</td>
<td>1997-1998</td>
<td>Newt Gingrich (Speaker)</td>
<td>3262</td>
<td>Tom DeLay (Whip)</td>
<td>1438</td>
<td>John Kasich</td>
<td>748</td>
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<tr>
<td>106</td>
<td>1999-2000</td>
<td>Rick Lazio</td>
<td>799</td>
<td>Dick Armey (Leader)</td>
<td>660</td>
<td>Bob Barr</td>
<td>336</td>
</tr>
<tr>
<td>107</td>
<td>2001-2002</td>
<td>Tom DeLay (Whip)</td>
<td>1156</td>
<td>Duncan Hunter</td>
<td>383</td>
<td>Tom Tancredo</td>
<td>376</td>
</tr>
<tr>
<td>108</td>
<td>2003-2004</td>
<td>Tom DeLay (Leader)</td>
<td>4410</td>
<td>Mark Foley</td>
<td>1250</td>
<td>Tom Tancredo</td>
<td>981</td>
</tr>
<tr>
<td>109</td>
<td>2005-2006</td>
<td>Tom DeLay (Leader)</td>
<td>3559</td>
<td>Tom Tancredo</td>
<td>1328</td>
<td>Duncan Hunter</td>
<td>1186</td>
</tr>
<tr>
<td>110</td>
<td>2007-2008</td>
<td>Ron Paul</td>
<td>2585</td>
<td>Michele Bachmann</td>
<td>909</td>
<td>Eric Cantor (Whip)</td>
<td>789</td>
</tr>
<tr>
<td>111</td>
<td>2009-2010</td>
<td>John Boehner (Leader)</td>
<td>12850</td>
<td>Ron Paul</td>
<td>9634</td>
<td>John Boehner (Speaker)</td>
<td>6934</td>
</tr>
<tr>
<td>112</td>
<td>2011-2012</td>
<td>John Boehner (Speaker)</td>
<td>8125</td>
<td>Paul Ryan</td>
<td>3488</td>
<td>Eric Cantor (Leader)</td>
<td>2996</td>
</tr>
</tbody>
</table>

