1.0 Introduction

Anthropogenic climate change is one of the most salient issues facing the world. Numerous countries, policy-makers, organizations, and individuals have recognized the need to implement wide-ranging actions to mitigate further greenhouse gas emissions. As one of the world's largest $C0_2$ emitters, in both total emissions and per capita emissions (EPA.Gov), the United States will play a critical role in the future for mitigating the dangerous effects associated with it. One of the major drivers for large-scale change in public policy in the United States has always been by lawmakers (Mintrom and Vergari, 1996). These initiatives generally rely on public support for approval and passage by Congress. Therefore, it is imperative that the general public support the notion that anthropogenic climate change is an accurate scientific assessment and also a pressing matter in need of requiring immediate action.

There has been an overwhelming consensus within the scientific community since at least the early 1990s that issues related to global warming and climate change have been primarily anthropogenic in origin. Until 2007, public opinion on the issue in the United States was trending with the scientific community, contending both that increasing global temperatures was a pressing matter and that the actions of human beings were contributing to the increase. However, after 2007, public support over environmental issues began to significantly change. Public opinion on the importance of climate change sharply declined in the United States, as did public consensus on the science behind the anthropogenic influence on the issue.

Several theories have attempted to explain the decline in public support of climate change related issues. Some of the theories for the shift in public opinion include: the economic recession of 2008, short-term, localized, cooler weather patterns leading the public to believe that the earth is not trending toward warmer overall temperatures, limited public access to accurate scientific information on the subject, bias in media coverage, so-called elite cues from politicians, the Climate Research Unit email controversy of 2009, a movement/countermovement advocacy campaign against policy initiatives, and general discrepancies in the science as to the overall effects of increased warming (Brulle et al. 2012). Whereas many of these factors likely play a role in the shift in public opinion on issues related to climate change, there is reason to believe that many of these indicators are, in actuality, manifestations of elevated political polarization on the issue.

In recent years, shifting "cues" from scientific elites toward political elites has played a significant role in the public's understanding, perceptions, and skepticism of climate change science origins. Much of the literature exploring this shift identifies political polarization as a major driver, meaning that as a political party tends to formulate and project an opinion on environmental topics, individuals who identify or associate with that political party tend to formulate similar opinions, even if they differ from evidentiary support from the scientific community.

This paper will explore the shift in public opinion and support in the last decade. Disagreements within the scientific community on the effects of climate change related issues are presented and explored as possible influences on public opinion, along with several of the drivers that political polarization has used to shift opinions. This paper

hypothesizes that some of the drivers include the shift in cues from scientific elites to political elites, media balance as a form of bias, and the role of the great recession of 2008 as both an argument for a counter-movement away from climate change science and research toward non-scientific opinion. This paper will also explore cues from the political elite, primarily members of the U.S. Congress, during the transition of political majority power from 2007 to 2008 and from 2008 to 2010 and how the presentation of climate change differed in Congress as a result of party majority. How the media was used by the elites to drive the conversation of global warming away from a consensus of scientific fact toward one of scientific skepticism will also be explored. How the recession of 2008 became a means of shifting public opinion by political elites not only on the overall importance of climate change, but also on the negative economic impacts of climate change policies will also be explored. As many studies and polling data presented here use either "climate change" or "global warming" when referring to Americans perceptions, this paper will use both terms when citing literature.

2.0 Public opinion on climate change

According to recent data, perceptions over the issue of climate change have never been an overwhelming consensus in the United States. However, attitudes on climate change are complex and multivariate. When polling the public for attitudes regarding the issue of climate change or global warming, attitudes regarding worry and concern, whether there is a scientific consensus on the issue, the seriousness of the issue, whether human activity is a contributing factor, and how to address the issue have been analyzed. According to Gallup Research, only 34 percent of Americans saw global warming as a threat in their lifetimes in 2013, and only 53 percent of Americans think that human activity is a significant contributing factor to global warming (Clement, 2013). According to a 2012 Pew Research poll, only 45 percent of Americans believe there is a scientific consensus over the issue of climate change (Plummer, 2012), while a similar Gallup poll showed a slight majority, with about 55 percent of the public believing there was a scientific consensus (Clement, 2013).

Evidence suggests that only about half of Americans think there is a scientific consensus over the issue of climate change or global warming (Cook et al. 2013). The questions then becomes, is there significant data that suggests there is a scientific consensus regarding climate change or global warming, and if so, is the scientific consensus over anthropogenic global warming significantly higher than what the public believes?

3.0 The scientific consensus on anthropogenic climate change

There is an overwhelming consensus within the scientific community that global warming is occurring and in large part due to anthropogenic forces (Oreskes, 2005). The 2007 Intergovernmental Panel on Climate Change (IPCC) scientific assessment report concluded with a 90 percent level of certainty that increasing global temperatures is both primarily anthropogenic in origin and linked to industrial processes (Parry, 2007). This was preceded by the 2001 IPCC report on climate change that reported global warming was "*very likely"* anthropogenic in origin (McCarthy et al. 2001). The IPCC echoed what has consistently been consensus within the scientific community on the issue of anthropogenic climate change.

Doran and Zimmerman (2009) conducted an assessment of the scientific consensus of climate change. They asked two questions to 10,257 earth-scientists and received 3,146 responses. The two questions asked were "When compared with pre-1800s levels, do you think that mean global temperatures have generally risen, fallen, or remained relatively constant?" And "Do you think human activity is a significant contributing factor in changing mean global temperatures?'' Of these specialists, 96.2 percent answered "risen" to question one and 97.4 percent answered "yes" to question two (Doran and Zimmerman, 2009).

The National Research Council, an arm of the National Academy of Sciences, in 2010 completed three assessments of global warming. The three reports concluded that Earth is warming, that this warming is largely due to human activities, and that there are multiple lines of evidence supporting this conclusion. While there are many uncertainties of how high future global average temperatures could be, the reports noted that the

United States should begin a plan for reducing greenhouse gas emissions immediately (NAS.org).

A newly published study (2013) on the scientific consensus on climate change finds an even greater percentage of agreement within the scientific community. In a study by Cook et al. (2013), over 11,000 abstracts from 1991-2011 were reviewed that matched the topic of "global climate change" or "global warming." The findings showed that among the abstracts that expressed a position on anthropogenic global warming (32.6% of the abstracts viewed), 97.1 percent expressed a consensus that human beings are causing global warming (Cook et al., 2013). These findings suggest that although the effects of global warming are still a topic of debate within the scientific community, the causes are not.

There is, however, significant debate over the effects of global warming and these debates are in the context of overwhelming scientific literature pointing towards numerous environmental and public health effects (McMichael, 2013). Much of the scientific disagreement stems from inadequacies in model data to accurately predict the climate's sensitivity to a variety of different forcings. With considerable scientific consensus over human contributions to warming, what is the scientific debate over the effects of this warming?

4.0 The scientific debate over the scale of climate sensitivity

With the recent news that the concentration of carbon dioxide in Earth's atmosphere passed 400 parts per million for the first time in three million years (Showstack, 2013), the debate over what a doubling of CO_2 in Earth's atmosphere means

for Earth's overall temperature has never been more important. Accurately predicting the sensitivity of Earth's climate is a significant challenge within the scientific community. This challenge has been investigated thoroughly since global warming became a salient issue in the 1980s. In fact, there is debate, albeit uneven, within the scientific community about just how sensitive Earth's climate is to increasing CO_2. And with this rigorous debate, it is argued that the American public's trust in the science behind anthropogenic climate change has never been overwhelming (Brewer and Ley, 2012). One reason for debate among the general public over the importance of anthropogenic climate change is that there is debate, albeit uneven, from the scientific community on this issue as well.

There is uncertainty in many of the outcomes of increased warming, such as the geographic locations of future extreme storms or heat waves. These involve how much warming will be caused by excess CO_2 emissions. The uncertainties in the outcomes of this warming are due to the complexities of the climate system, the incomplete understanding of this complex system, and the fact that the system is moving outside the bounds of historical records (Weber and Stern, 2011).

Despite an overwhelming consensus within the scientific community that global warming is occurring and very likely driven by anthropogenic GHG emissions, there is still debate over how much warming the Earth will see and what effects will come of it. Climate skeptics have long used discrepancies in the climate model outputs to show that the science used to predict climate sensitivity to increased global warming is not sound enough to warrant a prediction of significant change. This could have implications for the American perceptions of climate change. If the science in the climate sensitivity

models is not precise enough yet to accurately predict the effects of a doubling of CO_2 in Earth's atmosphere, why should Americans conclude the impending consequences?

Climate sensitivity is the globally averaged equilibrium change in temperature as a response to a doubling of atmospheric CO_2 (Annan and Hargreaves, 2006).

Climate sensitivity (S) is known as the equilibrium of the change in global surface temperature (ΔTeq) as a response to a specified forcing after the planet has come back to or reached a new energy balance:

$$S = \Delta Teq/F$$

This sensitivity is the global temperature change per unit forcing. Climate sensitivity depends upon climate feedbacks. Positive feedbacks amplify the climate response and negative feedbacks reduce the response. Earth's sensitivity to its climate revolves, in part, around the idea that its response to climate variables is being slowed by global ocean inertia, along with the ice sheets of Greenland and Antarctica. These require centuries or even millennia to reach their total response to such variations. This long response time, along with the evaluation of many positive and negative feedback mechanisms, makes the task of avoiding dangerous human alteration of climate particularly difficult (Hansen et al. 2012).

The American public is not likely to have a firm understanding of either climate sensitivity or the positive and negative feedbacks in place to scientifically deduce how sensitive the Earth is to a potential doubling of atmospheric CO_2. However, these sensitivities are likely to cause perturbations that may be felt by the general public (Bostrom et al. 1994). It is argued that Americans have become better natural observers

of their local environments, which can help provide a better understanding of environmental issues, such as climate change (Crona et al. 2013). If the general public does not have a sense that temperatures are warming or that there are significant effects, public opinion on the significance of climate change is likely to wane, even if the science concludes that warming is occurring.

4.1 Variability in climate sensitivity models

The debate over climate change is not simply over temperature as it pertains to climate sensitivity. Rather, the debate points to real discrepancies among models geared toward predicting future outcomes. The details of the impacts of climate change that humans would have to prepare for and adjust to are still the subjects of considerable research. Adapting these models requires information on the scale over which human organizations and institutions have authority and capacity, yet the general circulation model's forecasting skills at these scales are still incomplete (Oreskes et al. 2010).

