Adaptation or Mitigation? Policy elites' rhetorical treatment of climate change between 1979-2011

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It is clear that the era of extreme weather is upon us. From record breaking floods in Boulder, Colorado (Mooney, 2013), to the appearance of the "polar vortex" (Samenow, 2014), to the devastation of Superstorm Sandy (Samenow, 2013), severe weather events are increasingly linked to climate (Peterson, Hoerling, Stott, & Herring, 2013). Of course, no single event can scientifically be linked to anthropogenic climate change; however these events are consistent with what scientists would predict under a changing climate. While we do not know with great certainty the precise pace or intensity of climate change, we do know that it is changing, and that nearly all of that change is attributed to human activity (IPCC, 2013). It is also clear that both public and private sector efforts at curbing greenhouse gas emissions (GHGs) have been inadequate, and instead of tackling this problem head-on, the last two decades have been mired in a stalling debate (Boykoff, 2008; Boykoff & Boykoff, 2004) focused on whether or not anthropogenic climate change science is valid or if it is a left-wing conspiracy attempting to impose draconian regulation on business and industry.

Unfortunately, we are now faced with an uncertain situation with the dual challenges of slowing the pace of climate change while simultaneously dealing with and preparing for current and future extreme changes. We suggest that this new era of dual-strategy policy imposes unique challenges on policymakers, public officials and the private sector, as societies around the world grapple with inherent policy trade-offs: Do local, regional, and national governments invest in mitigation (slowing future climate change) or do they adapt and prepare for the changing climate, or can both be accomplished simultaneously? These two distinct policy categories: **mitigation** - policies focused on slowing or reducing climate change, and **adaptation** – policies focused on preparing for or responding to climate change – likely produce different politics and subsequent policies and policy options. Our concern is that

without careful consideration of the politics that ensue as a result of choosing either or both of these types of policies – the resulting policy outcomes could fail to accomplish either. Moreover, as we enter the era of extreme weather, it is highly plausible that efforts to adapt to climate change will take precedence over efforts to mitigate climate change. Will we get stuck in a downward spiral of continuous adaptation, where policies of adaptation take resources away from mitigation?

Our research is guided by a perspective that emphasizes careful understanding of the dual-strategy policy landscape and changes in politics that occur as a result in shifting foci between adaptation and mitigation. Understanding these ideational shifts and their policy implications will be paramount to successful climate change policy. Without a fully informed discussion and understanding of the relationship between policies of mitigation and the policies of adaptation, the policy process is likely to produce a zero-sum outcome, whereby efforts to mitigate climate change will weaken efforts to adapt and vice versa. Furthermore, we call attention to the insights of political scientists and policy process scholars and especially to their prominent placement of ideas in the policy process. It is not only a question of whether or not the scientific or technical aspects of mitigation and adaptation are complementary or contrary, but also a question of what ideas and whose interests are shaping policies and the politics that follow. New policies create new winners and new losers, which can shift the policy debate and the direction of future policies.

In an effort to better inform this debate, our research is focused on ideational shifts between adaptation and mitigation amongst policy elites. Our modest goal, in the first phase of this project, is to empirically verify changes in the rhetorical treatment of climate change policy. Toward this end, we ask, how is the discussion over climate change policy changing at the elite level? Is there any evidence of an ideational shift toward policies of adaptation and away from mitigation or vice versa? To accomplish this goal, we expand our discussion of the policies of adaptation and mitigation, discuss the significance of ideas in the policy process, and compile and search 263 Congressional hearings between 1979 and 2011 for instances of climate change adaptation and climate change mitigation. While much more work remains; we do find evidence of an increasing discussion of adaptation.

1. Distinguishing Between Policies of Mitigation and Adaptation

The policy debate surrounding climate change is largely focused on averting or minimizing climate change; these are the policies of **mitigation**, and are aimed at reducing the amount of greenhouse gasses (GHGs) emitted into the atmosphere. Mitigation also includes capturing and/or sequestering GHGs about to enter or already in the atmosphere. Some examples of mitigation include: encouraging the development of non-carbon or renewable energy, creating more stringent energy efficiency standards, creating a tax on carbon, carbon emission trading systems, carbon storage and sequestration, reforestation, and land use policies focused on reducing GHGs.

Somewhat recently, the policy debate seems to have shifted or expanded to incorporate ideas associated with lessening the human costs incurred by climate change itself; these policies of **adaptation** seek to alleviate real or anticipated climatic changes without necessarily reducing GHGs. Policies of adaptation can be either proactive (pre-climate change or climatic event) or reactive (post-climate change or climatic event) policies, but either way, the key distinction for adaptation is that there is no attempt to inhibit climate change. Adaptive policies are focused on dealing with the actual or anticipated consequences of climate change. Examples of adaptation include: fortifying infrastructure to withstand more frequent and intense weather events, devising new strategies for water, forest, and land management, working on developing drought or storm resistant agricultural crops, geographically shifting agricultural activities, developing new emergency plans to deal with severe weather events.

Increasingly, climate researchers and policy experts have articulated a need for an expanded policy space, which incorporates the ideas of mitigation and adaptation simultaneously. It is argued that individuals, businesses, and governments continue their efforts to mitigate climate change while simultaneously planning on adapting to the repercussions of climate change. The concern is that if we only consider mitigation, and mitigation fails, then we will be left completely unprepared to deal with the rapidly changing climate and its predicted impacts: droughts, floods, fires, hurricanes and typhoons, the proliferation of new diseases, and other severe climatic events. As early as 1998, Roger Pielke, a leading climate policy and science researcher, expressed concern over the disproportionate attention paid to

mitigation, and blamed this on the negative social connotations associated with policies of adaptation. Countries, individuals or other political actors may be seen as being against mitigation, anti-environmental, or fatalistic about the prospect of mitigating climate change. He strongly urged scientists and policymakers to accept the limitations of mitigation and to expand their policy options to include adaptation:

> There is little wonder that adaptation has been viewed out of favor: who wants to be viewed, at best, as working prematurely on adaptation studies and, at worst, as obstructionist, lazy, arrogant, and anti-environmental? A close look at the logic of mitigation suggests that dismissals of adaptation are misplaced. Adaptation deserves a larger and more formal role in climate policy. (Pielke R. A., 1998, p. 162)

From Pielke's perspective adaptation had not been considered seriously because it carried with it negative social and professional connotations. His rationale for this shift in attention was based largely on the probability that mitigation will ultimately fail, or at the very least occur too slowly to avoid many of the most damaging aspects of climate change. Thus, governments and private actors should develop plans to adapt to climate change while continuing to work on long-term plans for mitigation. Others have made similar claims about the urgent need to develop policies of adaptation (Adger, 2004; Paavola & Adger, 2006; Parry, Arnell, Hulme, Nicholls, & Livermore, 1998; Pielke, Prins, Rayner, & Sarewitz, 2007; Shalizi & Lecocq, 2010).

Indeed, the arguments in favor of advancing adaption in addition to mitigation are convincing. First and foremost, a certain degree of climate change is inevitable; with each passing year, higher total concentrations of GHGs accumulate in the atmosphere. Our policies of mitigation have not been able to stop this upward trend, and even if we stopped all GHG emissions today, it would still be quite some time before concentrations stabilize and begin to recede. Thus, some adaptation will be necessary.

