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Public Support for Climate Change Policy: Consistency in the Influence of Values and Attitudes Over Time and Across Specific Policy Alternatives

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Abstract

This study examines the factors that explain public preferences for a set of climate change policy alternatives. While scholarly work indicates a relationship between attitudes and values on views toward specific issues, the literature often examines general support for issues rather than specific policy proposals. Consequently, it is unclear the extent to which these attitudes and values affect specific policy considerations. This project examines public support for five climate change policy options in two national surveys taken three years apart. The empirical analysis reveals that time is a factor and that those who are liberal, have strong ecological values, report greater concern for climate change, and trust experts are consistently more supportive of the climate policy options considered here. The results shed new light on the nuanced views of the American public toward climate change.

KEY WORDS: climate change, environment, governance, pollution, United States, policy, public opinion, values, experts

Introduction

Over the past decade, the issue of climate change continues to makes its way on and off public and governmental agendas. Although a consensus among scientists concerning the causes and consequences of climate change has become stronger, public opinion on this issue is increasingly polarized (Dunlap & McCright, 2008). Given the breadth and depth of this issue, numerous policy options have been floated by scientists, interests groups, and policy makers. Public support for policy proposals has been shown to increase the likelihood that such programs will pass (e.g., Page & Shapiro, 1983). As such, understanding the factors that shape the preferences of the public with regard to these alternatives is particularly important as political figures consider which options to adopt in an effort to mitigate climate change.

The motivation for this paper stems from a fairly limited body of work considering and comparing attitudes on a variety of climate policy options. Our primary research question is whether predictors are the same across climate change policy alternatives. More specifically, we are asking which determinants explain attitudes toward climate change policy on a set of five domestic policy options. Public opinion polls suggest that there is quite a bit of variance in support levels for distinct options (O'Connor, Bord, Yarnal, & Wiefek, 2002). As previous research almost exclusively

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centers on general dispositions toward climate change policy, we make an important contribution in understanding more nuanced beliefs.

The U.S. political system is characterized by a belief in policy responsiveness among elected officials. Scholars regularly consider the importance of issue attitudes in shaping public policy outcomes through intensity of preferences. Although general support for various policy areas is relevant, the intensity of preferences is even more so. In much of his work, V. O. Key (e.g., 1961) has argued that strong attitudes on policy issues have more force in influencing policy outcomes than do more general indications of support. Those who feel intensely concerning an issue are more likely to support, or oppose, a number of specific government policy actions to deal with that issue. In addition, individuals often indicate greater support for general policy action but respond differently when presented with a specific policy option (Jacoby, 2000; Lax & Phillips, 2009). By examining policy options, we are able to understand more clearly the kinds of policies individuals support and the sacrifices they are potentially willing to make in order to achieve a broader policy goal. Given this, focusing on the factors that influence the development of these preferences is highly relevant to the study of public policy.

Although some research has explored the factors that influence predispositions toward environmental policy generally, less has been done to consider more specific policy proposals (Burstein, 2003). Additionally, the public often indicates general support for addressing policy problems but tempers their support when asked about more concrete proposals. Absent these specific measures, scholars have looked to various proxies to explain public sentiment.[1] However, broad examinations of environmental concern can mask opinions concerning specific environmental problems and policy options (Dunlap & Jones, 2002). What factors, then, contribute to these nuanced policy positions?

Several academic disciplines have regularly found that the values and attitudes of individuals influence their political and policy views (e.g., Dunlap, Van Liere, Mertig, & Jones, 2000; Hetherington, 2005; Kellstedt, Zahran, & Vedlitz, 2008). However, much of this literature has focused on relatively general views toward an issue, aggregated policy support, or specific nonpolicy views. In short, it is still fairly unclear the extent to which these values and attitudes affect support for variant approaches to climate change.

This study aims to address both concerns. More specifically, we are interested in the factors that explain public preferences for various climate change policy alternatives. The climate change domain is ripe for attitudinal research on the nuanced positions of the U.S. populace, especially given the likelihood that this issue will appear on governmental agendas for quite some time.

To explain the rationale for public preferences on climate change policy, we utilize two national surveys of the U.S. public conducted in 2004 and 2007. The surveys examine a series of five climate change policy proposals ranging from enacting taxes to mandating automobile companies to create more fuel-efficient vehicles. This provides a unique opportunity to identify which proposals are viewed most favorably and to understand how values and attitudes shape these views. Moreover, by utilizing surveys conducted 3 years apart, we are able to determine the extent to which the effect of these values and attitudes are stable,

and not situationally dependent. Additionally, this analysis enables us to determine if there are variations in the public's intensity of support for these policies.