For instance, a look at subtropical subsidence as it pertains to climate sensitivity suggests that the intensity of subtropical dry zones in models within the boreal monsoon is linked to projected cloud trends, albedo, and model sensitivity. However many of these models fail to accurately resolve these links within the boreal monsoon and, therefore, are inadequate predictors of future trends (Fasullo and Trenberth, 2012).

Current models also inadequately capture the role of climate sensitivity as it relates to increased warming and sea ice cover. There appears to be discrepancies over the amount of sea ice lost based on model projections when compared to actual satellite data (Winton, 2011). While these data proved to underestimate the sensitivity of sea ice

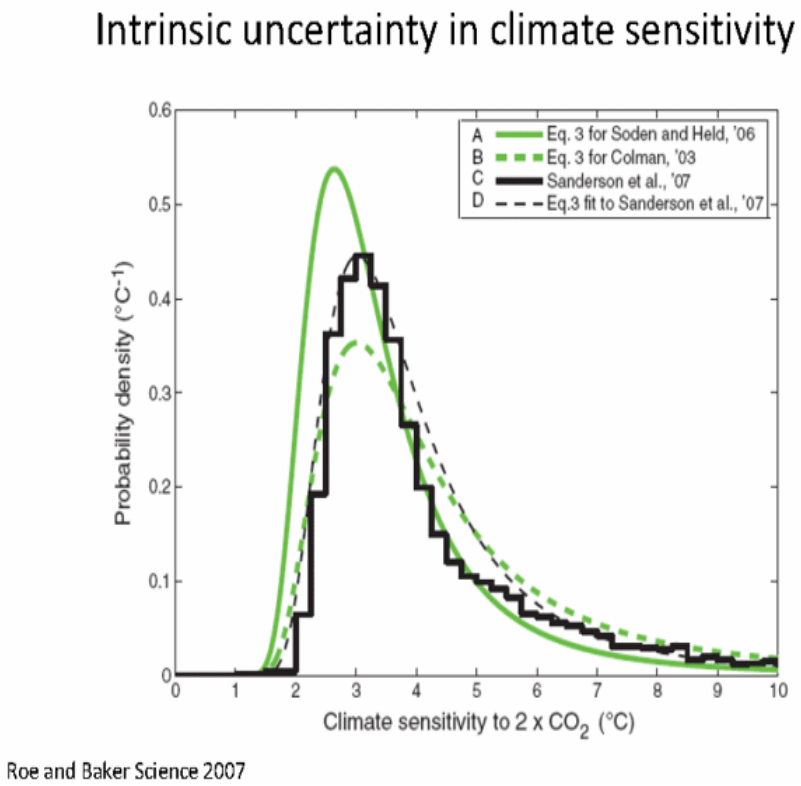
cover, it nevertheless underscores that there are clear and present inadequacies within climate sensitivity models to accurately predict future outcomes to warming trends.

With drastic ideas by some in the scientific community to "geoengineer" the Earth back into a more stable climate before the effects of global warming have fully set in, it is important to fully understand these effects. From injecting aerosols into the atmosphere, to dumping excess iron into the world's oceans, it is reasonable to see why Americans may be apprehensive about embracing global warming as an issue in need of desperate "fixes" with implications that are, in and of themselves, uncertain (Hamilton, 2013).

A look into the debate over the effects of climate change does show large disagreements among the models aimed at predicting climate sensitivity to increased CO_2. The question then becomes, how much do these discrepancies play a role in the public's perceptions of climate change?

Many climate sensitivity models have predicted that a doubling of atmospheric CO_2 could increase planetary warming between three and eight degrees Celsius (Gillis, 2013). However, new studies now suggest that the upper values of this range are not likely outcomes. It is estimated that a doubling of CO_2 in Earth's atmosphere could cause an increase in global temperatures between 1.5 and 4.5 degrees and that the value of six degrees is too much of an uncertainty based on given climate sensitivity models (Annan and Hargreaves, 2006). Figure 4:1 shows the likely warming that will occur as a result of a doubling of atmospheric CO_2.

Figure 4:1-Temperature response of Earth to a doubling of atmospheric CO_2



Along the lines of climate sensitivity as it pertains to cloud feedback modeling in order to quantify the balance between radiative fluxes in the atmosphere, a number of cases where individual models show stronger forcings and feedbacks than otherwise normal have also been identified. Recent studies have encouraged modeling groups to investigate these unusual model behaviors. One explanation is that most of the models fail to correctly reproduce relationships between stability and the cloud radiative effect in the subtropics, showing there is still room for future model improvements (Webb et al. 2013). Moreover, studies associated with the Coupled Model Intercomparison Project (CMIP5) have shown that differences in tropical cloud feedbacks

between low and high sensitivity models occur over large regimes, but primarily happen from the regimes associated with shallow cumulus and stratocumulus clouds. These results point to an underestimation of the multi-model mean and inter-model cloud-induced temperature change associated with it (Vial et al. 2013).

Some variables (such as temperature) are easier to predict with models when considered on global scales, however, large discrepancies still exist on regional scales for such variables as precipitation, drought, and flooding. With limitations in global climate models to accurately predict hydrologic variables on regional scales—even within 200 kilometers—the reliability of precipitation and flooding predictions due to climate change is still a topic of debate (Maraun et al. 2010).

Results of these studies show how clear the challenge within the scientific community is to interpret local and remote physical processes in order to assess the reliability of model responses. Polling data show that the American public expresses quantifiable doubt over the severity of climate change effects. But what is also of considerable note is that the general public tends to believe that the level of scientific agreement on climate change is substantially low as well (Anderegg et al. 2009). While there is considerable evidence that this opinion is most likely shaped by a countermovement campaign by conservative think tanks in order to downplay the effects and origins of anthropogenic climate change (Smith and Leiserowitz, 2012), the level of uncertainty within the scientific community over these effects is one factor whose contribution to this opinion is worthy of more investigation.

4.2 Scientific scrutiny and climate change

It is suggested that political controversies with a technical foundation, such as the origins and consequences of climate change, cannot be resolved by technical means. Therefore, rather than a lack of scientific understanding, scientific uncertainty is understood as the lack of coherence among competing scientific understandings that are amplified by political, cultural, and institutional frameworks that science is carried out under (Sarewitz, 2004). This suggests that as the science around climate change grows more and more robust, it is only helping to aid in the political gridlock that uses these discrepancies in scientific inquiry not only to de-legitimize climate change as an area of scientific study, but to point to a lack of coherence in science itself.

A lack of coherence within the scientific community may also aid in politically motivated conclusions regarding climate change origins and outcomes. As Stephen Schneider, Biological Sciences professor at Stanford University and lead author of several IPCC chapters and the IPCC guidance paper on uncertainties writes: "Even the most credible international assessment body, the Intergovernmental Panel on Climate Change (IPCC), has refused to attempt subjective probabilistic estimates of future temperatures. This has forced politicians to make their own guesses about the likelihood of various degrees of global warming. Will temperatures in 2100 increase by 1.4 degrees Celsius or by 5.8? The difference means relatively adaptable changes or very damaging ones (Schneider, 2002)." By allowing politicians to use scientific debate and scrutiny as a means of portraying science as incoherent, a seed of doubt can be placed among people susceptible to political elite cues shaping the issue as one of a lack of scientific coherence.

5.0 Public response to scientific debate over climate change

The American public's views have evolved since the idea of global warming became more salient in the 1980s, and by 2007 the majority of the public viewed the issue of climate change as an important issue (Akerlof et al. 2010). The range of potential in the effects of increased CO_2 in the Earth's atmosphere, however, have been a topic of debate within the world of science during this evolution in American public opinion. Despite incredible advances in computer power from the 1980s to late 2010, neither the level of uncertainty over this issue, nor the amount of effort put forth by the scientific community, has waned. Roe and Baker write that this suggests that reductions in the uncertainty in projecting future climate conditions have been impeded by gaps in our understanding of the climate system or by a mechanism (which by itself may be well understood) of the system's underlying nature (Roe and Baker, 2007).

Levels of uncertainty within the scientific community may be an indirect driving force shaping public opinion on climate change issues. However, even though there is evidence that attention to science-based news and research (such as environmental magazines or news articles) does have positive effects on knowledge about climate change (Zhao et al. 2011), it is not likely that Americans, in the aggregate, will scour through copious peer-reviewed journal articles and weigh the level of agreement versus disagreement within the scientific literature (Anderson, 2011). Instead, Americans are more likely to perceive climate change if it manifests in ways they recognize in their own environment. Therefore, how the effects of climate change are dispersed will influence if climate change effects are seen as credible. Moreover, since there is great variability in

the effects of climate change, the capacity for Americans to tangibly feel its effects will likely dictate the level of commitment they have to mitigate the effects. As these effects are uneven and observed in the more remote and extreme places on Earth first, such as the northern and southern polar regions (Kolbert, 2010), the capacity for Americans to perceive climate change as a significant threat begins to wane. This suggests that Americans are undergoing a phenomenon of "psychological distancing," whereby climate change is perceived as a distant problem not currently impeding the lives of the average American and therefore not seen as a clear and present danger (Spence et al. 2011). This could be where the discrepancies in climate sensitivity begin to severely impact the public's perceptions of the importance of climate change mitigation.

There is evidence that suggests that localized and short-lived climate-related anomalies have little effect on public perceptions of climate change. However, long lasting weather anomalies (between one month and a year) do have lasting impacts on public perceptions (Deryguina, 2013). This trend could reinforce the notion that perceptions of climate change may be more linked to "feelings" in climate sensitivity and susceptible to doubts that can be reinforced by scientific discrepancies. However, these findings are more significant among the American public who identifies themselves as political conservatives. This would suggest that political affiliation and climate perception interact in ways that intensify the divide amongst Americans over the severity of climate change effects (Deryugina, 2013).

Although there is some disagreement within the scientific community on how much of the climate is currently being impacted by increased CO_2 and how much this impact will be seen in the future, this disagreement is not likely to be a direct cause in the

shift in public opinion on climate change for a few reasons: 1. Public support for climate change mitigation peaked in 2007 and began to significantly wane after that year (Marquart-Pyatt et al. 2009). However, disagreements within the scientific community have been present since climate change became a relevant topic more than twenty years before this shift and have significantly erred on the notion that climate change's effects will be more devastating than benign in recent years (Cook et al. 2013). 2. Scientific articles are typically not read by the general public and therefore have little quantifiable effect on public perceptions (Brulle et al. 2012). 3. As stated previously, there is a general view by the American public that there is a quantifiable disagreement within the scientific community over climate change, suggesting a more complex rationale for the public opinion shift that climate change is more benign in nature than scientific consensus on the topic would suggest.