Table D.3 Total news media mentions for the top three Republican Representatives, by Congress.
<table>
<thead>
<tr>
<th>Congress</th>
<th>Years</th>
<th>Most mentions</th>
<th>#</th>
<th>2nd most mentions</th>
<th>#</th>
<th>3rd most mentions</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>96</td>
<td>1979-1980</td>
<td>Elizabeth Holtzman</td>
<td>70</td>
<td>John Brademas (Whip)</td>
<td>19</td>
<td>Chris Dodd</td>
<td>16</td>
</tr>
<tr>
<td>97</td>
<td>1981-1982</td>
<td>Barney Frank</td>
<td>38</td>
<td>Claude Pepper</td>
<td>29</td>
<td>Steny Hoyer</td>
<td>25</td>
</tr>
<tr>
<td>98</td>
<td>1983-1984</td>
<td>Geraldine Ferraro</td>
<td>284</td>
<td>Barney Frank</td>
<td>61</td>
<td>Robert Garcia</td>
<td>31</td>
</tr>
<tr>
<td>99</td>
<td>1985-1986</td>
<td>Don Bonker</td>
<td>36</td>
<td>Barney Frank</td>
<td>34</td>
<td>Ed Jenkins</td>
<td>37</td>
</tr>
<tr>
<td>100</td>
<td>1987-1988</td>
<td>Buddy MacKay</td>
<td>91</td>
<td>Dick Gephardt</td>
<td>78</td>
<td>Patricia Schroeder</td>
<td>54</td>
</tr>
<tr>
<td>101</td>
<td>1989-1990</td>
<td>Bill Nelson</td>
<td>218</td>
<td>Barney Frank</td>
<td>133</td>
<td>Tom Foley (Leader)</td>
<td>83</td>
</tr>
<tr>
<td>103</td>
<td>1993-1994</td>
<td>David Bonior (Whip)</td>
<td>373</td>
<td>Tom Foley (Speaker)</td>
<td>268</td>
<td>Dick Gephardt (Leader)</td>
<td>229</td>
</tr>
<tr>
<td>104</td>
<td>1995-1996</td>
<td>Jesse Jackson</td>
<td>849</td>
<td>David Bonior (Whip)</td>
<td>281</td>
<td>Dick Gephardt (Leader)</td>
<td>276</td>
</tr>
<tr>
<td>105</td>
<td>1997-1998</td>
<td>Dick Gephardt (Leader)</td>
<td>822</td>
<td>Chuck Schumer</td>
<td>454</td>
<td>Jesse Jackson</td>
<td>343</td>
</tr>
<tr>
<td>106</td>
<td>1999-2000</td>
<td>Jesse Jackson</td>
<td>1535</td>
<td>Dick Gephardt (Leader)</td>
<td>868</td>
<td>Charlie Rangel</td>
<td>367</td>
</tr>
<tr>
<td>107</td>
<td>2001-2002</td>
<td>Gary Condit</td>
<td>1509</td>
<td>Dick Gephardt (Leader)</td>
<td>978</td>
<td>Jesse Jackson</td>
<td>851</td>
</tr>
<tr>
<td>108</td>
<td>2003-2004</td>
<td>Dick Gephardt</td>
<td>2080</td>
<td>Dennis Kucinich</td>
<td>826</td>
<td>Nancy Pelosi (Leader)</td>
<td>726</td>
</tr>
<tr>
<td>109</td>
<td>2005-2006</td>
<td>Nancy Pelosi (Leader)</td>
<td>2806</td>
<td>Harold Ford</td>
<td>837</td>
<td>John Murtha</td>
<td>717</td>
</tr>
<tr>
<td>110</td>
<td>2007-2008</td>
<td>Nancy Pelosi (Speaker)</td>
<td>5049</td>
<td>Jesse Jackson</td>
<td>1326</td>
<td>John Murtha</td>
<td>1212</td>
</tr>
<tr>
<td>111</td>
<td>2009-2010</td>
<td>Nancy Pelosi (Speaker)</td>
<td>5775</td>
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<td>1075</td>
<td>Barney Frank</td>
<td>887</td>
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<tr>
<td>112</td>
<td>2011-2012</td>
<td>Nancy Pelosi (Leader)</td>
<td>2591</td>
<td>Anthony Weiner</td>
<td>1281</td>
<td>Debbie Wasserman Schultz</td>
<td>720</td>
</tr>
<tr>
<td>113</td>
<td>2013-2014</td>
<td>Nancy Pelosi (Leader)</td>
<td>2396</td>
<td>Bruce Braley</td>
<td>504</td>
<td>John Lewis</td>
<td>420</td>
</tr>
</tbody>
</table>

Table D.4 Total news media mentions for the top three Democratic Representatives, by Congress.
Appendix E  Mood measure

The climate skepticism mood measure we utilize in this paper is a combination of all the questions on global warming and climate change that we were able to find at the Roper archive coded in the same, skeptical, direction. We also included questions that were not in our pool, but were included in Carmiachael, Brulle and Huxster. The measure is primarily composed of two types of questions that were most common over a long period. The first asked respondents how serious of a problem climate change is, and the second inquired as to whether climate change was happening. The wording varied slightly, but the general spirit of the questions remained the same. There are a host of other questions asked periodically, including polls asking about global warming in terms of a threat, whether it was man made, and whether it is happening. Although questions were different, the mood measure remains rather robust.

The measure was purged of two outliers. One was a question about the existence of global warming, from February of 2006. Only 6 percent of the respondents said that global warming is ‘probably not happening,’ substantially below the average response at the time. The survey was conducted by a relatively unknown pollster, Ayers, McHenry & Associates. The other question came from a CBS/NY Times poll fielded on April of 2007, in which only 9 percent of respondents state that global warming is not a serious problem. The latter, however, has virtually no effect on the mood measure.
<table>
<thead>
<tr>
<th></th>
<th>Quarterly</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of series</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Exponential smoothing</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>Period</td>
<td>1986.2 to 2015.2</td>
<td>1986 to 2015</td>
</tr>
<tr>
<td>Time points</td>
<td>117</td>
<td>30</td>
</tr>
<tr>
<td>Variance explained</td>
<td>79%</td>
<td>66%</td>
</tr>
</tbody>
</table>