To understand the influence of values and attitudes on individual policy support, we turn to a number of scholarly works that provide a theoretical background for this project. We begin by discussing literature that is relevant to understanding the influence of values and attitudes. Subsequently, we move toward a description of our analytical approach and report our results. We find an intriguing variation in which attitudes are relevant for each of the five policy options we consider, though there are some fairly consistent predictors across the options as well.

Environmental Values and Attitudinal Influences on Policy Support

Scholars have given a great deal of attention to understanding environmental views and, to a lesser extent, public perceptions in regard to climate change. Although there are a number of studies dedicated to this topic, a relatively small proportion have examined public views on a variety of policy options, with the majority of these studies relying upon aggregations of specific policies (e.g., Dietz, Dan, & Shwom, 2007; Lubell, Vedlitz, Zahran, & Alston, 2006; Lubell, Zahran, & Vedlitz, 2007), general policy sentiments (e.g., Borick & Rabe, 2010), or considerations of only one policy option (e.g., Aldy, Kotchen, & Leiserowitz, 2012; Tingley and Tomz, 2014). For instance, Borick and Rabe (2010) consider factors relevant to whether an individual believes in global warming in addition to how demographics and partisanship shape what kinds of experiences ultimately impact beliefs. The study provides an important explanation for general beliefs but does not consider policy options. Surprisingly few studies have examined public support for specific policy options, and most of these studies have emphasized the influence of basic demographics. Aldy et al. (2012) examine one particular policy option—whether the individual supports a national clean energy standard. They also explore one's willingness to pay for climate change policy action. Here still, the authors are considering only one policy option. This does not allow a test of whether predictive factors vary across policies. Similarly, Tingley and Tomz (2014) examine one type of policy option. The authors consider the factors that shape support for international climate change agreements that include a form of reciprocity.

Evidence in the literature suggests that attitudes concerning more specific policy options are a better indicator for whether individuals support concrete government action on a policy issue. The logic is similar to that used in literature on policy framing and priming. When individuals are exposed to a general policy statement, they respond differently than when exposed to a more specific statement (Jacoby, 2000). In addition, when considering general action, the respondent is likely primed to consider certain policy considerations over others, which we cannot identify by looking at their response to a general question. When making a judgment concerning whether government should be involved in climate change, respondents are likely to consider the most salient policy option to them in their response (Tversky & Kahneman, 1981). We are better able to understand their true attitudes on climate policy options by asking about them individually.

This is further exemplified in work by Chaudoin, Smith, and Urpelainen (2013), who find a distinct difference between support for international agreements with regard to climate change and domestic programs for American evangelicals. If one were to ask this group of individuals simply whether they support government action to curb climate change, they may answer differently depending on which type of policy comes to mind. Consequently, studying their general attitudes in this way could potentially mask their true attitudes. Chaudoin, Smith, and Urpelainen's work moves beyond previous studies by distinguishing between domestic and international policy. We take this point a step further and consider a broader array of policy options.

In addition, the public often expresses general support for policy action, but when specific proposals are brought forth, the public realizes the costs involved and retracts some of that support. This is demonstrated in work by Downs (1972) regarding issue attention cycles. Simply knowing there is general support for action on climate change is likely not enough to produce policy change.

We consider competing approaches when examining specific policy options. Presumably there may be different factors that relate to different policy options. For instance, a policy option that asks a respondent to make fiscal sacrifices may more likely be influenced by personal income (Klineberg, McKeeber, & Rothenbach, 1998). In addition, certain policy options may have broader public appeal given their approach. The literature has suggested that market-based approaches, such as cap and trade, are more acceptable across party and ideological labels (Stavins, 1998). This may lead ideology to be less relevant when considering carbon cap and trade.