Another rationale for focusing on adaptation is related to the distribution of climate-vulnerable populations. Paavola and Adger (2006) argue that the populations most vulnerable to the effects of climate change are the world's poorest, and they have done little to create the climate change problem. It would be inequitable to thwart their efforts to prepare for climate change populations. They need to expeditiously focus on adaptation. It is also unjustified as many of these populations will not be able to

contribute much if anything toward mitigation of climate change, as they are not presently producing enough emissions to make major cuts. Of course, their future growth may have negative implications for climate change, but this is also noted to be a principle reason why poor countries are against signing international agreements which limit GHG emissions[1] (Shalizi & Lecocq, 2010). They are concerned that policies of mitigation will negatively impact future economic growth and development. Shalizi and Lecocq (2010), recommend pursuing an "integrated portfolio of actions", which seeks to find the proper balance between adaptation and mitigation.

Regardless of the legitimacy or accuracy of the justifications for expanding climate change policy options beyond mitigation to encompass adaptation, policy scholars and practitioners should carefully consider the relationship between these two types of policies. Again, while there are good reasons for incorporating policies of adaptation into this debate, it is crucial that we better understand this relationship – especially in light of the increasing frequency and intensity of extreme weather events, and the potential for climate related focusing events to change ideas and raise the salience of the issue. This is not to say that the policy community should stop any and all attempts to adapt to climate change, but rather they should proceed with an ongoing dialogue, building awareness of the differences between the two types of policies, and evaluation of the potential trade-offs between the two types of policies. This includes consideration of the way the relationship is defined, what actors and interests benefit from different frames and definitions, the effect of climatic change – especially in the form of extreme weather events – on the issue definitions and frames, and the effect of the way that shifts in the balance between policies of adaptation and mitigation may shape subsequent politics and policies.

There is evidence that the relationship between mitigation and adaptation is not being carefully considered – especially in the media.

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[1] Another source of contention in this debate is definitional: what makes a country "poor" or "rich". The political debate over where these distinctions are drawn holds many climate stability consequences.

> Bad climate policies, such as backing renewable energy with no thought for the cost, or insisting on biofuels despite the damage they do, are bad whatever the climate's sensitivity to greenhouse gases. Good policies – strategies for adapting to higher sea levels and changing weather patterns, investment in agricultural resilience, and research into fossil fuel-free ways of generating and storing energy – are wise precautions even in a world where sensitivity is low. So is putting a price on carbon and ensuring that, slowly but surely, it gets ratcheted up for decades to come. (The Economist, 2013)

This recent statement in *The Economist* illustrates the trend of considering adaption and mitigation as complementary policies. The "bad policy" category only includes policies of mitigation, whereas the "good policy" category includes both mitigation and adaptation, with a stress on efficiency. It is important to note that there is no discussion of the relationship between these two types of policies.

It may indeed be socially and ecologically optimal to take an integrated approach to climate change by figuring out the best balance of adaptation and mitigation. However, this assumes that an integrated approach is possible. There is convincing evidence in the policy process literature to warrant a skeptical view of the feasibility of integration. Of particular concern is the limited ability of governments and publics to focus on multiple and complex issues simultaneously. There are finite material and cognitive resources and a plethora of problems competing for those resources. Moreover, as Rochefort and Cobb (1992; 1994, p. 15) demonstrate in their discussion on homelessness, "…policymakers have often adopted a holistic approach that spreads resources thinly among all the leading claimant groups, an inclusive but ultimately unfocused strategy that is yet to be demonstrated as effective."

Our position is that the relationship between these two policies needs further investigation and clarification. As the literature on focusing events, crises, and disasters (Birkland T. A., 1998; Birkland T. A., 2006; Nohrstedt, 2008) would suggest, increasing frequency and intensity of weather events will have an impact on the way that this relationship is framed and defined, and undoubtedly change climate change policies. Whether or not the balance of treatment between adaptation and mitigation is occurring, and whether or not there are discussions over the relationship between the two types of policies is an empirical question, and our primary objective is to build an empirical foundation to answer these and other related questions.

2. The Policy Process of Climate Change

2.1. Ideas and policy elites

Central to our investigation is the notion that ideas matter in politics, and that policy elites are often significant actors in ideational discourse. For example, in Baumgartner and Jones (2009) punctuated equilibrium theory, ideas and the way problems are defined are the critical variables explaining policy stability and change. Baumgartner and Jones (2009) incorporate Schattschneider's (1960) mobilization thesis, which recognizes the way that definitions change and how these changes mobilize otherwise disinterested individuals and groups to alter the balance of power and change policies. The literatures on framing (Bardwell, 1991; Callaghan & Schnell, 2005; Chong & Druckman, 2007; Entman, 2007; Nisbet, 2010; Trumbo, 1996), priming (Scheufele & Tewksbury, 2007; Bimber, Brundidge, Conroy, & Lively, 2013), and policy narratives (Jones & McBeth, 2010; Shanahan, Jones, & McBeth, 2011; Shanahan, Jones, McBeth, & Lane, 2013) stem from the premise that political realities are constructed in part by the active players (elites) and the predispositions of message recipients (the public). Although the concern of 'cheap talk' is not unimportant, we agree with scholars who assert that the language and discourse employed during policy debates influences the shape and extent of agenda control, influence perception of winners and losers, and attract supporters and opponents (Stone, 2002).

We build upon insights found in the advocacy coalition framework (ACF) (Sabatier & Weible, 2007; Weible, Sabatier, & McQueen, 2009), and its emphasis on the way ideas, through their attachment to core beliefs, are central to policy stability and change. Expert-based information is a significant factor shaping elite policy debates and policy learning (Weible, 2008). Deciding whether to emphasize policies of adaptation, mitigation, or both is not exclusively a matter of elites performing a cost benefit analysis to determine the most efficient and effective policy combinations. There are, or there will be, interests favoring certain policy prescriptions over others. As Lowi (1972, p. 299) astutely popularized, "policies determine politics", and as the policies of climate change shift we expect to see shifts in the political arena. Winners will be created from the policies of adaptation, and coalitions will form that will seek government attention and resources.

2.2 Polarization in the climate change debate

Any discussion of climate change policy development is incomplete without considering the polarization of the issue. Like many issues, climate change is polarized along partisan lines – climate activists in and out of government tend to be liberals. However, climate change is an interesting issue because it includes both a conservative-denier faction and conservatives that favor small-government, non-regulatory solutions. In many ways, the presence of a denier group changes the dynamic. As Cobb and Ross (1997) demonstrate, denying that there is a problem is a way for opponents to prevent an issue from entering the government agenda. Several authors demonstrate that the conservative response to climate change includes denial and conservative-policy solutions – including market-based solutions that avoid regulation (McCright & Dunlap, 2000; McCright & Dunlap, 2003). The three main ideological camps – deniers, conservative solutions, and liberal solutions – make climate change a deeply polarized issue (Antonio & Brulle, 2011; McCright & Dunlap, 2011). This has been achieved through elite-level debate (Hulme, 2009), ideas of climate change denial flowing from conservative think tanks (Jacques, Dunlap, & Freeman, 2008) and the media's practice of matching a denier with an activist to represent the two sides, regardless of the fact that they are highly unequal in terms of scientific support (Boykoff & Boykoff, 2004; Boykoff, 2008). We also expect to see elements of these discussions within congressional testimony.

2.3 The development of climate change

In most accounts of the development of climate change as a political issue, the national government has been stuck in the agenda setting or issue consideration phase of policymaking. For the most part, this is an accurate portrayal. Except for the 2009 House Waxman Markey carbon cap and trade bill, Congress has passed no legislation for mitigation or adaptation.