**Table E.1 WCalc6 details for quarterly and annual climate skepticism mood measures.**

<table>
<thead>
<tr>
<th>Series</th>
<th>Cases</th>
<th>Quarterly mood</th>
<th>Annual mood</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>0.99</td>
<td>0.94</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>0.96</td>
<td>0.99</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>-0.89</td>
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<tr>
<td>6</td>
<td>9</td>
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<td>0.76</td>
</tr>
<tr>
<td>7</td>
<td>11</td>
<td>-0.26</td>
<td>-0.08</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>0.92</td>
<td>0.68</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>11</td>
<td>17</td>
<td>0.9</td>
<td>0.96</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
<td>0.95</td>
<td>0.21</td>
</tr>
<tr>
<td>13</td>
<td>7</td>
<td>0.86</td>
<td>0.06</td>
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<td>16</td>
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<td>-1</td>
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<tr>
<td>17</td>
<td>2</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>16</td>
<td>0.94</td>
<td>0.98</td>
</tr>
</tbody>
</table>

**Table E.2 Dimension loadings for quarterly and annual climate skepticism mood measures.**
Appendix F  Dictionaries, paper II

(R-
Bill Frist
Bob Dole
Bob Michel
Dan Quayle
Dennis Hastert
Dick Cheney
G.O.P.
George Bush
George H.W. Bush
George W. Bush
GOP
Howard Baker
John Boehner
John McCain
John Rhodes
Mitch McConnell
Mitt Romney
Newt Gingrich
President Bush
President Reagan
Republican
republican
Ronald Reagan
Speaker Boehner
Speaker Gingrich
Speaker Hastert
Trent Lott
Vice President Bush
Vice President Cheney
Vice President Quayle

Table F.1 Republican Party dictionary. List of keywords and phrases we searched for to establish the measure of Republican elite cues in Paper II.
Table F.2 Democratic Party dictionary. List of keywords and phrases we searched for to establish the measure of Democratic elite cues in Paper I.

<table>
<thead>
<tr>
<th>Political Role</th>
<th>Person</th>
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<tbody>
<tr>
<td>(D-)</td>
<td>Nancy Pelosi</td>
</tr>
<tr>
<td>Al Gore</td>
<td>President Clinton</td>
</tr>
<tr>
<td>Barack Obama</td>
<td>President Obama</td>
</tr>
<tr>
<td>Bill Clinton</td>
<td>Robert Byrd</td>
</tr>
<tr>
<td>Democrat</td>
<td>Speaker Foley</td>
</tr>
<tr>
<td>democrat</td>
<td>Speaker O'Neill</td>
</tr>
<tr>
<td>Democratic</td>
<td>Speaker Pelosi</td>
</tr>
<tr>
<td>democratic</td>
<td>Speaker Wright</td>
</tr>
<tr>
<td>George Mitchell</td>
<td>Tip O'Neill</td>
</tr>
<tr>
<td>Gephardt</td>
<td>Tom Daschle</td>
</tr>
<tr>
<td>Harry Reid</td>
<td>Tom Foley</td>
</tr>
<tr>
<td>Jim Wright</td>
<td>Vice President Biden</td>
</tr>
<tr>
<td>Joe Biden</td>
<td>Vice President Gore</td>
</tr>
<tr>
<td>John Kerry</td>
<td>Walter Mondale</td>
</tr>
<tr>
<td>Michael Dukakis</td>
<td>Joe Biden</td>
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</table>

Table F.3 General politician dictionary. Lists the keywords and phrases we searched for to establish the measure of general political cues.