Key to understanding the effects of climate change is to better understand the physical and biological processes that can make it hard to determine and plan for such effects. In a study done by Lobell and Burke (2008), crop production for 94 crop-region combinations was analyzed for areas of malnourished populations (mostly throughout Asia and Africa). While the hypothesis was that variations in precipitation as an effect of climate change would prove to be the most important, the conclusion of the study determined that uncertainties related to temperature had the greatest contribution to climate change impact uncertainty (Lobell and Burke, 2008). This study underscored the importance of crop responses to temperature variations, with such responses themselves likely to be uneven in the future.

It is expected, however, that these discrepancies within the scientific community, made manifest within the non-scientific community, work as an indirect effect on the public's perception of climate change. It has been recently argued that nominally scientific arguments that question the validity of the effects of anthropogenic climate change and that are publicized by the non-scientific community have been designed to reach ideologically receptive audiences (Hamilton, 2011). Therefore, an audience already susceptible to information regarding climate change as being largely non-anthropogenic could be getting evidence-based literature presented by non-scientific elites specifically targeted to them. Conversely, audiences who believe that climate change is largely anthropogenic in nature will receive information by non-scientific elites reinforcing this belief.

With considerable scientific data suggesting debate over the issue of the climate's response to increased warming, the questions becomes how does the American public receive scientific information, and does the way Americans receive information regarding climate change or global warming shape their attitudes on the issue?

6.0 *U.S. media coverage of climate change and global warming*

Scientific journals are unlikely resources for the general public when accessing climate change information (Brulle et al. 2012). Coverage by the media represents the public's main source of information (Feldman et al. 2011). It is argued that Conservatives, primarily, use media coverage to gauge the positions of political elites and internalize their own perceptions of issues (such as climate change) based on their political party's ideological framework. This notion is the idea of political "priming,":

how the media, through political elite messages, can alter the importance that individuals place on a given issue when evaluating politicians (Lenz, 2009).

News organizations are the primary source for information for the American public, and primary cable news outlets (CNN, MSNBC, and FOX) have the ability to reinforce public opinions on a wide range of issues, including climate change (Stroud and Lee, 2013). As ratings for these news channels have increased in recent years, so has the partisanship on the issue of climate change. With the invention of twenty-four hour cable news, the invention of "niche programming" to target specific audiences, instead of catering to the masses, has become a popular brand of news distribution (Sobieraj and Berry, 2011). According to Pew Research data, Conservatives and Republicans tend to watch Fox News above the national average, and Liberals and Democrats, to some extent, watch CNN and MSNBC above the national average ("Beyond red and blue", 2011). The question then becomes, how do these three cable news outlets differ in their reporting on the issue of climate change?

In a study by Feldman et al. (2011), climate change coverage by Fox News, CNN, and MSNBC was examined, along with the relationship between viewership of these channels and their beliefs about climate change. The results of this analysis reported that there was differentiation on the issue of climate change between the three stations. During the years of 2007 and 2008, Fox News took a more dismissing "tone" toward climate change than did CNN and MSNBC, while also interviewing a higher ratio of climate change doubters and skeptics than did the other two. What is important about this study was the conclusion that Republicans and Conservatives are much more likely

to have their opinion of climate change shaped by the cable news they watch than Democrats or Liberals (Feldman et al. 2012).

The media has become a powerful tool for political elites to shift lay opinion about the scientific consensus on climate change for another important reason: people who do not consider themselves especially well informed on information regarding climate change tend to rely more on political elites and the media when shaping their own opinions about the origins and effects of climate change (Scruggs and Benegal, 2012; Wood and Vedlits, 2007).

The tone of each news station on climate change, along with the degree of scientific skepticism, is shown below. Transcripts from these outlets were classified as accepting of climate change if at least 80 percent of the viewpoints and information presented conveyed that climate change was a real problem and required significant action. Transcripts were classified as dismissive if at least 80 percent of the viewpoints presented challenged the existence or severity of climate change. Figure 6.1 shows the bias between Fox news and CNN and MSNBC when taking a more "dismissive" or "accepting" tone towards climate change. Figure 6.2 shows similar trends in the way Fox news, CNN, and MSNBC depicts the claim that scientists agree on the issue of climte change, with Fox news rejecting the consensus more often than MSNBC, and CNN being the most "affirming" of the scientific consensus over the issue.

Figure 6.1- Overall tone and number of mentions regarding climate change on cable news.

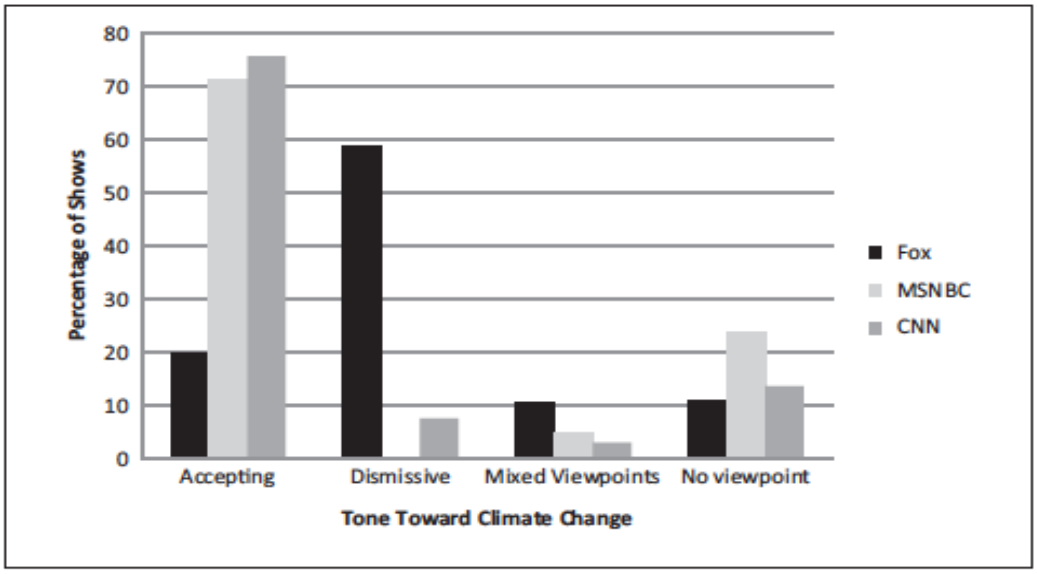


Figure 1. Overall tone toward climate change across cable news networks

Figure 6.2- Percentage of shows vs. scientific agreement

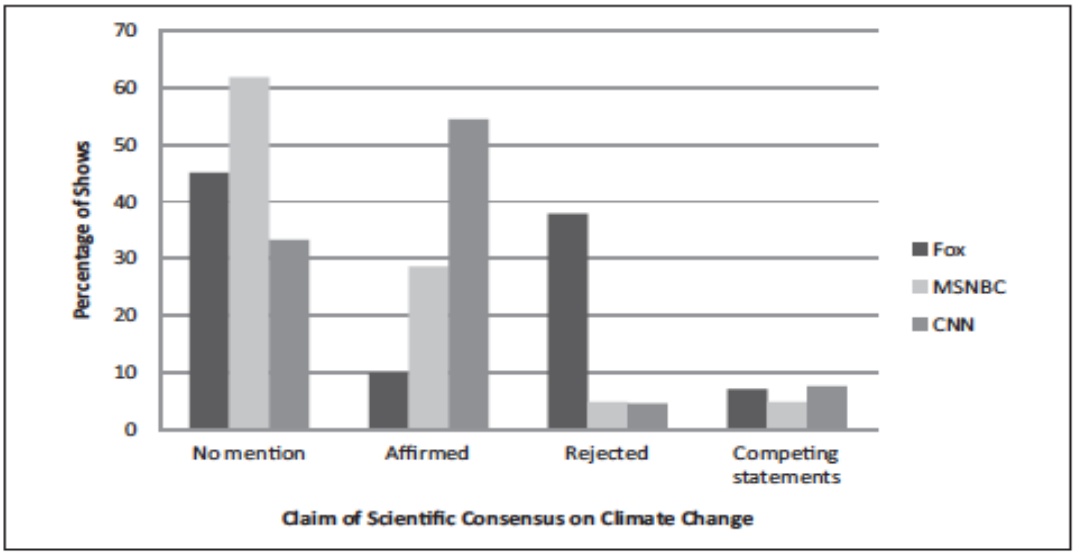


Figure 2. Discussion of scientific agreement on climate change across cable news networks

Fox News, more than CNN or MSNBC, offers news on climate change that leans toward skepticism. This skeptisim typical of conservative-leaning news organizations presents climate change in a way that conforms more closely to the Conservative viewers' positions than did non-conservative outlets (Hart, 2008). This feedback loop—reinforcing a belief in order to maintain that belief—has been a tool in the political arsenal of both Librals and Conservatives in cable news and in newspaper articles as well. A look at the New York Times, Washington Post, Los Angeles Times, and the Wall Street Journal reveals possibly biased coverage of both anthropogenic and natural contributions to global warming. The bias in the reporting may result from the "balance" that many news outlets perceive is necessary when reporting on an issue (Boycoff, 2007).

There is evidence that news outlets, in an attempt to cover both sides of an issue that scientists overwhelmingly agree on, end up sending mixed messages on the consensus of global warming within the scientific community (Schmit, 2010).

Balanced reporting on the anthropogenic contributions to global warming appeared over 52 percent of the time from the New York Times, Los Angeles Times, Wall Street Journal and Washington Post. However, scientific consensus on the contributions of climate change is well above 90 percent from several analyses previously mentioned (Oreskes, 2005; IPCC, 2007; Cook et al. 2013). Reporting that the origin of climate change, often through opinions of political elites, is a matter of scientific debate has incredible potetial to polarize the American public's opinion on climate change

7.0 Political affiliation and climate change perceptions

Scientific consensus about climate change and global warming emerges from peer reviewed journals, magazines, or newspaper articles (Bast and Taylor, 2007). However, the general public does not get the majority of their information from journal articles, or from the vast majority of the scientific community. As mentioned above, information on global warming for the average American comes from media coverage of the issue (Kahlor and Rosenthal, 2009). Furthermore, there is a divide along political party lines over the trust of scientific data concerning climate change. Those who describe themselves as Liberal and Democrat tend to have more trust in scientific findings related to climate change, and those who tend to have less trust in scientific findings on climate change describe themselves as Conservative and Republican (Malka et al. 2009).