National Climate Change Policy Events

Year	Event
1990	US Global Change Research Program (USGCRP) established through the Global Change Research Act of 1990
1997	US Senate passes Byrd-Hagel Resolution rejecting Kyoto, even though the Clinton Administration (through Vice President Al Gore) included the US as a member of the protocol negotiations
2000	The USGCRP Released its First National Climate Assessment
2001	President George W. Bush withdraws from Kyoto negotiations
2005	31st G8 Summit includes climate change on agenda, no progress made
2006	California, under Governor Arnold Schwarzenegger, forms the Climate Action Board to address climate mitigation in the state
2006	Stern Review published - economic look at climate change urging action
2007	*Massachusetts v. EPA* Supreme Court Decision, ruling that the EPA can regulate carbon dioxide as a pollutant
2009	US House of Representatives passed the American Clean Energy and Security Act - a carbon cap-and-trade program. The Senate did not pass the measure.
2009	The USGCRP Released its Second National Climate Assessment
2009	President Barack Obama issued Executive Order 13514 - directing federal agencies to evaluate climate change risks and vulnerabilities
2011	*American Electric Power Company v. Connecticut* Supreme Court decision, the court ruled that companies cannot be sued for greenhouse gas emissions since the EPA is responsible for regulating them under the Clean Air Act
2013	President Barack Obama in a speech at Georgetown University unveiled The President's Climate Action Plan
2013	President Barack Obama issued Executive Order 13653 - establishing a task force to evaluate and help prepare the nation for the impacts of climate change
2013	The USGCRP Released its Third National Climate Assessment

Sources: (U.S. Global Change Research Program, 2014; Oyez: U.S. Supreme Court Media, 2014; The White House, 2014; Library of Congress, 2014; California Natural Resource Agency, 2009; Stern, 2006)

However, legislation is merely one form of policymaking. Climate change has been considered by the Supreme Court – *Massachusetts v. EPA* (2007) and *American Electric Power Company v. Connecticut* (2011) – and is the subject of several Executive Orders under the Obama-Biden Administration (Orders #13514 – Federal Leadership in Environmental, Energy, and Economic Performance and #13653 – Preparing the United States for the Impacts of Climate Change). Furthermore, many executive agencies are beginning to individually develop mitigation or adaptation strategies. While these piecemeal measures by no means combine to form a significant national government response to climate change, they do represent policy inroads and locations for future policy expansion. Therefore, we have developed a timeline of national climate change policy developments.

While the US does not conform to international climate policy standards, actions by the international community can impact domestic debates. Thus, we include a summary of these events. International climate change policy is dominated by the IPCC as a provider of information and the United Nations Framework Convention on Climate Change (UNFCCC) yearly meetings. For the purpose of brevity, each of the UNFCCC Conferences of the Parties (COP) is not included because they are yearly occurrences. However, we do include specific COP meetings where international agreements were achieved.

International Climate Change Policy Events

Year	Event
1979	First World Climate Conference
1987	Bruntland Report - "Our Common Future" by the World Commission on Environment and Development
1988	IPCC created by the WMO and UNEP
1990	First IPCC Assessment Report
1992	Rio Earth Summit - creation of the UNFCCC which has had yearly summits since then including Kyoto and Copenhagen
1995	Second IPCC Assessment Report
1997	Kyoto Protocol Agreement at the UNFCCC COP 3
2001	Third IPCC Assessment Report
2005	The Kyoto Protocol goes into force when Russia signed the agreement
2007	Fourth IPCC Assessment Report, IPCC Awarded the Nobel Prize
2009	Climategate "Scandal" at the University of East Anglia
2012	The Doha Amendments to the Kyoto Protocol passed at COP 18
2014	Fifth IPCC Assessment Report *expected*

Sources: (IPCC, 2014; United Nations, 2014; Union of Concerned Scientists, 2011)

Additionally, we include major climate and weather events as influences on US national policymakers. The National Oceanic and Atmospheric Administration's (NOAA) National Climate Data Center (NCDC) has compiled a list of "Billion-Dollar Events" (National Climatic Data Center, 2013). Since 1980, NCDC has identified 151 such events. We only include 40 disasters where more than $10 billion in damage was sustained (in 2013 CPI-adjusted dollars) or more than 40 people died. These are contained in

Appendix A: Climate Timeline. While we do not claim that this is a comprehensive listing of potential influences on the climate change policy debate, these events were all covered by national news leaders like the New York Times and Washington Post, which (Citations on media influence) show to influence policymakers.

These events do not necessarily privilege a mitigation or adaptation interpretation of climate change action. For instance, while the Kyoto Protocol is largely discussed in terms of reducing greenhouse gas emissions (i.e. mitigation), it includes an Adaptation Fund for developing nations (United National Framework Convention on Climate Change, 1998). Severe storms like Sandy which struck the Connecticut, New Jersey, and New York coastlines inspired both adaptation and mitigation responses by New York City (New York City Government, 2013) and New Jersey (New Jersey Future, 2014). Therefore, we see these focusing events only as drawing attention to climate change, not privileging one strategy – mitigation or adaptation – over the other, in line with findings from focusing event scholar Thomas Birkland (1998; 2006). However, these major events do serve as context for our analysis of elite discussions. To be clear, we are not testing to see if any of these events cause a shift in the elite dialogue about climate change. Our purpose in considering these events is to understand how an event like Hurricane Katrina or the Kyoto Protocol going into force could inspire Congressional hearings or a potential change in the debate. Discourse is not context-independent.

3. Conversations Concerning Climate Change - Data

The climate change debate is centered in elite policymaking circles including: climatologists, climate change scientists, legislators, interest groups and think tanks, policy entrepreneurs and bureaucrats and select grassroots organizations like 350.org and the Sierra Club. While most of the public is aware of climate change and its potential consequences, the issue steadily holds the last spot on the Gallup organization's list of public policy priorities (Jones J. M., 2014). Therefore, we focus our analysis on elite-level discussions concerning climate change. Elite treatment of the issue will demonstrate both the evolution if the issue and the potential types of policies that can emerge. This assumption follows

from Kingdon's multiple streams model where politics, problems, and solutions (policies) develop in separate but linked streams (Kingdon, 1995). While we do not intend to apply or test this model of policymaking, we do accept its assertion that when policies are successfully passed they fit or match the current political situation. Therefore, we analyze Congressional hearings on climate change[2].

3.1 Elite discussions in Congressional hearings

We track the rhetorical treatment of climate change in Congressional hearings between 1979 and 2011, paying close attention to the use and treatment of adaptation and mitigation. We consider the following hypothesis:

> *Hypothesis 1: As the issue evolves and more events are linked to climate change, the elite discourse will focus more on adaptation than mitigation.*

In order to illuminate elite rhetorical treatment of climate change, we sought a site where this discussion would be highly visible. Congressional hearings focused on climate change afford just this sort of opportunity. In these hearings, numerous perspectives are submitted and recorded by climate scientists, politicians, policy practitioners, interest groups and other policy elites. To identify the proportion of hearings addressing climate change mitigation or adaptation, our analysis employs Congressional hearings between 1979 and 2011[3]. To select hearings focused on climate change, we used the Policy Agendas Project database and found all hearings they identified as concerning climate change or global warming (Baumgartner & Jones, Policy Agendas Project, 2013). The Policy Agendas Project took on an incredible task of organizing and quantitatively coding policy relevant documents from 1945 onwards, and we commend this project. However, in their coding system, climate change is grouped in with air pollution and noise pollution. For the purposes of our analysis, these extra topics are noise in the data. Furthermore, we found that by searching in the coding descriptions for the terms "climate change" and

[2] Since climate change refers to the same phenomenon also known as the greenhouse effect and global warming, we included all of these search terms to determine the body of climate change hearings in Congress.
[3] The Policy Agendas Project has not updated their database beyond 2011.