<table>
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<tr>
<th>Political Role</th>
<th>Position</th>
</tr>
</thead>
<tbody>
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<td>Congressman</td>
<td>Rep.</td>
</tr>
<tr>
<td>Congresswoman</td>
<td>Representative</td>
</tr>
<tr>
<td>Governor</td>
<td>Sen.</td>
</tr>
<tr>
<td>governor</td>
<td>Senator</td>
</tr>
<tr>
<td>Lieutenant Governor</td>
<td>Speaker of the House</td>
</tr>
<tr>
<td>lieutenant governor</td>
<td>state Representative</td>
</tr>
<tr>
<td>Lt. Governor</td>
<td>State Representative</td>
</tr>
<tr>
<td>lt. governor</td>
<td>state senator</td>
</tr>
<tr>
<td>Majority Leader</td>
<td>State Senator</td>
</tr>
<tr>
<td>Minority Leader</td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>Professor</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>doctor</td>
<td>professor</td>
</tr>
<tr>
<td>Doctors</td>
<td>Professors</td>
</tr>
<tr>
<td>doctors</td>
<td>professors</td>
</tr>
<tr>
<td>Dr</td>
<td>Researcher</td>
</tr>
<tr>
<td>dr</td>
<td>researcher</td>
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<tr>
<td>Expert</td>
<td>Researchers</td>
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<td>researchers</td>
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<tr>
<td>Expert</td>
<td>Scientist</td>
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<tr>
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<td>scientist</td>
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<td>scientists</td>
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</table>

**Table F.4 Expert dictionary.** Lists the keywords and phrases we searched for to establish the measure of expert cues.

<table>
<thead>
<tr>
<th>Advancement Of Sound Science Center</th>
<th>Greening Earth Society</th>
<th>National Council For Environmental Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Council On Science And Health</td>
<td>Independent Commission On Environmental Education</td>
<td>National Environmental Policy Institute</td>
</tr>
<tr>
<td>Australian Climate Science Coalition</td>
<td>Institute For Biospheric Research</td>
<td>New Zealand Climate Science Coalition</td>
</tr>
<tr>
<td>Center For Study Of Carbon Dioxide And Global Change</td>
<td>Biospheric Research Institute</td>
<td>Oregon Institute Of Science And Medicine</td>
</tr>
<tr>
<td>Co2 Is Green</td>
<td>Institute For Regulatory Science</td>
<td>Plants Need Co2 Org</td>
</tr>
<tr>
<td>Cooler Heads Coalition</td>
<td>Institute For Study Of Earth And Man</td>
<td>Science And Environmental Policy Project</td>
</tr>
<tr>
<td>Environmental Literacy Council</td>
<td>International Climate And Environmental Change Assessment Project</td>
<td>Science And Public Policy Institute</td>
</tr>
<tr>
<td>George Marshall Institute</td>
<td>International Climate Science Coalition</td>
<td>Smithsonian Astrophysical Observatory</td>
</tr>
<tr>
<td>George C. Marshall Institute</td>
<td>Junkscience</td>
<td>Statistical Assessment Service</td>
</tr>
<tr>
<td>Global Warming Policy Foundation</td>
<td>Lindenwood University</td>
<td>Weidenbaum Center</td>
</tr>
</tbody>
</table>

**Table F.5 Climate skeptic dictionary.** Lists the keywords and phrases we searched for to establish the measure of organizations whose sole mission is climate denial, the so-called “Merchants of Doubt.” List comes from Farrell (2016b).
<table>
<thead>
<tr>
<th>American Coal Foundation</th>
<th>Exxon Mobil</th>
<th>Shook Hardy And Bacon</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Coalition For Clean Coal</td>
<td>Federation For American Coal Energy And Security</td>
<td>Us-Russia Business Council</td>
</tr>
<tr>
<td>American Farm Bureau</td>
<td>Global Climate Coalition</td>
<td>American Energy Alliance</td>
</tr>
<tr>
<td>American Fuel And Petrochemical Manufacturers</td>
<td>Independent Petroleum Association Of America</td>
<td>Americans For Balanced Energy Choices</td>
</tr>
<tr>
<td>American Gas Association</td>
<td>Intermountain Rural Electric Association</td>
<td>Citizens For Affordable Energy</td>
</tr>
<tr>
<td>American Natural Gas Alliance</td>
<td>Koch Industries</td>
<td>Coalition For Vehicle Choice</td>
</tr>
<tr>
<td>American Petroleum Institute</td>
<td>National Association Of Manufacturers</td>
<td>Coalition For American Jobs</td>
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<td>National Mining Association</td>
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<td>Exxon</td>
<td>Peabody Energy</td>
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**Table F.6 Industry and astroturf groups dictionary.** Lists the keywords and phrases we searched for to establish the measure of industry and astroturf organizations. List comes from Farrell (2016b).