Evidence suggests that there is a divide over the perceptions of the causality and severity of climate change in the U.S. and that this divide may be the result of political ideology more than scientific debate (McCright and Dunlap, 2011; Brulle et.al 2012; Fisher et al. 2012). Moreover, there is a general divide in the trust placed in scientific information on climate change as well.

7.1 Increased Political Polarization and Climate Change Perceptions:

While national opinions on various topics tend to wax and wane, there has been a consistent trend in the downward direction from 2006 through 2010 concerning the importance of anthropogenic effects on climate change (Pidgeon, 2012). According to Gallup data, the percentage of adults saying they worry a great deal about climate change fell to just 28 percent of the population by 2010, and to 25 percent by 2011 (Brulle et al.

2012). These shifts in the public opinion on climate change have been related to economic conditions and local weather patterns; however, they also tend to fall along politically affiliated lines. Shifts in beliefs can reduce the cognitive dissonance related to short-term needs and long term problems. Political conservatives are more likely than political liberals to resolve dissonance problems in times of economic hardships as it pertains to climate science and research (Malka et al. 2009).

A recent study performed by Scruggs and Benegal (20120) show that in the period between 2006 and 2010, public belief in anthropogenic contributions to climate change dropped among both Democrats and Republicans; however Republicans from roughly 60 percent believers in 2006 to 38 percent by 2010. Conversely, Democrats decreased from roughly 90 percent to 80 percent in this time period. Republicans are also about 75 percent as likely as political Independents to believe that climate change is occurring, and Conservatives describing themselves as "very Conservative" are about 50 percent as likely as political neutrals to believe in anthropogenic climate change. Democrats, however, are 2.25 times more likely than Independents to believe in climate change, and those describing themselves as "very Liberal" are 2.25 times more likely than "neutrals" to believe in climate change (Scruggs and Benegal, 2012).

While there is some evidence that education differences can lead to misunderstandings about climate science, thereby influencing public opinion (Skamp and Boyes, 2013), there is far greater evidence that political affiliation (along with religious beliefs) has a greater effect in shaping individual beliefs about anthropogenic climate change (Zia and Todd, 2010). Zia and Todd indicated in their findings that education on climate change will not be enough to shift and shape public opinion; rather, political

dynamics will likely shape attitudes about climate change. Therefore, shifts in political elite cues are a far better indicator of public opinion shifts than education paradigm shifts.

Gallup polls spanning the decade of 2001 to 2010 based on telephone interviews with representative samples of adults across the United States were conducted to measure attitudes about climate change (McCright and Dunlap, 2011). These years are important because 2001 marked the publication of the first IPCC report on climate change, along with the National Research Council's 2001 report.

McCright and Dunlap (2011) performed a multivariate statistical analysis on these data mentioned above. Out of these polls, several variables were measured, including: timing of global warming, primary cause of global warming, overall worry about global warming, perceived threats of global warming, party identification, educational attainment, self-reported understanding, environmental movements, identity, gender, age, race, annual income, and religiosity. This study showed a dramatic change took place over these 10 years of Gallup polling. In 2001 there was an 18-point difference between the percent of Liberals (67.1 percent) and the percentage of Conservatives (49.4 percent) who believed global warming had already begun. By 2010 this 18-point difference had become a 44-point difference, with 74.8 percent of Liberals believing global warming was underway and only 30.2 percent of Conservatives believing the same. The same trend was found for Democrats versus Republicans, with an 11 percent difference between the two in 2001, and a 41 percent divide by 2010 (McCright and Dunlap, 2011) (Figures 7.1.1 and 7.1.2).

Figure 7.1.1-Polarization of global warming among Liberals and Conservatives, 2001-2010 (McCright and Dunlap, 2011).

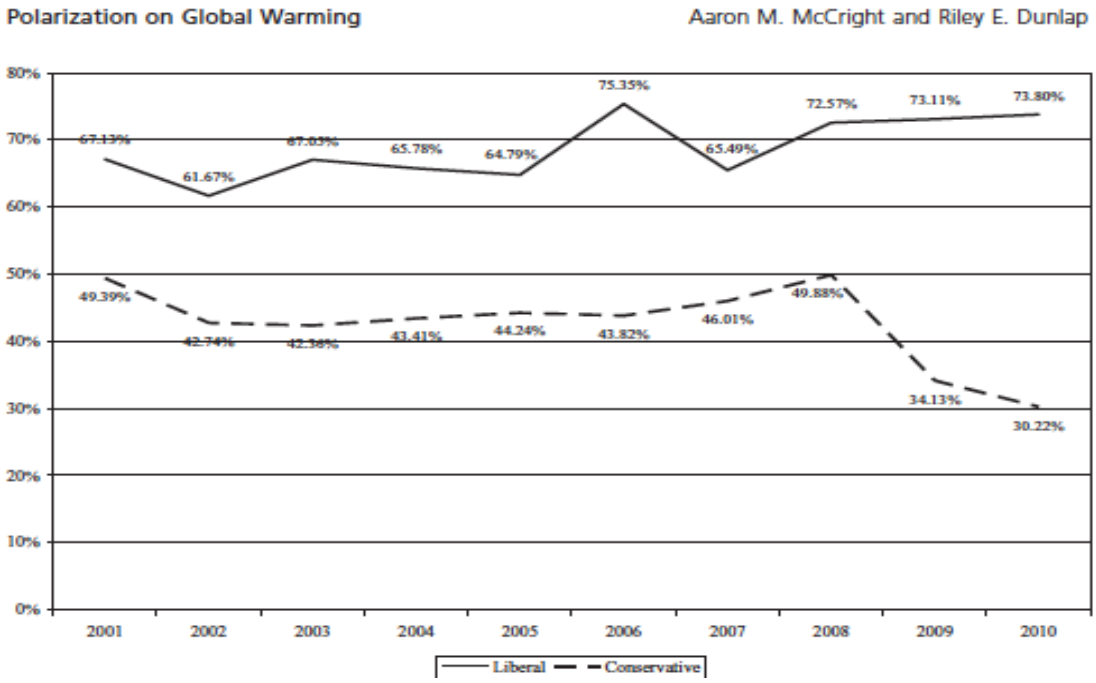


Figure 7.1.2- Democrats and Republicans who believe global warming has already begun 2001-2010

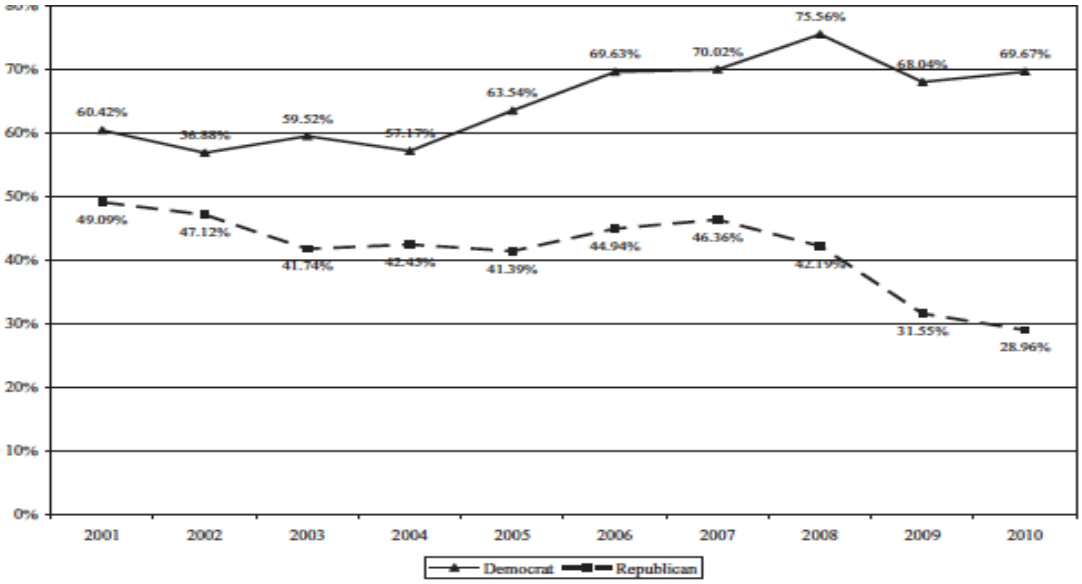


FIGURE 4. Percent of Americans Who Believe the Effects of Global Warming Have Already Begun to Happen from 2001–2010, by Political Ideology and Party Identification.

A similar analysis was conducted by polls from the Gallup Organization at 10-year intervals, from 1990, 2000, and 2010. Three objectives were investigated: 1. To compare the level of concern Americans express for global warming (a term used more frequently in the 1990s than "climate change") to that of a variety of other environmental problems. 2. Situating environmental issues within the context of U.S. national politics. 3. Disaggregating concern about global warming among partisan identifiers by the level of understanding of the issue they claim to possess. Along the same lines as similar studies, the mean levels of concern for global warming were dispersed along political party lines (Democrats, Republicans, and Independents) (Guber, 2012).

What is interesting about this analysis was that Democrats who said they understood the issue of global warming were far more concerned than Democrats who did not. But for Republicans (and to a lesser extent Independents), the reverse was found. Party polarization was married to the acquisition of information on the issue of global warming because Republicans that reported to have a better comprehension of global warming reported to be less worried about its effects than those who reported knowing less. Figure 7.1.3 listed below shows a graphical representation of how the level of worry over global warming coincides with their reported understanding along party lines.

Figure 7.1.3-Concern for global warming among Democrats, Independents and Republicans (McCright and Dunlap, 2011).