Despite this potential for nuance, there are also reasons to believe that there may be no such variation across policy options. This partly lies in the assumption that when aggregating across policy options, there should be no variation across these options for results to be reliable.[2] For instance, Dietz, Dan and colleagues (2007) aggregate several policy measures in their work and note the limitation in having respondents consider all policies rather than each individually. Although this work provides us information regarding broad support for climate change through the combining of several options, it does not allow for comparison across the options examined. In addition, there are frequently used predictors in environmental public opinion models that consistently demonstrate relationships. In other words, the current state of the literature leaves us with an open question concerning whether predictors will vary across policy options and implies that factors will not vary across policy options. As such, we test the following hypothesis:

> H1: Predictors for each climate change policy option will not vary based on the policy option considered.

Given the lack of studies considering multiple policies, it is possible that the literature has this wrong, in which case we would see some variation. Our work offers the opportunity to test whether we see nuance across policy options, or whether we see support for the assumptions made in aggregation work and work on more general attitudes regarding climate change.

Although the following hypotheses are seen in numerous public opinion studies, there is little work that tests them across a variety of specific climate change policies.

Given this lack of attention, we test some familiar hypotheses on a new set of data. Environmental values and attitudes are consistently strong predictors of environmental opinions. Values, within the larger domain of the environment, represent core beliefs (e.g., Feldman, 1988) concerning the role of humans within the environment (see Dunlap et al., 2000). These values serve as the foundation from which specific attitudes are often formed (Feldman, 1988). Findings from this literature have generally suggested that individuals who express strong, broad-based environmental values are also likely to display more supportive environmental attitudes (e.g., Schultz & Zelezny, 1999). Within the climate change domain, the literature has also suggested that these values influence aggregated support for policies (Zahran, Brody, Grover, & Vedlitz, 2006).[3] In this case, we do not expect to see variation across policy options. Individuals who hold strong values associated with climate change are likely to be supportive of a large variety of alternatives. This body of literature has suggested the following:[4]

H2: Those who hold stronger ecological values are more likely to express support for specific climate change policy options.

It is also possible that focused environmental attitudes may influence specific environmental policy preferences. For climate change, there are three general attitudes that likely influence support for climate policies. Specifically, the literature has illustrated the importance of capturing attitudes toward concern about climate change; confidence in the science of climate change; and one's efficacy, or willingness, to alter behavior to address climate change.

The relationship between concern for climate change and support for policy action seems straightforward. Perhaps not surprisingly, Zahran et al. (2006) have found that those who are more concerned about climate change are more likely to support climate change policy; however, their measure of policy was an aggregation of several specific proposals. When presented with more detailed policy proposals, the public may respond differently depending upon the nature of the costs associated with a given policy. Similarly, Krosnick, Holbrook, Lowe, and Visser (2006) have found that public views of the seriousness of climate change influence support for general policy sentiments. The literature has indicated that we should expect attitudes of concern to influence policy support. Consequently, we anticipate the following:

H3: Those who indicate higher levels of concern about climate change will express a greater degree of support for climate change policy options.

When the public perceives uncertainty within the scientific community, they are more likely to support policy actions that have the least direct impact on them (e.g., Sapolsky, 1968). Climate change certainly appears to be an issue where the public is uncertain concerning the science, mostly because it is an issue that is "intrinsically difficult to understand" (Weber & Stern, 2011, p. 317). Scholars have indicated that those who express greater confidence in the science of climate change are more likely to express higher levels of concern for the risks of climate change (e.g., Blocker & Eckberg, 1997; Stoutenborough & Vedlitz, 2014).[5] This perception of uncertainty is further solidified by news coverage of climate change (Boykoff & Boykoff, 2007; McCright & Dunlap, 2003). Consequently, there is reason to believe

that a substantial portion of the public is likely hesitant to simply accept what scientists have to say concerning climate change and therefore should be less likely to support potentially costly policy options. Accordingly, we expect the following:

> H4: Those who report that climate scientists do not understand climate change will be less likely to express support for climate change policy options.

Although we generally expect to find support for this hypothesis, this may be a case where we see variation. The policy options examined vary in terms of their perceived or real costs. This may cause an individual to be more accepting of policies that appear to have a low cost while indicating low support for high cost or "pocketbook" options (Leiserowitz, 2006).