"global warming" captured hearings that were coded under other topics including (a) space, science, technology and communication, (b) public lands and water management, and (c) energy. In total, we identified 263 hearings for analysis. With over 50,000 pages of text, we sought the help of computer assisted qualitative data analysis software (CAQDAS).

Using QSR NVIVO 10, content analysis software, we searched for the distribution of classifications within Congressional hearings. Our classifications of interest were references of mitigation and adaptation for each Congressional hearing. We searched the documents for instances of: adaptation, mitigation, climate change, the causes of climate change (carbon, greenhouse gases, etc.), and the consequences of climate change (weather, storms, sea-level rise, drought, etc.). The full details of this are disclosed in Appendix B: Content Analysis. Next we searched for instances of each type of policy – adaptation or mitigation – in close proximity to climate change terms, and either climate change consequences for adaptation, or climate change causes for mitigation. To give a sense of scale of the data, we found over 180,000 references to climate change, over 5,000 references of adapting to climate change, and over 30,000 instances of mitigating climate change.

Since each hearing is a different length the focus on mitigation or adaptation measure is expressed by a proportion: the number of mentions per page. This allowed us to compare frequencies between long hearings and shorter hearings. Next, we used a few simple quantitative tests to determine if the elite treatment of climate change shifted between mitigation and adaptation.

First, the data were aggregated by Congress to determine trends over time and differences between the Congresses. Since the number of hearings per Congress was unequal, some of the data points should not be considered reliable[4]. Considering that this is the entire population of climate-related hearings in Congress, we did include them in our analysis. However, interpretations that rely on these points should be treated with caution. Most of our results will rely on the more reliable data points.

[4] Specifically, the 96th, 97th, 98th, 104th, and 106th Congresses had fewer than five hearings each.

Our analysis of the hearings aggregated by Congress was the most revealing. We calculated general trends for the adaptation and mitigation average focus per Congress (see Figure 1 and Figure 2). Again, keep in mind that some data points are based on a small number of hearings, and thus their accuracy is less certain.

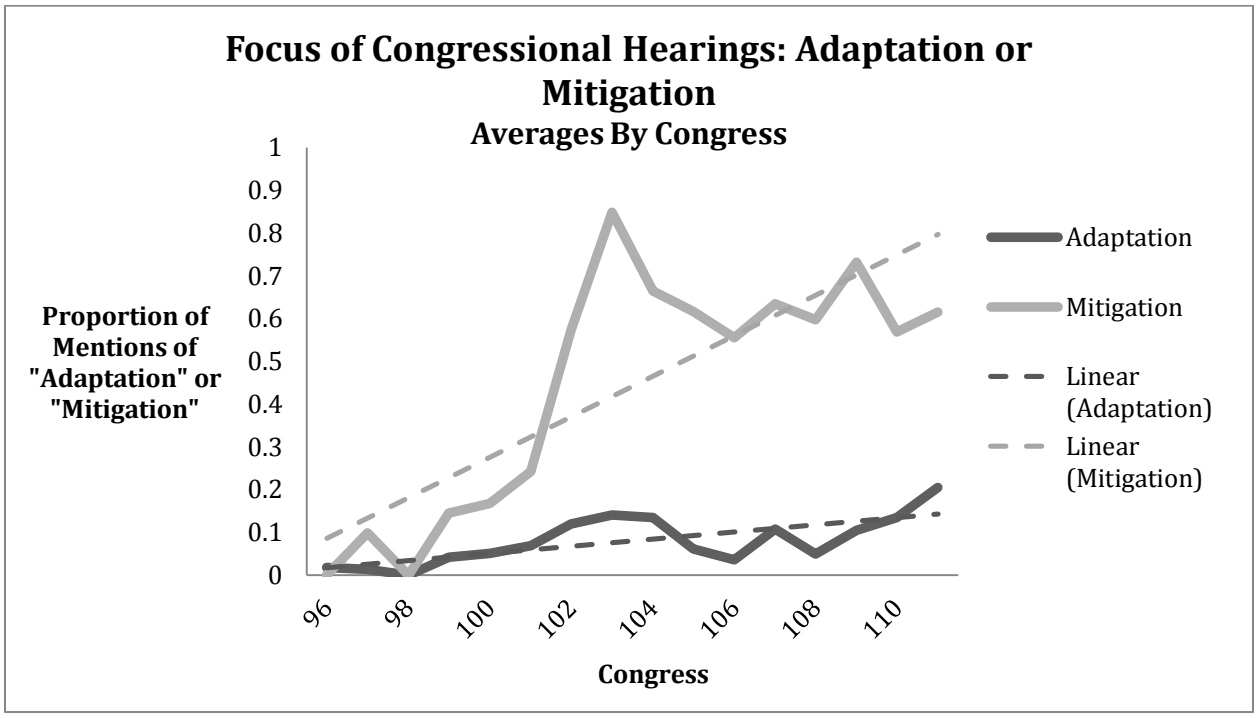

Figure 1: Adaptation and Mitigation by Congress Trend.
Adaptation linear trend line $R^2 = 0.4873$. Mitigation linear trend line $R^2 = 0.648$. For a better idea of our confidence in these results and the extent of these differences, see Figure 2**Error! Reference source not found.**.

As Figure 1 shows, the focus on mitigation has been increasing with time, but there is a spike during the 103rd Congress. This most likely reflects the discussion of the Kyoto Protocol in 1997. Since then, the focus on mitigation has remained high (above 0.6), but has declined somewhat since its peak. At the same time, focus on adaptation is increasing, albeit at a slow rate. We also see that focus on both of these options has increased with time.