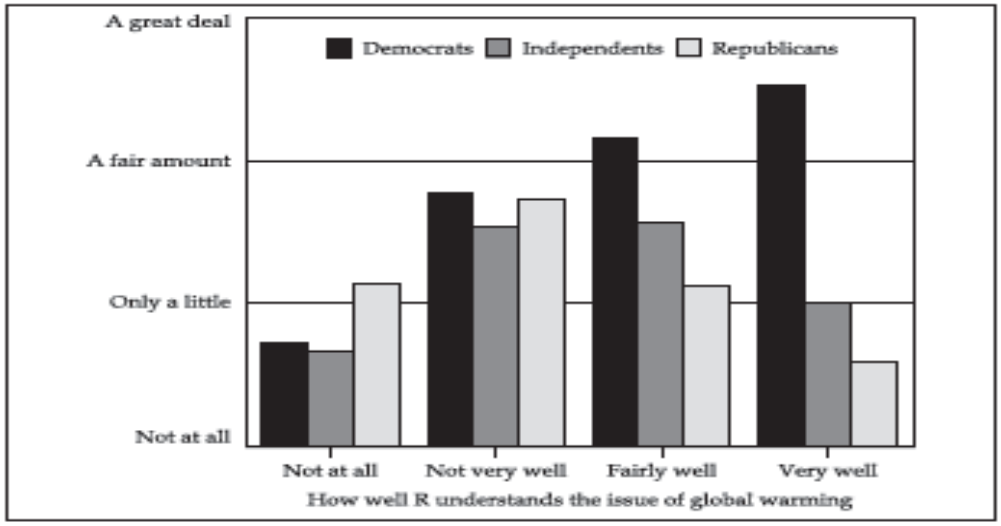


Figure 4. Concern for global warming among partisan identifiers, by level of understanding. "I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little, or not at all. First, how much do you worry about global warming?"
Source: Copyright 2010 by Gallup, Inc. All rights reserved. Reprinted with permission.
Note: The data above have been weighted, using a variable provided by Gallup, to ensure a representative sample of the American adult population.

This evidence is significant relative to the portion of the American public who already thinks that the effects of global warming have begun to happen. As expressed by these polls, scientific discrepancies as to the effects of global warming appear to have far less influence over shaping public opinion on climate change when compared to political affiliation.

Political party affiliation does also have multivariate attachments to personal attitudes about climate change. For instance, individuals with weak political party attachments have been shown to use fluctuations or anomalies in local weather and temperature to change or reassess their beliefs about the existence or magnitude of global warming (Egan and Mullin, 2012). This correlates well with the notion that stronger political ties, either Conservative or Liberal, likely means stronger opinions on anthropogenic climate change as a national issue.

7.2 Political polarization by political elites

With the election of Barack Obama in 2008, and Democratic majorities in both the House and Senate, a growing trend towards legislation related to climate change began to arise. However, by 2010, the Republicans had taken back the House of Representatives, and any hope of passing the cap and trade bill (HR 2454), a significant piece of climate change legislation, proposed by Congress was quickly squashed. It has been argued that since the George W. Bush administration, and moving into the Republican Congressional takeover of 2010, political polarization on the issue of climate change has had a significant effect on public opinion on the issue (McCright and Dunlap, 2011).

Several studies have aimed their hypotheses at the actions of the U.S. Congress to explain shifts in public opinion on climate change. Although reports from news outlets and other media sources are a large part of a Conservative effort to discredit climate change (Feldman et al. 2012), Congressional testimonies provide valuable insight and direct accounts of the discourse around legislation geared towards climate change issues in a broader sense. Data presented below is used to show that Representatives in Congress do have significant influence over the opinion of the general population. For example, many scholars suggest that public opinion polarization is a consequence of "elite" polarization (Layman et al. 2006). And as party voters become more divided, it becomes easier for party elites to target the divided in order to preserve their own constituency (Baldassarri and Gelman, 2008).

In a data analysis from Fisher et al. (2011) of testimonies from climate change hearings during the 109th and 110th sessions of the U.S. Congress were examined. The 109th session was between January 3, 2005 and January 3, 2007. The 110th session of Congress was between January 3, 2007 and January 3, 2009. What is significant about these years is that the Republicans held a majority in both bodies of Congress during the 109th session, with a 55 percent majority in the House and a 53 percent voting share in the Senate. However, by the 110th Congress, Democrats controlled the majority of the House of Representatives, with 54.3 percent of the voting share and 49 seats in the Senate with two Independents who caucused with the Democrats.

Dana Fisher et al. (2011) conducted a search of all hearings before Congress that discussed climate change using the Government Printing Office during the years between 2005 and 2009. The search yielded 71 relevant hearings between 2005 and 2008. Their

study showed that there were more hearings during the Democratic-controlled 110th session of Congress (42 hearings with 598 testimonies from Congress) compared with the Republican-controlled 109th session (29 hearings and 498 testimonies). Coding for statements within the testimonies noted whether the speakers agreed or disagreed with specific ideologies linked with climate change, such as the claims that climate change is anthropogenic (yes or no) and caused by greenhouse gases (GHGs) (yes or no). Coding involved analyzing statements related to the science of climate change or the policy of climate initiatives. Eight statements were coded, and four were analyzed. What is of notable distinction is that science related statements significantly increased from the Republican controlled Congress to the Democratic controlled Congress compared with policy related statements that increased less substantially.

It is also important to point out the differences in organizational affiliations of the witnesses at Congressional hearings during the two sessions. Participation by representatives of business and business trade associations decreased between the 109th and 110th sessions (from 20 percent to 14 percent in the aggregate), and the participation by members of environmental groups increased from 8.7 percent to 14.8 percent. Fisher et al. suggests that the decrease in business statements and increase in environmental group statements shows how the argument was presented from a Republican vs. Democratic controlled Congress. While the number of scientific testimonies did increase during the 110th congress, its representation was still minimal, increasing from 8.3 percent to 10.7 percent (Fisher et al. 2012). Table 7.2, presented below, shows these organizational affiliations. What is of notable distinction in this table is the increase in scientific statements between the 109th and 110th Congress and the sharp increase in

government agencies in the 110th, as Fisher et al. speculated was a powerful lobbying tool for the Democrats.

Table 7.2-Organizational affiliations of "witnesses" at Congressional hearings (2005-2008)

Table 1. Organizational Affiliations of Witnesses at Congressional Hearings on Climate Change (2005–2008)

	109th Congress (2005–2006)		110th Congress (2007–2008)	
	n	%	*n*	%
Business	48	11.7	36	9.2
Business association/ trade group	37	9.0	19	4.9
Democrat	100	24.3	79	20.2
Environmental group	36	8.7	58	14.8
Government agency	41	10.0	87	22.3
Independent	5	1.2	0	0.0
Republican	99	24.0	19	4.9
Scientist	34	8.3	42	10.7
Other	12	2.9	51	13.0
Total groups	412		391	

It has been observed that between the 1970s and the new millennium the major political parties have trended toward a general and gradually increasing polarization on environmental issues (Shipman and Lowry, 2001). Kellstedt et al. (2008) point out as well that more educated individuals may be better able to differentiate between partisan positions that are opposite of their beliefs. For instance, well-educated individuals who are also politically motivated are less likely to change their beliefs than educated individuals who are less politically motivated (Kellstedt et al. 2008). Therefore, increased political polarization has the ability to drive public opinion on climate change among the population of America that is tuned in to political ideologies.

Brulle et al. (2012) presented a study aimed at discovering what was behind the shift in public opinion on climate change leading up to 2010. According to the Gallup polls reviewed for this study, concern over climate change was expressed by 26 percent of participants nationwide in 2004, increasing to 41 percent by 2007, and then it significantly dropped again to 28 percent by 2010. Many different factors were studied to attempt to explain this drop, including extreme weather events, public access to accurate scientific information, media coverage, political elite cues, and a movement/countermovement advocacy campaign concerning global warming. Political elite cues were measured as Congressional press release statements on climate change issued by Republicans and Democrats, Senate and House roll call votes on bills related to climate change, and the overall number of Congressional hearings related to climate change.

A climate change threat index (CCTI) model was utilized to quantify the results of the study. Cues (taken by respondents of the surveys analyzed for this study) from political party elites showed significant results. The Climate Change Threat Index entailed quantifying how concerned respondents were over climate change in survey data from the years of 2002 to 2010 as a result of variables occurring during these years. These variables included weather related events, political elite cues, media advocacy, control variables (economic conditions, GDP, and unemployment, Iraq/Afghanistan war deaths), and mass media coverage. When Democrats released public statements promoting actions to mitigate climate change, the CCTI increased ($P \leq .001$). Each statement promoting climate change saw a CCTI increase of 0.25 points, however, when Republicans released statements opposing climate change mitigation, the CCTI index

declined significantly (P≤.05), driving the index down by 0.17 points. Political elites addressing climate change in a polarizing fashion had the ability to shape public opinion more so than any other variable tested in the climate change threat index model. Most notably, Democratic Congressional action statements and Republican roll-call votes had the greatest capacity to increase and diminish public concern (Brulle et al. 2012). This study reinforced the notion that political forces have an interest in voting and arguing (either in Congressional hearings or through media outlets) in opposing fashion on the issue of climate change in order to get the political "upper hand" on climate change legislation (McDonald, 2009).

8.0 The effect of the recession of 2008 on climate change perceptions

In 2008 the United States, along with many other countries around the globe, experienced the beginnings of what would be termed "the great recession." There is evidence that economic conditions are a driver of public opinion over the level of concern regarding environmental issues (Shum, 2012). Polls tend to indicate that people prioritize concerns over threats they see as most imminent. Therefore, if people perceive that economic conditions will cause negative consequences sooner than climate change will, then this could be reflected in their opinion about which issue should take priority (Leichenko et al. 2010).

In 2009, a Washington Post-ABC News poll revealed that when rating the top concerns for the Obama administration to focus on, only 1 percent of the respondents picked climate change, as opposed to 40 percent who cited the economy. Scruggs and Bengal's 2012 study shows that not only do priorities about climate change wane when

economic conditions worsen, so does the American public's belief in basic facts related to climate change and their trust in the validity of climate change itself. Figure 8.1 shows the trends in American belief about basic climate change facts relative to the start of the great recession (Scruggs and Benegal, 2012). During the recession (2008) opinions about warming being "imminent", warming being due to "human activity", "worry and concern", and belief in the scientific consensus of warming significantly wane from the years of 2008 to 2010.

Figure 8.1-Trends in public support about global warming, 1990-2010 (Scruggs and Benegal (2012).