An individual's belief that their actions have an impact on global warming and their willingness to make an effort to reduce their carbon footprint is likely to influence their support for climate policy. Efficacy "involves the regulation of thought processes, affective states, motivation, behavior or changing environmental conditions. These beliefs are critical in approaching novel or difficult situations, or in adopting a strenuous self-regimen" (Luszczynska, Schwarzer, Lippke, & Mazurkiewicz, 2011, pp. 152–53). Consequently, efficacy is a powerful attitude that is central to explaining why individuals may alter their status quo. Within the context of climate change, those who are efficacious are more likely to modify their behavior to limit their impact on climate change (Kellstedt et al., 2008; Stoutenborough & Vedlitz, 2012). In more colloquial terms, these individuals put their money where their mouths are and consciously decrease their carbon footprint. Given the costs associated with pursuing a lower carbon lifestyle,[6] those who have climate change efficacy ought to hold policy perspectives that differ from those who are less willing to alter their lifestyles. Therefore, we anticipate the following:

> H5: Those who feel they are more likely to have an impact on climate change mitigation will be more likely to express support for climate change policy options.

General Attitudinal Influences on Policy Support

Although there should be little doubt that attitudes related to climate change ought to have a strong influence on an individual's perception of climate change policy, general attitudes may also influence policy preferences. In particular, trust ought to be an important influence. There are two relevant forms of trust—trust in experts and trust in the media.

It is unreasonable to expect that the public will have the requisite knowledge necessary to accurately evaluate every issue. When we are unable to solve a problem, we typically turn to experts for advice. However, in today's society, it is increasingly difficult for the public to blindly trust the experts when an issue is based on science. There has been an increasing politicization of science in the United States (e.g., Sarewitz, 2004), and scientists are facilitating this by becoming overtly political (Martin & Richards, 1995). Furthermore, scientists face an uphill battle in earning the trust of the public. Trust is easily lost for the scientific community because much of what they work with is highly complex, and when scientific research is found to be incorrect, the public often views this as the experts failing them (Freedman, 2010).

Psychometric research has indicated that trust is a component of two characteristics—social value similarity and competence (Cvetkovich & Nakayachi, 2007). Robinson, Liu, Stoutenborough, and Vedlitz (2013) have argued that the competence component is the most appropriate when it is suitable to evaluate performance. In other words, have the experts within climate change demonstrated that they are competent? Given the implications of climate change and the costs of addressing it through policy, we suspect that evaluations of trust in experts is most likely based upon the competence component, and not social value similarities. Finally, Stoutenborough and Vedlitz (2012) have told us that climate scientists are significantly more likely to support climate policy than the public, therefore those who trust the experts ought to hold similar policy views. Based on this literature, we expect that:

H6: Those with greater trust in the experts are more likely to express support for climate change policy options.

Trust in the media ought to also influence support for climate policy. As noted, the media is contributing to the perception that climate scientists may not fully understand climate change. This is largely attributed to the journalistic norm of presenting both sides of an argument (Boykoff & Boykoff, 2007; McCright & Dunlap, 2003). However, the need to present information concerning risk at a sixth- to ninth-grade level is also necessary for the public to understand complex matters (Covello & Sandman, 2001). This often leads to dramatizing issues and limiting the role of expert knowledge (Peterson, 1996). Furthermore, when the media discusses potential remedies for climate change, they tend to emphasize the opinions of politicians or interest groups instead of scientists (Trumbo, 1996). Not surprisingly, climate scientists generally believe that media coverage is more inaccurate than accurate (Stoutenborough, Fette, & Vedlitz, 2014).

This background knowledge is essential for understanding the influence of trust in the media on climate policy support. Miller and Krosnick (2000) have found that those with greater trust in the media are more likely to be influenced by the media, and Séguin, Pelletier, and Hunsley (1999) have found that when the public trusts the source of information, they are more likely to perceive risk. Given the media likely presents climate change information in a simplified manner that through balancing effects may overemphasize the opinions of climate skeptics and that climate scientists largely believe that this coverage is inaccurate, there is every reason to expect that those who trust the media are more likely to hold views that differ from scientists. Accordingly, we expect the following:

H7: Those with greater trust in the media are less likely to express support for climate change policy options.

Finally, general public opinion research often finds a relationship between ideology and issue attitudes (e.g., Jacoby, 1991). Although not all environmental issues display a clear breakdown along ideological lines, climate change is a noticeably polarizing environmental issue (McCright & Dunlap, 2011). The literature on general environmental public opinion has found fairly consistent differences between conservatives and liberals. Liberals are, on average, more supportive of environmental policy action (e.g., Guber, 2003). In research specific to climate

change, McCright and Dunlap (2011) have found that liberals are more likely to believe there is a scientific consensus concerning global warming than conservatives. Consequently, we anticipate:

H8: Those who are more liberal are more likely to support climate change policy options.