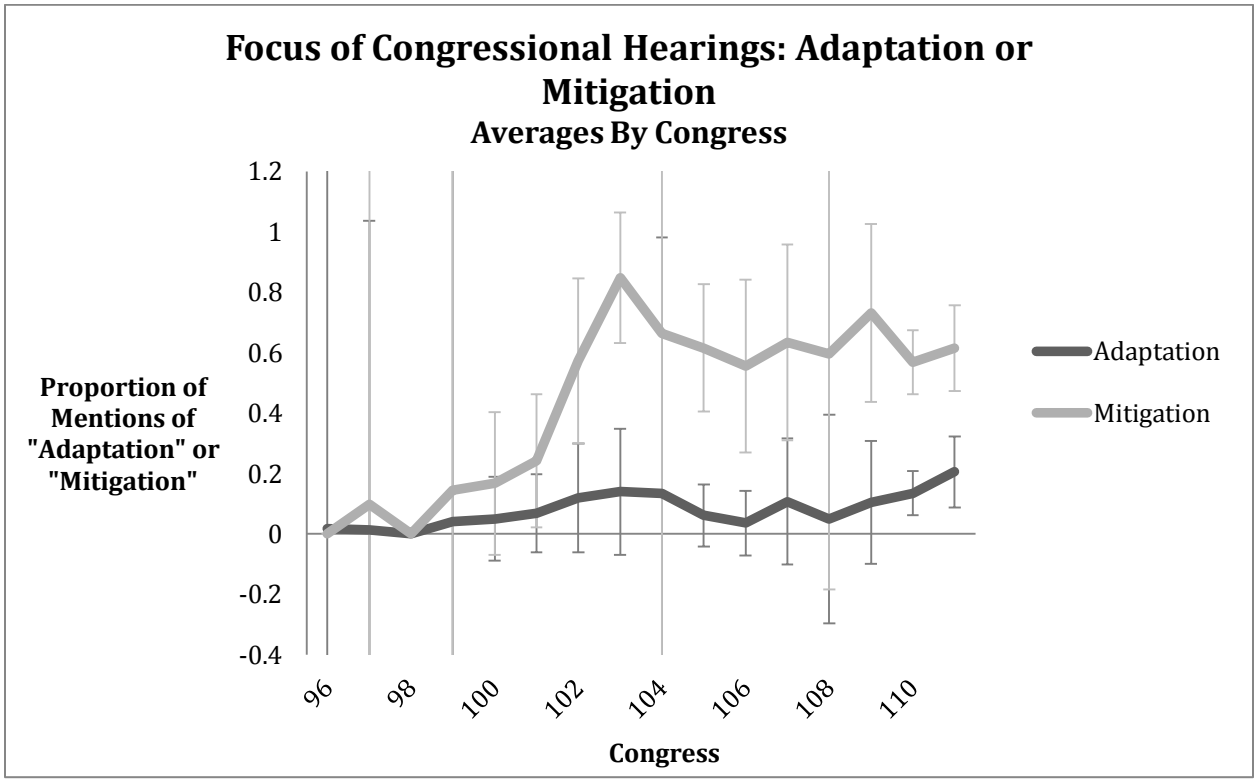

Figure 2: Adaptation and Mitigation by Congress with Confidence Intervals

Figure 2 displays the same information as Figure 1, but includes error bars instead of the trend lines. For the 96th, 97th, 98th[5], 104th, and 106th Congresses, there were less than 5 hearings, which inflated the standard errors. However, the rest of the Congresses had 10 or more hearings, and there are statistically significant differences between focus on mitigation and adaptation. We see significant differences between mitigation and adaptation in the discussion during the 103rd, 105th, 106th, 109th, 110th, and 111th Congresses. We also chose to examine the difference between adaptation and mitigation proportions. Since they tell the same story as Figures 1 and 2, these results are included in Appendix C: Statistical Analysis.

Early hearings in the study period were specific investigations into the science of the greenhouse effect, rather than discussions of specific policy prescriptions. This might indicate that the number of hearings looking purely at the science of the issue and not at a policy response is diminishing as a proportion of total Congressional inquiry.

[5] There were no hearings on climate change during the 98th Congress. It is included in this analysis and coded at zero for both mitigation and adaptation to allow for the continuity of the results. Other than the trend of the results, including this value does not change the results. For the trend analysis it makes our conclusions slightly more conservative.

Until we can conduct further tests on the reliability of our coding, we do not have a high degree of confidence that our search was completely balanced between each of the terms i.e., we may have found more instances of mitigation simply because our search parameters were slightly more inclusive. However, we are much more confident of the validity of the terms independent of each other. In other words, we cannot yet say a great deal about the ratio of adaptation vs. mitigation, but we are confident of the trend lines for each term independently. From these data, we can conclude that the focus of debate has shifted over time. Although it is not a definite switch from mitigation-centered debate to adaptation-centered debate, we do see an increase in mentions of adaptation over time compared with a more stable trend line for mitigation since the 103rd Congress. We expect that by extending these results to 2014, we would see these trends continue where mitigation gets less focus and adaptation more focus. At this time, adaptation has not grown to overtake mitigation as the focus of climate change discussions at the elite level, but it does seem to becoming more central to the debate.

3.2 The Role of Partisanship

Not only is the climate issue polarized, but the parties would seem to prefer competing policy solutions. Democrats have been linked to the climate change mitigation debate through prominent Democratic elites like Former Vice President Al Gore, Senator Barbara Boxer, Representative Nancy Pelosi, Representative Henry Waxman, and Representative Edward Markey. Each of these players has introduced and promoted mitigation policy solutions. In some ways, mitigation policies are now associated with the Democratic Party. Furthermore, these policies imply that humans are both at fault for and capable of fixing climate change. This brings up to our second hypothesis:

> *Hypothesis 2a: Democrats are more likely than their Republican counterparts to benefit from policy discussions about climate change. We expect to see more Congressional hearings during times of Democratic control.*

However, the causal story behind adaptation does not require 'blaming' human actions. It fits with a Republican-preferred story that climate change is a natural cyclical phenomenon. Indeed, this approach puts leaders in the position of responding to natural disasters like hurricanes and severe storms rather than

blaming specific human actions (burning fossil fuels, using non-renewable resources, etc.) (Boin, McConnnell, & Paul, 2008).

Hypothesis 2b: Republicans are more likely to welcome discussions about adaptation than discussions about mitigation.

Therefore, we analyzed the data by hearings through regression. We ran two regressions: one with the focus on mitigation as the dependent variable, and the other with the focus on adaptation as the dependent variable. The data were analyzed with an ordinary least squares regressions to determine what influence party control of the House and Senate had. In order to use OLS, the focus measures needed to be transformed; we used a log transformation to normalize the data. Our measures for partisan control were proportions of the seats in each chamber controlled by Democrats.

The full results for each regression are included in Appendix C: Statistical Analysis -Regression Results. Overall, there were few significant variables. We did find, however, that the percentage of the House controlled by Democrats was significant for the mitigation model and the percentage of the Senate controlled by Democrats was significant for the adaptation model (both at the $p = 0.05$ level). These speak to hypotheses 2a and 2b.

In the mitigation model, the coefficient for the House Democratic control variable is -10.249. This is surprising because we hypothesized that Democratic control would increase mentions of mitigation. However, since our content analysis did not indicate if the testimony advocated for or against mitigation, it is possible that this relationship (more Democratic control leads to fewer mentions of mitigation) is because during periods of Republican control hearings were held to criticize mitigation measures. It is also possible that when Democrats were out of control, they introduced mitigation bills and held hearings to energize environmentalists and their liberal base. Keeping in mind that Republicans were in control from the 104th to the 109th Congress (1995 to 2007) there were significant climate change

events including: the UNFCC negotiated the Kyoto Protocol[6], Hurricane Katrina hit New Orleans, Al Gore's released *An Inconvenient Truth*, and the Supreme Court decided *Massachusetts et al v. EPA*.

Similarly, the coefficient for Democratic control of the Senate was significant in the adaptation model. Again, the result runs contrary to our hypothesis. The coefficient was 10.197 indicating that a higher proportion of Democrats in the Senate leads to more mentions of adaptation. Since adaptation discussions are consistent with the non-denier Republican attitude towards climate change, we expected to see the opposite result. Again, it is possible that Democrats mentioned adaptation as a way to bring attention to their mitigation policy priorities. Additionally, we should consider that Democrats had control of the Senate for about half of the study period, covering when 110 of the 263 hearings were held. Without specific contextual analysis of the focus on adaptation, we cannot come to any definite conclusions.

Also, the variable included to describe which Congress a hearing was held in was found to be significant in both models. The coefficient for this measure was 0.031 in the mitigation model and 0.087 in the adaptation model; therefore we can conclude that the change over time was slight. None of the dummy variables created for the subsystems[7] were found to be statistically significant in either model. However, they did increase the fit of the model. This suggests that some sort of topic-based measure should be included, but the subsystem measure as we constructed it was not sufficient to capture the variation in the data.

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[6] Although the Senate has approval and consent powers for international treaties, the House also took up climate-related hearings at this time in response to the focus on climate change.

[7] Subsystems refer to informal networks of organizations and individuals all focused on a specific issue area. These were initially included in our analysis with the hope that our results would be more robust. However, the majority of hearings fell into three subsystems: Environment, Energy and Natural Resources (41.44%), Science and Technology (20.15%), and Commerce (15.97%). More specific work investigating the representatives of these subsystems is needed.