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<td>Cornwall Alliance For The Stewardship Of Creation</td>
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<td>Communications Institute</td>
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**Table F.7 Conservative think tank and advocacy group dictionary.** Lists the keywords and phrases we searched for to establish the measure of conservative think tanks and advocacy organizations. List comes from Farrell (2016b).
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<th>Donald N Parkes</th>
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<th>Monce</th>
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<th>Roger Dewhurst</th>
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<td>Willie Soon</td>
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Table F.8 Contrarian scientist dictionary. Lists the keywords and phrases we searched for to establish the measure of contrarian scientists. List comes from Anderegg et al. (2010) and was downloaded from http://www.eecg.utoronto.ca/~prall/climate/skeptic_authors_table_by_clim.html.
Appendix G  Coding instructions

Coding instructions for the manual coding of the news articles and transcripts.

Purpose of paper: to examine the signals or cues being sent to the voting public by Democratic and Republican Party elites on climate change policy and climate science through the mainstream media. We argue that these signals increased over time as the salience of climate change rose and as coverage became politicized. By politicized, we mean that as the issue became more prominent, the news coverage featured an increased number of politicians in addition to scientific experts. The public learned from this discourse and polarized accordingly.

Purpose of this coding exercise: to validate hand coding done by us. The articles or transcripts you will read were all coded as having reference to Democratic or Republican elites. You will be verifying whether or not they are indeed cues by party elites on climate change and the nature of the message they were sending.

There will be three steps: 1) Code whether a cue from either a Republican or Democratic elite is present in the newspaper article or a television transcript; 2) Code whether the cues present in a given article or transcript have a pro-climate and/or anti-climate slant in the text; 3) Code the justifications given by party elites for an anti-climate stance (economic or climate uncertainty/denial).

The articles and transcripts you read will have words highlighted indicating reference to climate change or party leaders. The purpose of this is to help draw your attention to potentially the most important parts. You should still read each item carefully, however. The dictionary we used to identify party elite references in articles can be found at the back of these instructions.
Operating definition of a cue: an explicit or implicit stance on climate change science or climate change policy attributed to either the Republican or Democratic Party or their elites in a newspaper article or broadcast transcript.

Operating definition of party elite: a person who holds political office and is identified as a Republican or Democrat; a member of the executive branch that is affiliated with the administration (President, Vice President, cabinet officials, agency heads); a member of the majority or minority congressional leadership (whips, committee chairs, leaders, the Speaker); a Democratic or Republican party official; any person identified in the press as being currently linked to either the Republican or Democratic parties.

Note: sometimes series executive and congressional officials won’t have their party identified. It is taken for granted in coverage what party they belong to. This is always the case for Presidents and Vice Presidents for example.

Coders should look for the following:

1) Are any of the references to the Democratic or Republican Party or their politicians in the article part of a climate change cue? (Y/N; If N, move on to next article)

2) If Y: Is there a cue supportive of the scientific consensus? (Y/N)
   a. Should be scored Y if there is:
      i. An explicit recognition either that climate change is real and human-caused, or that most scientists concur; or
      ii. Support a policy action to address climate change, for example a carbon tax or cap and trade system (irrespective of magnitude of policy and the support it receives from environmentalists and other pro-climate actors)

3) If Y: Is there a cue opposing the scientific consensus? (Y/N)
a. Should be scored N if:

   i. Claim climate science is uncertain; and/or
   
   ii. Deny science of climate change full stop; and/or
   
   iii. Oppose a proposal of climate change mitigation or international climate change treaty