Here too we may see variation across policy options given some policies are more polarizing than others. It is possible that liberalism will demonstrate a smaller effect (or no effect) on policies that are more widely agreed upon.

Analytical Approach

To understand the influence of values and attitudes on specific policy preferences, we examined five policy proposals to combat climate change. The data for this project are from two national public opinion polls conducted in 2004 and 2007.[7] These data enable us to determine the extent to which specific attitudes and values influence policy preferences and to determine the consistency of these influences over time and across policy alternatives.[8]

The five dependent variables were based on five questions designed to evaluate support for policy options. Respondents were prompted with the following statement, "A number of policy alternatives have been proposed to deal with the problem of global warming and the resulting climate change. For each one listed below, please indicate whether you strongly support, support, oppose, or strongly oppose that policy." The five policy solutions evaluated were associated with the following statements: 1) "Impose a tax on industry to discourage industry practices that contribute to global warming"; 2) "Increase the price of fossil fuels (like gasoline) to encourage people to save energy and encourage the development of energy efficient devices"; 3) "Use market incentives to encourage industries to reduce emissions"; 4) "Develop renewable energy sources, like hydro power, solar power, and windmills that emit no carbon dioxide"; and 5) "Require automobile companies to build more fuel-efficient vehicles."[9] These policy options represent frequently discussed alternatives among policy makers during the time period examined and are among the most commonly adopted policies among individual American states (Rabe, 2004). In addition, these questions get at distinct approaches to addressing climate change. Although the options presented do not identify precise price points, these alternatives conjure up very different considerations for the respondent that are not achieved when asking a simple question of whether an individual supports action on climate change.

Due to the coding scheme utilized for the dependent variable, an ordered logit would have been the most appropriate statistical approach for the ordered, but not continuous, data (McKelvey & Zavoina, 1975). The ordered logit relies upon the parallel regression assumption, an assumption rarely tested within the social science literature, which holds that the influence of an independent variable is consistent across the range of the dependent variable (Long, 1997). When the parallel regression assumption is violated, it creates biased standard error estimates. We used the Brant Test to evaluate this assumption (Williams, 2006) and, as a result, we estimated our models using a generalized ordered logit (GOLOGIT), which is designed to correct for the biased standard errors.[10]

The focus of our study is to understand the public's preferences for these policy alternatives. As noted above, there are several attitudes and values that need to be considered when examining the support for climate change policy. Accordingly, we examined the influence of environmental efficacy, ecological values, concern for climate change, an assessment of how well scientists understand climate change, trust in experts, trust in the media, and political ideology. The expectations for each of these attitudinal measures are outlined above.[11]

We also controlled for the usual set of demographic characteristics that could influence behavior associated with climate change (e.g., Leiserowitz, 2006; McCright & Dunlap, 2011). Specifically, we controlled for the influence of party identification, education, age, race, gender, religious attendance, and income.[12]

We also controlled for the influence of time. Media coverage of global climate change has been increasing over several decades (e.g., Liu, Lindquist, & Vedlitz, 2011; Liu, Vedlitz, & Alston, 2008). This increased exposure should cause views to change as individuals better understand the issue of global climate change. Therefore, we anticipate that respondents associated with each survey would have viewed these policy alternatives differently. In some cases, this may have led to the public being more likely to support in 2007, but in others, the public may have become more skeptical of the option, making them less supportive.[13]

Finally, for comparison purposes, we estimated an ordinary least squares (OLS) using an aggregated measure of climate policy support. The aggregated measure represents the average level of support for the five climate policies. Although three of the policies have their scales truncated due to the empty bin problem, this is not a concern when aggregated in this manner. Consequently, the aggregated measure is based on the original four-point scales of the five policy questions. The OLS is estimated using the same variables found in the GOLOGIT models.