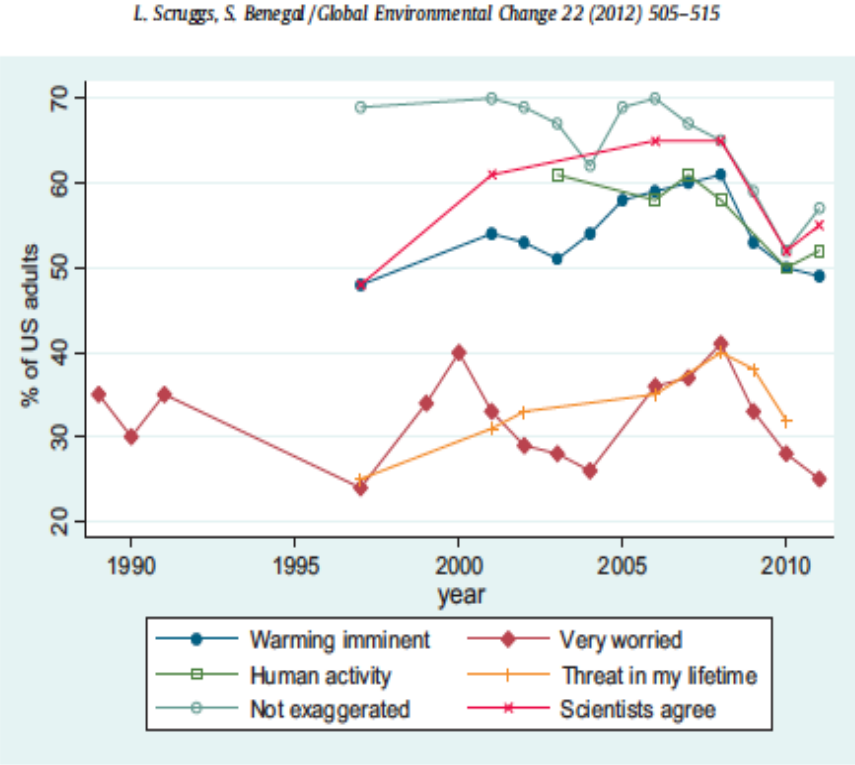
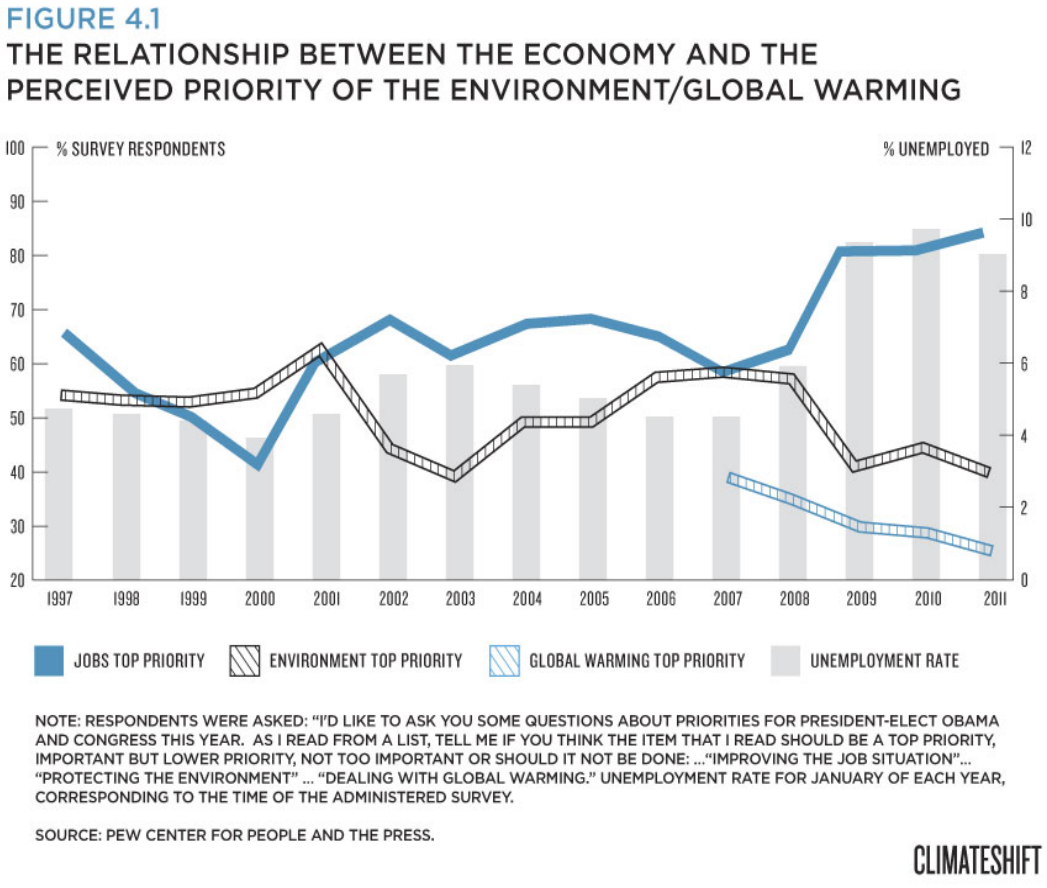


Fig. 1. Gallup poll trends on % of public support for questions about global warming.

To provide further evidence that these beliefs and opinions are linked with economic shifts and not just other opinion-related shifts around the same time, the data shows the statistically significant shift in public opinion on the perceived priority of environmental issues such as increased warming compared to economic issues, such as unemployment rates below. As seen table 8.2 below presented by Matthew Nisbet of Climateshiftproject.org, the trend in favoring environmental issues over economic growth declined significantly with increased unemployment, specifically around 2008, the start of the economic recession.

Figure 8.2-Trend in favoring environment over growth with unemployment (Nisbet, 2011)



8.1 Economics as deterrent for climate change mitigation

As referenced in figure 8.2, there is evidence that economic conditions correlate with trends in public opinion regarding issues related to climate change. The question becomes, do political elites use these economic conditions to downplay the importance of environmental conditions and does this affect public opinion on climate change? Republicans have framed environmental issues as an economic issue. During the first two years of the Obama administration, Republicans fought against tougher environmental regulations, such as stricter ozone pollution standards, citing that these regulations would cause an already battered economy to lose more jobs and impose more costs on business (Rich and Broder, 2011).

In June 2013, Republican lawmakers issued public statements on new regulations being considered that would mandate that gasoline be mixed with biofuels. The standard, created under the 2005 Energy Policy Act, would require thirty-six billion gallons of renewable fuel to be mixed into transportation fuel by 2022. Immediately, Republican lawmakers argued that these standards would cost families more money at the pump and hurt job growth in America. Representative James Lankford (R-Okla.) was quoted as saying: “By requiring refiners to produce a product that consumers can’t use and don’t want, it is only logical that this constriction of the market will increase fuel prices, causing economic damage.” Pat Meehan (R-Pa.) was quoted as saying; “You can destroy the refineries in my backyard overnight, because all they need is a couple of years of losing $150 million or more and they shut down, and when you close a refinery it doesn't come back (Hattern, 2013).”

With the passage of H.R. 2545, the so-called Waxman-Markey Cap and Trade bill in 2009 ("American Clean Energy Act", 2009), conservative think-tanks began an aggressive campaign to shape the bill as a tax that would do nothing more than hurt businesses and impose more taxes on American families. The bill, which became known amongst conservatives as "cap and tax", eventually stalled in the Senate and never became law. Myron Ebell of the Competitive Enterprise Institute gave a view into how conservative groups founded by corporations shape environmental issues to sway public opinion: "We turned it into 'cap and tax,' and we turned that into an epithet (Broder, 2010)."

The idea that environmental issues are fundamentally economic issues appears to resonate with political Conservatives more than Liberals. As previously mentioned, Republicans and Conservatives tend to rely more on political elites to shape their opinions than do Democrats and Liberals (Lenz, 2009). This was seen in the 2009 Reuters poll on the issue of cap and trade in America. Even though over 75 percent of the American public supported limited greenhouse gas emissions from cars and factories to reduce global warming, only roughly 50 percent supported a cap and trade bill. Moreover, the opposition to cap and trade had grown from 34 percent to 42 percent in less than a year (Boadle, 2009). Not surprisingly, these numbers were on the eve of the passage of H.R. 2454 in the House of Representatives, a time when political opposition to the bill was at its highest.

Economic conditions and results play a key role in Americans' perceptions of climate change; however, political elites and Conservative groups presenting environmental issues solely as negative economic issues shape these perceptions. Since

many parts of the world experienced economic recessions around the same time that the U.S. was undergoing theirs, did members of the European Union (EU) experience similar drops in public opinion on the importance of climate change?

9.0 Europe's public opinion on climate change

Political affiliation in America is an overwhelming predictor of public opinion on global warming. This is mostly due to the partisan divide among political elites in America that has helped sway public opinion (Baldassarri and Gelman, 2008). However, it is important to point out that there is evidentiary support in the literature that ties public opinion on climate change to other forces as well. It is suggested that women have a greater willingness to acknowledge ecological problems and risks and to partake in action to mitigate these risks more than men (Goldsmith et al. 2013); that opinions on climate change can have a cultural bias; that education and wealth factor into opinion formation (Crona et al. 2013); and that localized short-term weather events can have a statistically significant impact on perceptions related to environmental issues such as climate change (Deryugina, 2013).

As mentioned in previous sections, it is well established that economic conditions and political polarization on climate change can have significant impacts on perceptions on climate change. In order to differentiate between the two, a look at public perceptions in the European Union (EU) about climate change in the wake of their own economic slowdown should provide some insight into which issue is driving public opinion on

climate change more.

9.1 U.K.'s response to the 2008 recession

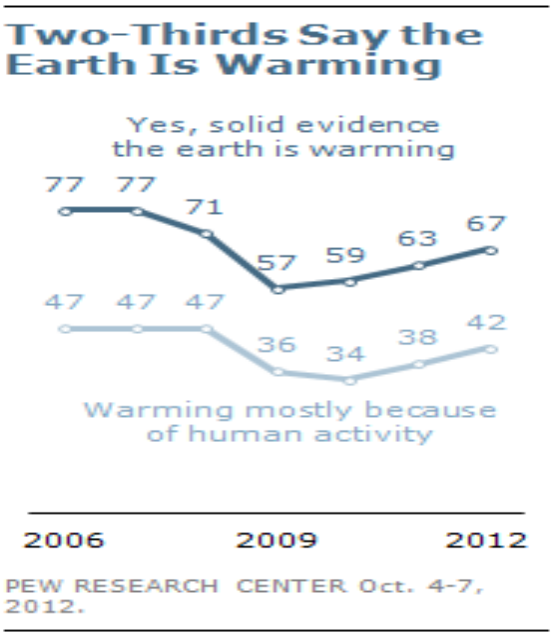
The recession of 2008 to 2009 was felt in many parts of the world, including the EU. In the United Kingdom, data suggests that after the initial recession, Britain fell into a second recession-like "dip" that lasted roughly three quarters (Rojas, 2013). In this time, unemployment rose from roughly five percent to over eight percent nationwide (Elsby and Smith, 2010). This was seen in other countries of Europe as well. The polls did indicate some decline in public opinion on climate change; however, the data indicated that not only were initial public opinions on climate change substantially higher before the economic recession in the EU than in the U.S., but also that the decline in the EU was not as drastic as in the U.S. and their the decline was more linked to the importance placed on climate change instead of opinions related to scientific consensus (Whitmarsh, 2011).