Note: Articles can contain cues that run in both directions for a given party. This can happen in the following situations (not inclusive):

   a. Opposing cues with same party in an article (e.g. John McCain vs. other Republicans)
   
   b. Contradictory policy (e.g. oppose Kyoto, but support alternative climate change policy action)
   
   c. Changing opinions of same politician (e.g. Mitt Romney)
   
   d. Accept climate change is happening (consistent with Y), but reject proposed policy action (consistent with N)
   
   e. Claim science is uncertain (consistent with N), but support funding of more research on climate change impacts, and/or policy to mitigate potential risk of climate change (consistent with Y; common in early years)

For cues that are coded N on the second test and Y on the third (pure anti-climate signal):

   1) Economy: is justification to opposing climate consensus, in part, related to economic concerns (jobs, the economy, economic competitiveness, need for developing world participation, energy costs, etc.)? (Y/N)
2) Uncertainty/Denial: is justification to opposing climate consensus, in part, related to alleged scientific uncertainty surrounding climate science or denying the seriousness, existence, or man-made nature of climate change? (Y/N)

Note: This is not all-inclusive. Many cues don’t have clear justifications for stance on climate change.
Appendix H  Media survey questions

Media question:

On an average day, how likely are you to turn to the following news outlets?

[randomized]

Network evening news like NBC Nightly News

Local news from your local TV station, for example Eyewitness News

Fox News with shows like America’s Newsroom or The Five

MSNBC with shows like Live with Tamron Hall or The Rachel Maddow Show

CNN with shows like CNN Newsroom or Anderson Cooper 360

Listen to NPR, with programs like All Things Considered or The Morning Edition

Read a national or regional newspaper (including online) like the USA Today, the New York Times or the Houston Chronicle

Read a local newspaper (including online) from your community

Listen to conservative talk radio, like The Rush Limbaugh Show or The Glenn Beck Program

Read liberal websites, like The Daily Kos or the Huffington Post

Read conservative websites, like the Daily Caller or Breitbart.com

Social media, like Facebook or Twitter*

*If this is selected, please specify the profiles you most frequently follow to get news on social media [text box]
## Appendix I Variable background

<table>
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<th>% of sample in category</th>
<th>Category type</th>
<th>Coding</th>
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<td>0</td>
<td>35.4</td>
<td>Strong believers</td>
<td>Must say that global warming is certainly happening, and very serious problem, and human caused.</td>
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<tr>
<td>1</td>
<td>20.4</td>
<td>Believers</td>
<td>Just like strong believers, but less certain. Can say that global warming is probably happening and/or it is a somewhat serious problem. Must say it is human caused.</td>
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<tr>
<td>2</td>
<td>25.6</td>
<td>Inconsistent</td>
<td>An inconsistent mix of answers on the three global warming questions that are not encompassed by the remaining four categories.</td>
</tr>
<tr>
<td>3</td>
<td>10.2</td>
<td>Skeptics</td>
<td>Just like denialists, but less certain. Can say that global warming is probably not happening and/or it is not a very serious problem. Must say it is due to natural causes.</td>
</tr>
<tr>
<td>4</td>
<td>8.4</td>
<td>Denialists</td>
<td>Must say that global warming is certainly not happening, and is not at all a serious problem, and due to natural causes.</td>
</tr>
</tbody>
</table>

### Table I Coding of climate denial scale

Categories are mutually exclusive, based on answers to three climate change questions: 1) You may have heard about the idea that the world's temperature may have been going up slowly over the past 100 years. What is your personal opinion on this? Would you say global warming is (certainly happening; probably happening; probably not happening, certainly not happening).; 2) Assuming it is happening, do you think a rise in the world's temperatures has been caused mostly by human activity or mostly by natural causes?; 3) Assuming it is happening, how serious a problem is the warming of the earth's climate? (very serious; somewhat serious; not very serious; not at all serious).
<table>
<thead>
<tr>
<th>Media diet</th>
<th>Must include</th>
<th>May include</th>
<th>Must not include</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echo chamber (left)</td>
<td>MSNBC or Liberal websites</td>
<td>Fox News &amp; Conservative talk radio &amp; Conservative websites &amp; national newspapers &amp; CNN &amp; network news</td>
<td></td>
</tr>
<tr>
<td>Diverse/Centrist</td>
<td>MSNBC or CNN or national newspapers or network news</td>
<td></td>
<td>Fox News</td>
</tr>
<tr>
<td>Diverse w/Fox</td>
<td>Fox News and at least one of the following: MSNBC or CNN or national newspapers or network news</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echo chamber (right)</td>
<td>Fox news</td>
<td>Conservative talk radio or conservative websites</td>
<td>MSNBC &amp; Liberal websites &amp; national newspapers &amp; CNN &amp; network news</td>
</tr>
<tr>
<td>No national</td>
<td></td>
<td></td>
<td>Fox News and CNN and MSNBC and national papers and network news</td>
</tr>
</tbody>
</table>