4. Conclusion and Future Research

Clearly the debate over climate change is evolving, and our data indicate that attention to adaptation is increasing amongst the policy elite. These findings are preliminary, but they are consistent with our proposition that an increasing frequency and severity of extreme weather events – an indication of climate change – is likely to shift focus and potentially resources away from climate change mitigation toward adaptation. Again, some would argue that shifting toward adaptation is perfectly acceptable and even more appropriate. We do not impose any normative judgment on these claims, but instead we hope to call attention to the insights offered by the policy process literature, and especially the unrealistic assertions from other perspectives, which proclaim shifts between these two types of policies to be apolitical or neutral. Our first goal was to establish a better empirical understanding of how the debate is shifting over time in light of a changing climate. This goal has been largely achieved, but much more work remains.

The first task ahead is to validate our coding, so we can increase our certainty about whether or not the expansion of adaptation into the conversation is having any effect on the frequency of mitigation dialog. We need to understand when mitigation or adaptation is referred to positively or negatively. For instance, are elites saying we need to mitigate or that mitigation is unnecessary? Related to this, we will also include content analysis of the rhetorical treatment between mitigation and adaptation. Do policy elites recognize that there may be trade-offs between the two policies, or do they think about these policies as being complementary? Within these 263 Congressional hearings, we have found a few thousand instances where climate change adaptation and mitigation are discussed together. We plan to code these instances to determine how elites understand and discuss the relationship between mitigation and adaptation, and how this debate is changing over time. Additionally, we hope to isolate discussions by policy subsystem. This can be accomplished by expanding our dataset to include non-climate change related hearings, or by isolating testimony from individuals associated with specific subsystems. This will not only contribute to our understanding of the changing dynamics of the climate change policy discussion, but it also has the potential to shed light on the way information traverses multiple

subsystems, and its origins. Moreover, as our data and content analysis expands, we anticipate other scholars may be able to incorporate these data into their projects. Our plans include making the data and content analysis available to other researchers.

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Appendix A: Climate Timeline

Severe Weather Events

Date	Event	Date	Event
June-Sept 1980	Drought/Heat Wave ($56.4 billion, 10,000 deaths)	Spring-Summer 2000	Drought/Heat Wave ($5.4 billion, 140 deaths)
February 1983	Western Storms and Flooding (2.6 billion, 50 deaths)	September 2002	Widespread Drought ($12.9 billion, 0 deaths)
Spring 1984	Tornadoes, Severe Storms, Floods ($1.1 billion, 80 deaths)	May 2003	Severe Storms/Tornadoes ($4.3 billion, 51 deaths)
January 1985	Winter Damage, Cold Wave ($1.2 billion, 150 deaths)	September 2003	Hurricane Isabel ($6.3 billion, 55 deaths)
October 1985	Hurricane Juan ($3.2 billion, 63 deaths)	August 2004	Hurricane Charley ($18.5 billion, 35 deaths)
Summer 1986	Southeast Drought Heat Wave ($2.8 billion, 100 deaths)	September 2004	Hurricane Frances ($11.1 billion, 48 deaths)
Summer 1988	Drought/Heat Wave ($78.8 billion, 7,5000 deaths)	September 2004	Hurricane Ivan ($17.2 billion, 57 deaths)
September 1989	Hurricane Hugo ($16.9 billion, 86 deaths)	August 2005	Hurricane Katrina ($148.8 billion, 1833 deaths)
December 1989	Winter Damage, Cold Wave, Frost ($1.2 billion, 100 deaths)	September 2006	Hurricane Rita ($19 billion, 199 deaths)
August 1992	Hurricane Andrew ($44.8 billion, 61 deaths)	October 2006	Hurricane Wilma ($19 billion, 35 deaths)
Summer 1993	Midwest Flooding ($33.8 billion, 48 deaths)	February 2008	Southeast Tornadoes and Severe Weather ($1.1 billion, 57 deaths)
March 1993	Storm/Blizzard ($8.9 billion, 270 deaths)	Summer 2008	Midwest Flooding ($16.2 billion, 24 deaths)
January 1994	Winter Damage, Cold Wave ($1.6 billion, 70 deaths)	September 2008	Hurricane Gustav ($5.4 billion, 53 deaths)
January 1996	Blizzard/Floods ($3.0 billion, 187 deaths)	September 2008	Hurricane Ike ($29.2, 112 deaths)
March 1997	MS and OH Valleys Flood/Tornadoes ($1.5 billion, 67 deaths)	2011	Southern Plains/Southwest Drought & Heat Wave ($12.4 billion, 95 deaths)
Winter-Spring 1998	Southeast Severe Weather ($1.4 billion, 132 deaths)	April 2011	Southeast/Ohio Valley/Midwest Tornadoes (10.5 billion, 321 deaths)
Summer 1998	Southern Drought/Heat Wave ($10.7 billion, 200 deaths)	May 2011	Midwest/Southeast Tornadoes ($9.1 billion, 177 deaths)
May 1999	OK-KS Tornadoes ($2.2 billion, 55 deaths)	August 2011	Hurricane Irene ($10.1 billion, 45 deaths)
Summer 1999	Drought/Heat Wave ($1.4 billion, 502 deaths)	2012	US Drought/Heatwave ($30.3 billion, 123 deaths)
September 1999	Hurricane Floyd ($8.4 billion, 77 deaths)	October 2012	Sandy ($65.7 billion, 159 deaths)
		Spring-Fall 2013	Western Drought/Heatwave ($ not yet estimated, 53 deaths)

Source: NOAA's NCDC "Billion-Dollar Weather/Climate Disasters" (2013)

Appendix B: Content Analysis

We imported 263 PDF versions of Congressional hearings into QSR NVivo 10 to perform content analysis. Our primary goal was determine the balance of treatment between discussions focused on adaptation and those centered on mitigation. Clearly, there are trade-offs associated with using computer assisted qualitative data analysis software (CAQDAS), but with the enormity of the data this method was deemed necessary and worthwhile. The major concern is that the software will incorrectly code instances of adaptation or mitigation. To minimize these concerns, we did not utilize any automated coding, where the software is responsible for making qualitative coding decisions. We did not rely upon NVivo to code for us, but instead coded according to specific word searches. We utilized a "bag of words" approach where key words and word combinations were searched for within a specified distance from other key words and word combinations. The search includes proximity before and after other terms, so the sequence is not considered. This is consistent with recommendations by Hopkins and King (2010) and Pang, Lee, and Shivakumar (2002).

In order to search for each policy concept comprehensively, we expanded our search to include important synonyms. Not only did we seek instances of adaptation, but also other forms. For example "we need to adapt to climate change", might look like "we need to prepare for climate change" or "we need to protect ourselves from sea-level rise" or "climate change adaptation is needed". This also illuminates the need to search for instances of terms in different sequential order. Thus adaptation is comprised of a full stem search of: adapt, prepare, respond, protect and adjust. We utilized NVivo's lexicon to search for all variations of each term. For example, for the term "adapt", NVivo searched for all of its stem forms: adaptation, adapting, adapted, adapts, etc. And the combined instances of adaptation are located near (20 words before or after) instances of climate change terms, and climate change consequences.