9.2 European Union's perceptions on climate change issues

The European Union has been a leading force in the field of climate policy. Some ambitious decisions have been made, for instance a 20 percent reduction in CO_2 emissions by 2020—and a reduction of 30 percent if an international agreement can be achieved (ESA, 2009). In contrast, in 2008, only 47 percent of Americans believed that global warming was being caused by anthropogenic forces (Pew Research, 2012). Figure 9.2 represents these trends in American perceptions on climate change. As shown, there is a drastic difference between Americans who believe the Earth is warming compared to

Americans who think human activity is the cause. Of notable distinction, around 2008, 71 percent of Americans thought there was evidence of increased warming, compared with only 47 percent who believed the warming was due to human activity.

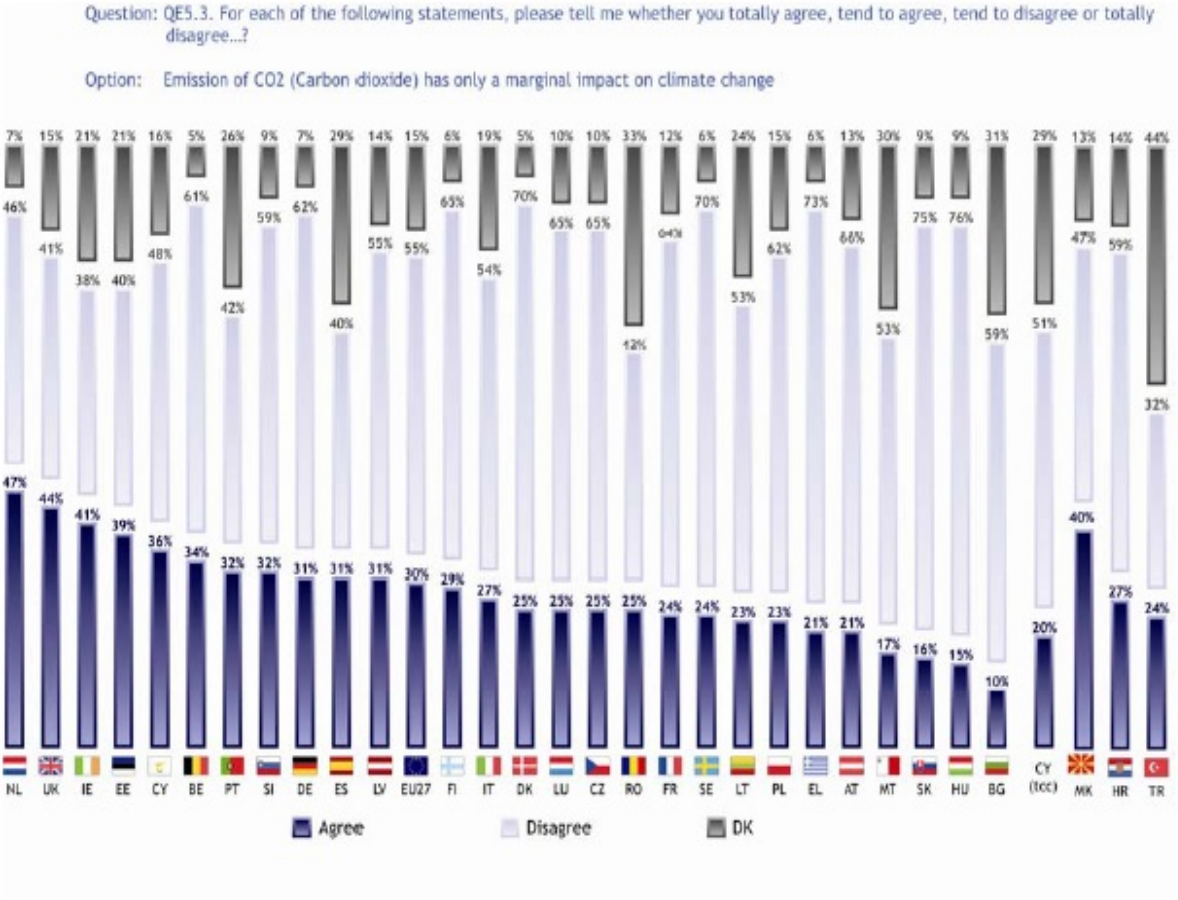
Figure 9.2-Trends in perceptions of human-caused warming in America from 2006-2012.



Data reflecting perceptions of climate change in the European Union in 2008 do show a drop in concern about climate change; however, over 60 percent of the EU still rated climate change as a serious problem facing the world. Just 24 percent cited a major global economic turndown as a threat (Eurobarometer, 2008). Similar studies performed by Eurobarometer in 2011 showed that 80 percent of the EU viewed climate change as a serious threat, with a majority of the EU picking climate change as a more serious threat than economic conditions (Eurobarometer, 2011). As referenced in Table 9.2 below,

when asked whether CO_2 emissions had only a marginal impact on climate change in 2008, a majority in almost every country disagreed, stating they believed it had a larger than marginal impact.

Table 9.2-Does CO_2 emissions have only a marginal impact on climate change?

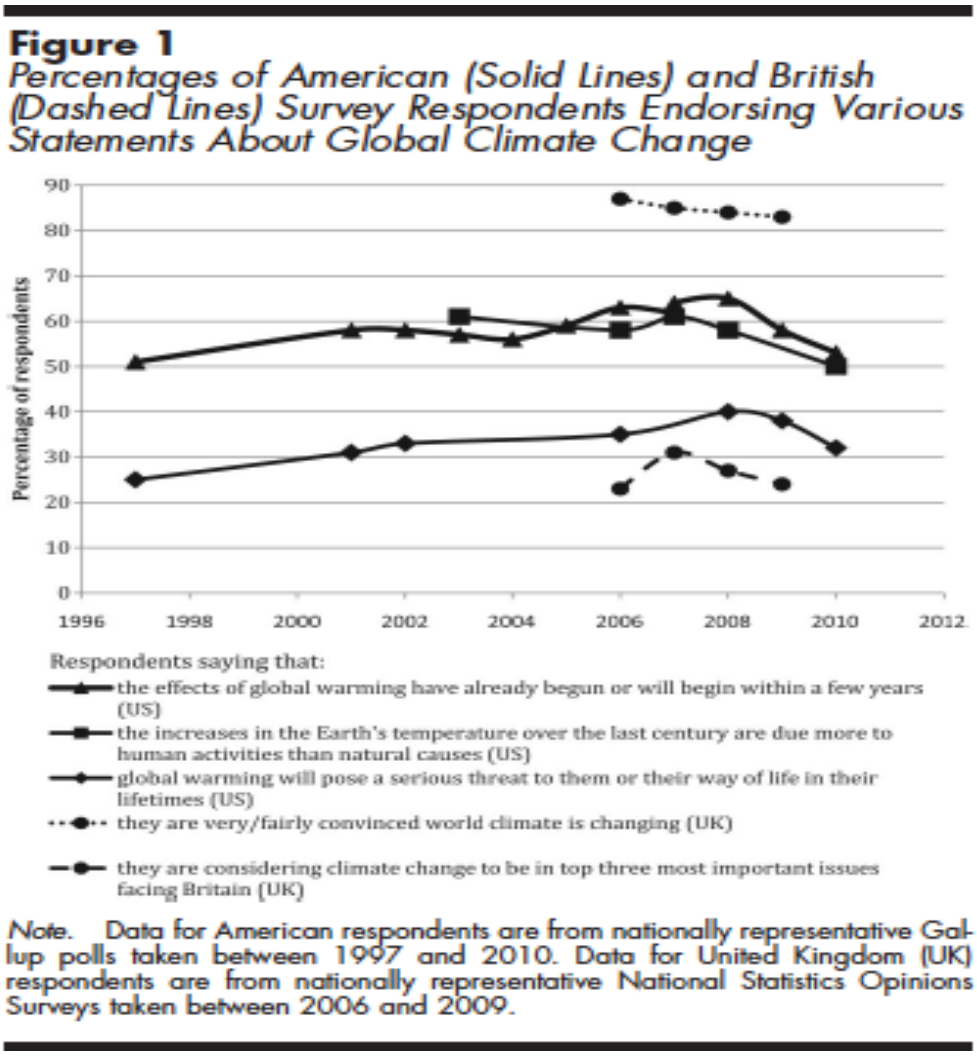


9.3 Climate change perceptions since the recession: Europe vs. the U.S.

In a Gallup report conducted between 1997 and 2010, polling data about the importance and validity of climate change in the U.S. and U.K. were examined. The data shows that in the wake of the recession, climate change was shown to drop significantly as an important issue among members of the United Kingdom, however, data

representing how "convinced" the public was that the climate is changing was much higher in the U.K. than in the United States, suggesting that more than economic conditions played a role in public perceptions of environmental issues not only in the U.S., but in the EU as well (Weber and Stern, 2011). Figure 9.3.1 shows the trends in statements about global warming in Britain and the U.S.

Figure 9.3.1- Respondents from Britain and the U.S. on various climate change questions.



What is of significant note here is that even though a recession likely caused a significant dip in the public's attitudes about the importance of climate change mitigation in comparison with economic issues, the belief in the existence and anthropogenic origins of climate change remain consistently high. A study done by Ipsos-Mori for Cardiff University conducted between January and March of 2010 found that 78 percent of the respondents still believed that the world's climate was changing (Pidgeon, 2010). This is significantly higher than in the U.S. in 2010, when only 61 percent believed the climate was changing, and only 47 percent of the American public thought this change was anthropogenic (Leiserowitz et al. 2011).

With a similar economic crisis, public perceptions about global warming, although affected, remained more stable than in the U.S., particularly perceptions regarding climate change being anthropogenic in origin. Perhaps lessened political polarization on the issue of climate change was a significant buffer to public perceptions in Britain. There is evidence that there were strong associations found with political affiliation and environmental issues in the U.K. Similar to U.S. congressmen, British government elites with a similar conservative voting pattern and less prominent environmental values tended to be the most uncertain about the reality and severity of climate change (Whitmarsh, 2011). However, the size of the group of people meeting this demographic is smaller in the U.K. than in the U.S. The answer might lie in the fact that the government of the U.K. has demonstrated to be less politically polarized on this issue of climate change mitigation than that of the U.S. (Poortinga et al. 2011).