Table I.2 Composition of media diets.
### Appendix J Full regression results

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>-0.275</td>
<td>-0.329**</td>
</tr>
<tr>
<td></td>
<td>(0.234)</td>
<td>(0.131)</td>
</tr>
<tr>
<td>Ideology</td>
<td>0.768***</td>
<td>0.736***</td>
</tr>
<tr>
<td></td>
<td>(0.149)</td>
<td>(0.0776)</td>
</tr>
<tr>
<td>Age</td>
<td>0.0113</td>
<td>0.000290</td>
</tr>
<tr>
<td></td>
<td>(0.00725)</td>
<td>(0.00415)</td>
</tr>
<tr>
<td>Higher education</td>
<td>-0.244</td>
<td>-0.359***</td>
</tr>
<tr>
<td></td>
<td>(0.271)</td>
<td>(0.148)</td>
</tr>
<tr>
<td>Black</td>
<td>-1.030*</td>
<td>0.146</td>
</tr>
<tr>
<td></td>
<td>(0.596)</td>
<td>(0.218)</td>
</tr>
<tr>
<td>Interest</td>
<td>0.167***</td>
<td>0.0468*</td>
</tr>
<tr>
<td></td>
<td>(0.0520)</td>
<td>(0.0275)</td>
</tr>
<tr>
<td>Religious</td>
<td>0.0963</td>
<td>0.0752</td>
</tr>
<tr>
<td></td>
<td>(0.234)</td>
<td>(0.139)</td>
</tr>
<tr>
<td>Republican</td>
<td>0.191</td>
<td>0.734***</td>
</tr>
<tr>
<td></td>
<td>(0.305)</td>
<td>(0.186)</td>
</tr>
<tr>
<td>Strong Republican</td>
<td>-0.275</td>
<td>-0.115</td>
</tr>
<tr>
<td></td>
<td>(0.287)</td>
<td>(0.202)</td>
</tr>
<tr>
<td>Trust in scientists</td>
<td>-0.718***</td>
<td>-0.512***</td>
</tr>
<tr>
<td></td>
<td>(0.144)</td>
<td>(0.0795)</td>
</tr>
<tr>
<td>No national news</td>
<td>1.658***</td>
<td>1.068***</td>
</tr>
<tr>
<td></td>
<td>(0.376)</td>
<td>(0.204)</td>
</tr>
<tr>
<td>Diverse w/Fox</td>
<td>0.652*</td>
<td>0.879***</td>
</tr>
<tr>
<td></td>
<td>(0.376)</td>
<td>(0.185)</td>
</tr>
<tr>
<td>Echo chamber (right)</td>
<td>2.563***</td>
<td>2.454***</td>
</tr>
<tr>
<td></td>
<td>(0.380)</td>
<td>(0.247)</td>
</tr>
<tr>
<td>Constant</td>
<td>-6.003***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.792)</td>
<td></td>
</tr>
</tbody>
</table>

| Observations         | 961     | 961     |
| Pseudo R squared     | 0.45    | 0.27    |

**Table J.1 Determinants of climate attitudes.** In Model 1, the DV is a dichotomous climate skepticism. Cell entries are coefficients from a logistic regression. In Model 2, the DV is an ordinal climate denial scale. Cell entries are coefficients from an ordered logistic regression. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1