Each of the terms and the summary statistics are in the following (Table 1: NVivo Search Terms and Summary):

Table 1: NVivo Search Terms and Summary

Concept	Search Terms	Notes	Total Instances
Adaptation	Combination of significant adaptation synonyms:		33,435
	Adapt	Full stem search	7,880
	Adjust	Full stem search	2,855
	Prepare	Full stem search	7,289
	Protect	Full stem search	10,716
	Respond	Full stem search	4,695
Mitigation	Combination of significant mitigation synonyms:		56,873
	Control	Full stem search	8,847
	Cut	Full stem search	4,152
	Mitigate	Full stem search	6,831
	Prevent	Full stem search	3,243
	Reduce	Full stem search	33,800
Climate Change Terms	Literal search: “climate change”, “climatic variability”, “global warming”	Combination of significant climate change synonyms	69,514
Climate Change Consequences	Full stem of: weather, drought, storm, hurricane, fire, flood, OR literal search for “sea level”	Combination of the consequences of climate change	187,720
Climate Change Causes	Literal search: “emission”, “emissions”, “carbon”, “greenhouse gas”, “greenhouse gasses” “co2”, “ghg”	Combination of the causes of climate change	24,279
Adaptation Near Climate Change Consequences	A search for all of the forms of adaptation within 20 words of the climate change consequences	Combined Query	1,089
Adaptation Near Climate Change Terms	A search for all of the forms of adaptation within 20 words of climate change terms	Combined Query	4,384
Total Adaptation			**5,473**
Mitigation Near Climate Change Causes	A search for all of the forms of mitigation within 20 words of the climate change causes	Combined Query	25,004
Mitigation Near Climate Change Terms	A search for all of the forms of mitigation within 20 words of the climate change terms	Combined Query	5,059
Total Mitigation			**30,063**

Appendix C: Statistical Analysis

Regression Results

Table 2: Mitigation OLS Regression Results

Variables	Log of Mitigation	Robust std. errors
Congress	0.0311**	0.0151
Democratic Control of House	-10.249**	3.246
Democratic Control of Senate	6.380*	3.324
Agriculture Subsystem[8]	-0.373	0.666
Budget Subsystem	-0.680	0.646
Commerce Subsystem	-0.346	0.597
Environment, Energy, and Natural Resources Subsystem	-0.533	0.588
International Relations Subsystem	-0.136	0.605
Merchant Marine and Fisheries Subsystem	-1.0146	1.0153
Oversight Subsystem	-0.914	0.631
Science and Technology Subsystem	-1.0118*	0.597
Observations	261	

*p ≥ 0.10, **p ≥ 0.05, ***p ≥ 0.01
R^2 0.1965, Adj-R^2 = 0.1610

[8] Transportation and Infrastructure Subsystem was left out of the regression model as the category for comparison.

Table 3: Adaptation OLS Regression Model

Variables	Log of Adaptation	Robust std. errors
Congress	0.0875***	0.0191
Democratic Control of House	-4.574	4.118
Democratic Control of Senate	10.198**	4.233
Agriculture Subsystem[9]	0.474	0.837
Budget Subsystem	-0.561	0.820
Commerce Subsystem	-0.408	0.751
Environment, Energy, and Natural Resources Subsystem	0.270	0.739
International Relations Subsystem	0.825	0.760
Merchant Marine and Fisheries Subsystem	0.466	1.276
Oversight Subsystem	0.340	0.797
Science and Technology Subsystem	0.338	0.753
Observations	249	

*p ≥ 0.10, **p ≥ 0.05, ***p ≥ 0.01
R^2 0.2289, Adj-R^2 = 0.1931

[9] Transportation and Infrastructure Subsystem was left out of the regression model as the category for comparison. Originally, this project sought to understand the impacts of the adaptation v. mitigation divide on subsystem prominence. However, there was not enough variety in subsystem participation to get a good idea of this relationship. We did find that the model's fit improved with the inclusion of the subsystems. This implies that subsystem participation does influence the debate on some level. Future research needs to investigate this relationship.

Results of Hearings Aggregated by Congress

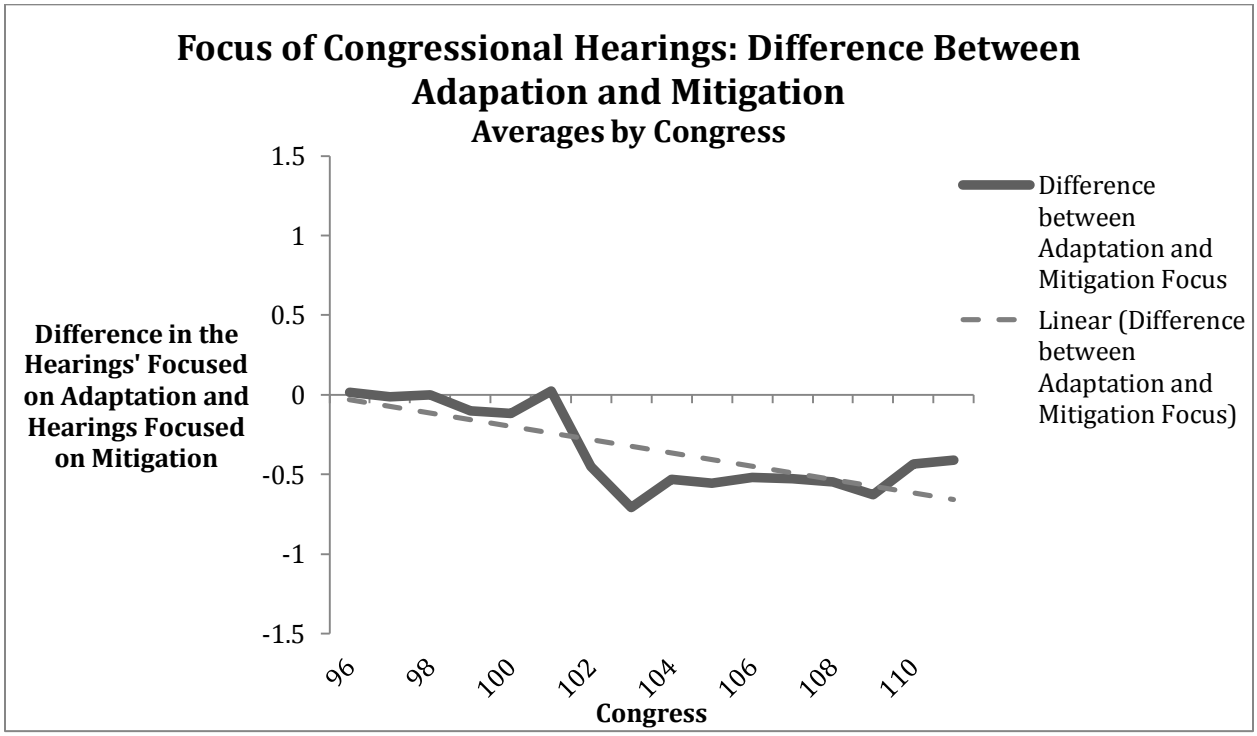

Figure 3: Difference between Adaptation and Mitigation Trend

Here, we display the difference between adaptation and mitigation, $R^2 = 0.5814$. Positive values mean the balance of the focus is on adaptation. The difference values were calculated by taking the yearly average proportion of mentions of adaptation in Congressional hearings and subtracting the year average proportion of mentions of mitigation. This gives us a better understanding of how wide the 'gap' in discussion is and what direction it is going. See Figure 4**Error! Reference source not found.** for our confidence in these values.