The British Parliament passed the Climate Change Act of 2008, which set an ambitious target of an 80 percent reduction in all domestic greenhouse gases by the year

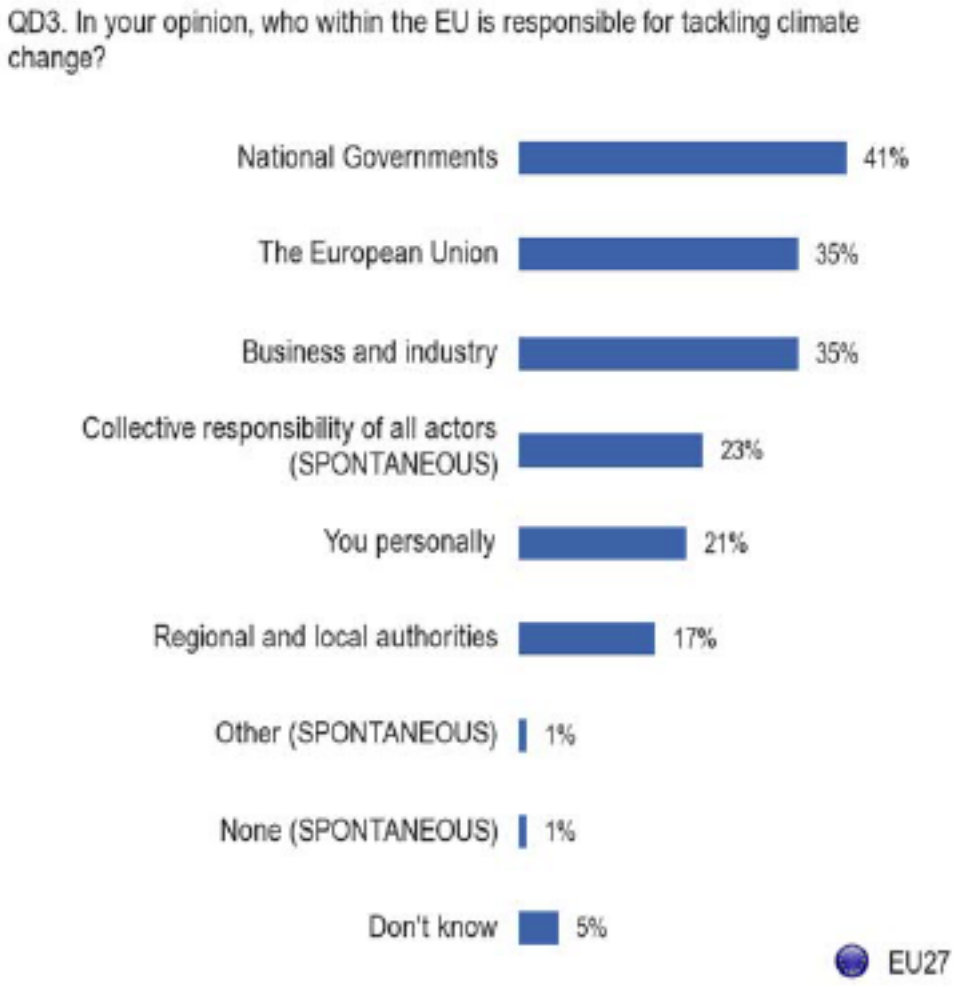
2050. This bill, although it went through several drafts and was debated by both the Liberal and Conservative parties within Parliament, eventually passed with bipartisan support in 2008 (Defra, 2008). There have been many other examples of environmental non-partisanship within the U.K. Other policy examples include emissions trading schemes, efficiency standards for automobiles and appliances, voluntary agreements between energy suppliers and government on emissions reductions, and laws promoting greener technological innovation (Chawla and Pollitt, 2012). While many examples exist regarding emissions reductions strategies and implementation in the United States under the Obama administration, most of the initiatives have been unilateral decisions under White House authority or legislation passed completely along party lines in one chamber of Congress or another.

Rollinson (2010) at the University of Leeds suggested that the brand of political non-partisanship found in the United Kingdom is the result of a concerted effort by the British Conservative party to remain electable. A strategy was launched by Conservative leaders, involving a range of issues putting the environment at the forefront, in an attempt to shed publicly held opinions about the party and make a Conservative government an electable reality (Rollinson, 2010). In other words, non-partisanship concerning environmental issues (like the Climate Change Act of 2008) led to the passage of pro-environmental bills that have likely shaped the susceptible public's image of the issue of climate change.

It can be argued that the political non-partisanship displayed by the British parliament in the last decade in regards to environmental issues contributed to the fact that the level of public opinion on climate change sustained itself through an economic

recession. This is in part due to cues from the political elites in Parliament who have demonstrated the ability to pass bills for climate change mitigation with much greater efficiency and cooperation compared to the U.S. These actions are represented in polling of the U.K. and throughout the European Union. When asked who should be responsible for tackling climate change, over 75 percent of responders picked national governments and the EU. Table 9.3 shows the trends of who each country within the EU thought should be responsible for tackling climate change. What is important to note is the high percentages of countries that thought either their national government or the EU as a whole (over seventy five percent) should be responsible for tackling the issue of climate change. What is also noteworthy is the high level of collective responsibility the EU placed in tackling climate change.

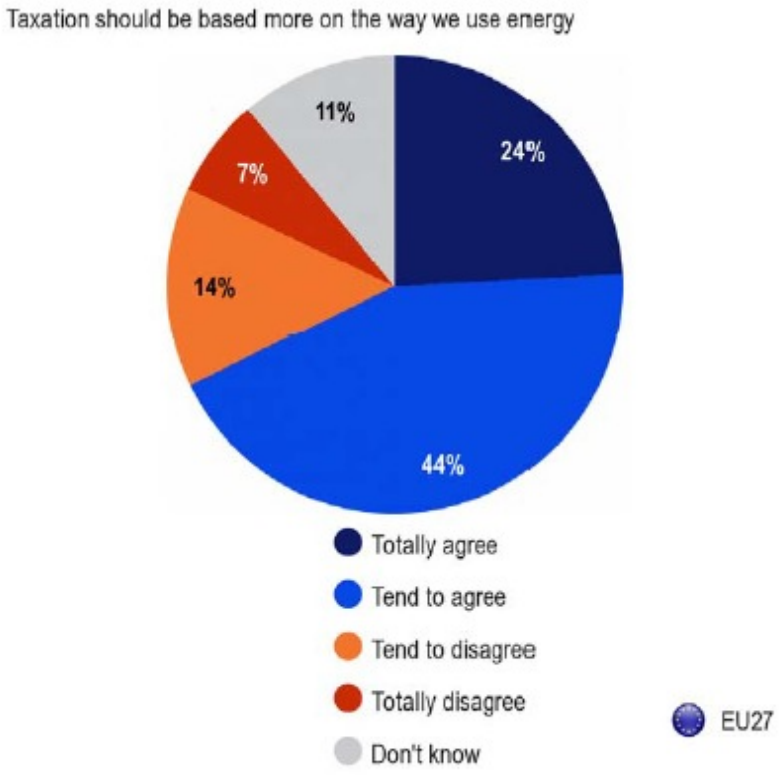
Table 9.3-Who in the EU is responsible for tackling climate change? (Euroboremeter, 2011)



Along with these findings, there is evidence that Europeans do not seem to mind that environmental issues, especially climate change, are issues that may increase taxes. Only 29 percent of the U.S. supports taxation plans for climate change mitigation, such as

a carbon tax (Duke University, 2013). However, when asked if taxes should be higher based on the way energy is used in the EU, 68 percent of respondents either totally agreed or somewhat agreed (Eurobarameter, 2011). This suggests that Europeans are less likely to change their opinions on environmental issues like climate change even if they are linked to economic factors, such as tax increases. Figure 9.3.2 shows that almost seventy percent of the EU either totally or tends to agree with the idea that taxation should be based on the way energy is used, suggesting that increased taxes to address issues like climate change is supported by an overwhelming majority in Europe.

Figure 9.3.2-EU respondents on should taxation be based on energy use.



Based on the views of the general public within the EU and in America, it is clear that there are similarities between the downscaling of public opinion on climate change since the 2008 recession. However, stark differences also arise on issues related to climate change origins and the economic impacts of climate change mitigation. These factors, although complex and likely multi-faceted, have been shown to be driven in part by cues from political elites. By policy initiatives, Europe has demonstrated a more homogenous perception of climate change than in the U.S., and perceptions of climate change are represented in the polling data.

10.0 Conclusions

Public perceptions of climate change in America are complex and multi-faceted. It does appear, however, that beliefs about climate change do tend to fall along political party lines, with Republicans tending to be more skeptical of climate change than Democrats (McCright and Dunlap, 2003). Evidence suggests that as Congress acts in ways that aim to mitigate and legitimize the effects of climate change, the public tends to perceive climate change as a more substantial issue (Gropp, 2011). The total implications of these results, however, are much more complex. For instance, Democrats are less likely to be swayed in their perceptions of climate change by political elite cues than are Republicans (Hamilton, 2011 and Brulle et al. 2012).

What makes the issue of climate change and public perceptions intriguingly complex is the science behind the effects of increased greenhouse gases, particularly CO_2, on climate change perceptions. The debate within the scientific community on the effects of climate change has been shown to affect opinions on climate change in a

negative way, making the public more skeptical of what is general scientific consensus about the origin of climate change (Schmidt, 2010).

It is likely that many variables play a role in Americans' opinions on climate change. For instance; gender, localized short-term weather events, education, and even geographical considerations have all been shown to affect public perceptions; however, these appear to be more statistically significant in people with weaker party affiliations (Egan and Mullin, 2012). A look at the recession of 2008 reveals significant data that economics can play a substantial role in climate change perceptions all over the world (Scruggs and Benegal, 2012), although skepticism about the importance of climate change relative to the economy appears to be a central issue. In terms of beliefs about the anthropogenic causes of climate change, the recession appears to have affected Americans more than members of the European Union because Americans opinions on climate change decreased in more areas, such as scientific consensus and anthropogenic causes as opposed to just concern and worry, as was seen predominately in the EU (Pew Research 2013 and Eurobarometer, 2011).

As Earth's atmosphere reaches 400 parts per million of CO_2 and beyond, it is imperative that the U.S. (one of the world's top GHG emitters) act swiftly and effectively to mitigate greenhouse gas emissions. Congress can best do this through substantial legislation. As the science behind this issue becomes clearer, public perceptions of the dangerous effects of climate change must also become clear and unified. Understanding how Americans get information on climate change and how their perceptions are shaped will be the driving force in shaping a Congress capable of tackling one of the most important issues facing the world.

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