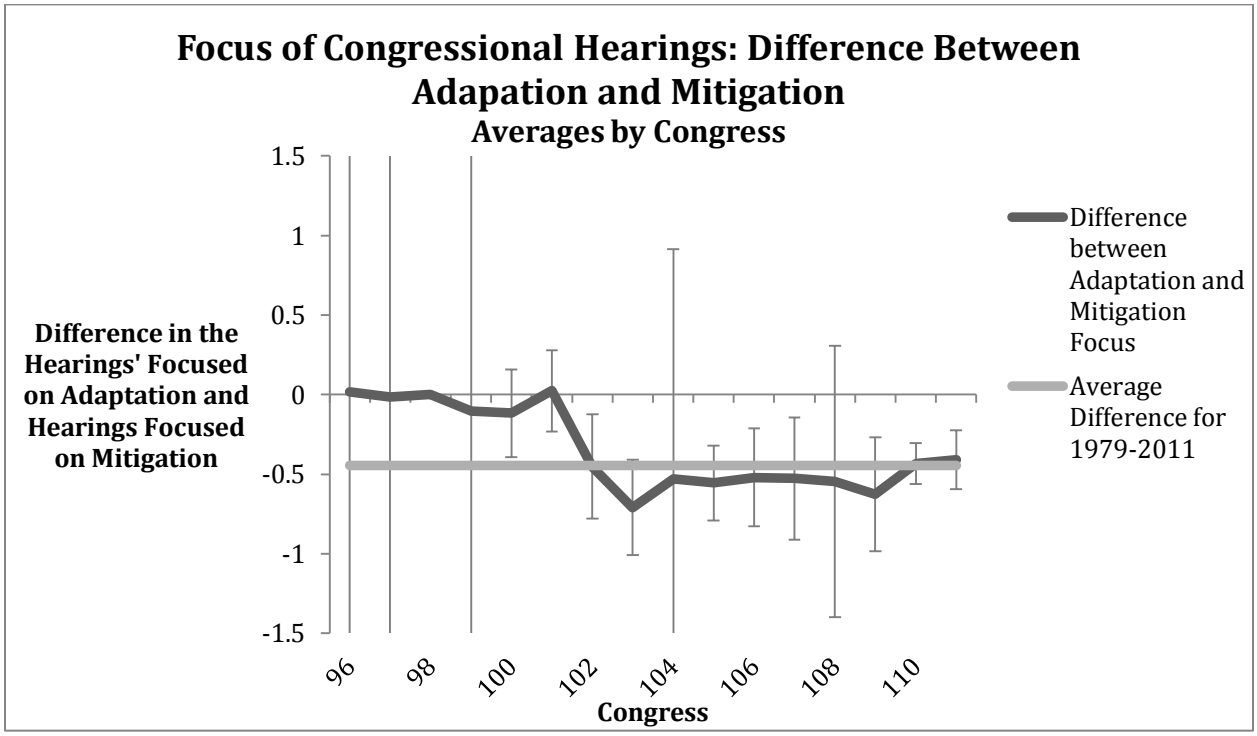

Figure 4: Difference between Adaptation and Mitigation with Confidence Intervals

The error bars displayed represent a confidence interval based on the standard error. Due to small sample sizes within certain years, the standard errors are large. For the 96th, 97th, 98th, 104th, and 106th Congresses, there were less than 5 hearings, which increased the standard errors. However, the rest of the Congresses had 10 or more hearings, and there are statistically significant differences between focus on mitigation and adaptation. The average difference for 1979-2011 is plotted as a reference point to see how much the discussion deviates from the norm.

Table 4: Adaptation and Mitigation Focus by Congress

Congress	Number of Hearings	% House Democratic	% Senate Democratic	Adaptation as a proportion of total hearing pages	Mitigation as a proportion of total hearing pages	Difference between adaptation and mitigation proportions
96	1	0.6414	0.5800	0.0171 (0.1296)	0.0000 (0.0000)	0.0171 (0.1296)
97	2	0.5586	0.5300	0.0132 (0.0806)	0.0987 (0.2109)	-0.0132 (0.2258)
98	0	0.6207	0.4400	n/a	n/a	n/a
99	2	0.5862	0.4700	0.0415 (0.1410)	0.1441 (0.2483)	-0.1026 (0.2856)
100	12	0.5954	0.5500	0.0498 (0.0628)	0.1671 (0.1077)	-0.1173 (0.1247)
101	17	0.6023	0.5500	0.0678 (0.0610)	**0.2423*** (0.1039)	0.0244 (0.1205)
102	15	0.6138	0.5600	0.1196 (0.0838)	**0.5725*** (0.1277)	**-0.4529*** (0.1528)
103	13	0.5931	0.5700	0.1396 (0.0961)	**0.8490*** (0.0993)	**-0.7094*** (0.1382)
104	3	0.4736	0.4800	0.1342 (0.1968)	0.6648 (0.2725)	-0.5307 (0.3362)
105	23	0.4759	0.4500	0.0609 (0.0499)	**0.6161*** (0.1014)	**-0.5552*** (0.1130)
106	14	0.4851	0.4500	0.0358 (0.0497)	**0.5557*** (0.1328)	**-0.5199*** (0.1418)
107	11	0.4897	0.5000	0.1073 (0.0933)	**0.6340*** (0.1452)	**-0.5267*** (0.1726)
108	4	0.4713	0.4400	0.0494 (0.1084)	0.5968 (0.2453)	-0.5474 (0.2681)
109	11	0.4621	0.4400	0.1044 (0.0922)	**0.7313*** (0.1337)	**-0.6269*** (0.1624)
110	87	0.5333	0.4900	**0.1344*** (0.0366)	**0.5686*** (0.0531)	**-0.4342*** (0.0645)
111	48	0.5908	0.5700	**0.2050*** (0.0583)	**0.6147*** (0.0702)	**-0.4097*** (0.0913)
All Hearings	*263*	*0.5456*	*0.5115*	***0.1013**** *(0.0186)*	***0.5473**** *(0.0307)*	***-0.4459**** *(0.0307)*

Standard Errors in Parentheses
* = significant with 95% confidence

Congress	Number of Hearings	% House Democratic	% Senate Democratic	Adaptation mentions as a proportion of total hearing pages	Standard error for adaptation	Mitigation mentions as a proportion of total hearing pages	Standard error for mitigation	Difference between adaptation proportion and mitigation proportion	S.E. of the difference between adaptation and mitigation
96	1	0.6414	0.5800	0.0171	0.1296	0.0000	0.0000	0.0171	0.1296
97	2	0.5586	0.5300	0.0132	0.0806	0.0987	0.2109	-0.0132	0.2258
98	0	0.6207	0.4400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
99	2	0.5862	0.4700	0.0415	0.1410	0.1441	0.2483	-0.1026	0.2856
100	12	0.5954	0.5500	0.0498	0.0628	0.1671	0.1077	-0.1173	0.1247
101	17	0.6023	0.5500	0.0678	0.0610	0.2423	0.1039	0.0244	0.1205
102	15	0.6138	0.5600	0.1196	0.0838	0.5725	0.1277	-0.4529	0.1528
103	13	0.5931	0.5700	0.1396	0.0961	0.8490	0.0993	-0.7094	0.1382
104	3	0.4736	0.4800	0.1342	0.1968	0.6648	0.2725	-0.5307	0.3362
105	23	0.4759	0.4500	0.0609	0.0499	0.6161	0.1014	-0.5552	0.1130
106	14	0.4851	0.4500	0.0358	0.0497	0.5557	0.1328	-0.5199	0.1418
107	11	0.4897	0.5000	0.1073	0.0933	0.6340	0.1452	-0.5267	0.1726
108	4	0.4713	0.4400	0.0494	0.1084	0.5968	0.2453	-0.5474	0.2681
109	11	0.4621	0.4400	0.1044	0.0922	0.7313	0.1337	-0.6269	0.1624
110	87	0.5333	0.4900	0.1344	0.0366	0.5686	0.0531	-0.4342	0.0645
111	48	0.5908	0.5700	0.2050	0.0583	0.6147	0.0702	-0.4097	0.0913
Averages	**263**	**0.5456**	**0.5115**	**0.1013**	**0.0186**	**0.5473**	**0.0307**	**-0.4459**	**0.0307**