Results

Simple analyses of the support for these policies revealed that public support might have been intensifying as they became more aware of climate change. Table 1 presents the percentage breakdown for each policy for both 2004 and 2007.[14] With

Table 1. Percent Support for Policy Solutions to Mitigate Climate Change

	Market Incentives		Tax Industry		Renewable Energy	
	2004 (%)	2007 (%)	2004 (%)	2007 (%)	2004 (%)	2007 (%)
Strongly oppose	2.41	2.42	4.96	9.52	0.19	0.75
Oppose	10.71	7.16	19.35	19.26	3.49	2.37
Support	67.37	48.29	54.34	39.53	51.93	33.69
Strongly support	19.49	42.11	21.35	31.67	44.39	63.17
	Fossil Fuel Price		Fuel Efficiency			
	2004 (%)	2007 (%)	2004 (%)	2007 (%)		
Strongly oppose	12.10	23.30	1.02	2.04		
Oppose	41.40	37.74	7.82	9.16		
Support	36.67	25.71	53.96	36.24		
Strongly support	9.83	13.23	37.18	52.53		

the exception of increasing fossil fuel prices, the public in 2007 was more willing to "strongly support" these policies. Indeed, four policy options had an increase of at least 10 percent in the "strongly support" response. Although this may suggest that the public was becoming increasingly intense in its support of policies to mitigate climate change, we needed to control for other relevant variables, namely attitudes and values, to ensure that these changes were not the result of differences in these characteristics but were, in fact, fundamental shifts in intensity.

Table 1 also demonstrates the large variance in support across the five policy options. For instance, among these alternatives, there is very strong support for developing renewable energy technology (more than 90 percent support or strongly support), whereas nearly 40 percent strongly support or support increasing the price of fossil fuels. This provides further impetus for considering determinants across policy options as there are clear differences that should be explored.

To understand the influence of values and attitudes on the public's policy preferences, we examine the results of the GOLOGIT and OLS analyses below. To allow comparisons across models, all six are presented in Table 2. We allowed some of the independent variables to vary across the range of the dependent variables because they violated the parallel regression assumption. Consequently, the GOLOGIT allows for a more nuanced interpretation of the influence between an independent and dependent variable (e.g., Bies, Lee, Lindsey, Stoutenborough, & Vedlitz, 2013; Robinson et al., 2013; Stoutenborough, Sturgess, & Vedlitz, 2013). This analytical approach allowed a variable to gain or lose statistical significance or change signs as it moved up the different levels of the dependent variable. This is possible because each level of the dependent variable is estimated simultaneously as a traditional logit, and variables that violate the assumption are allowed to vary in each logit while the nonviolating variables are held constant in each logit. This differs from a traditional ordered logit, which interprets the influence of a variable as a constant.

Consequently, the presentation of the results differs from the norm. Because there were four possible values for the dependent variable in two models, there were three levels examined, and three possible values with two levels for the remaining policies. For the two policies with four values, Level 1 corresponded to the contrast between 0 against all of the other ordered categories. Level 2 examined the contrast between 0 and 1 against 2 and 3, whereas Level 3 represented 3 against all of the lower values. For the policies with only 3 values (where 0 and 1 were collapsed into a single value) Level 1 contrasted 1 against 2 and 3, while Level 2 was 3 against the lower values.

As with any ordered analysis, the GOLOGIT creates a series of logit estimations that are simultaneously estimated. At Level 1, the model treats the ordered categories 1, 2, and 3 as being coded 1, and the 0 category as being coded 0. At Level 2, the model treats 0 and 1 as if they were coded 0, and 2 and 3 treated as being 1. At Level 3, the model combines 0, 1, and 2 into the 0 category, which leaves 3 coded as 1. A similar coding scheme is utilized in the models where the 0 and 1 ordered categories are combined into a single value. Finally, Gamma estimates are reported. Gamma estimates determined if the coefficient estimated in any level above Level 1 was significantly different from Level 1. This identified where the violation of the parallel regression assumption occurred.

Table 2. Public Support for Policy Solutions to Mitigate Climate Change

	Market Incentives	Tax Industry	Renewable Energy	Fossil Fuel Price	Fuel Efficiency	Aggregated Policy
Ecological values	−0.428 (0.230)†	1.201 (0.147)***	0.898 (0.160)***	0.579 (0.139)***	0.994 (0.151)***	0.249 (0.028)***
Concern	0.346 (0.117)**	0.727 (0.112)***	0.323 (0.121)**	0.295 (0.107)**	1.406 (0.203)***	0.143 (0.021)***
Scientists understand	0.069 (0.081)	0.130 (0.078)	−0.107 (0.084)	0.132 (0.074)†	0.099 (0.080)	0.028 (0.015)†
Efficacy	0.157 (0.153)	0.170 (0.150)	0.116 (0.159)	0.717 (0.143)***	0.189 (0.153)	0.080 (0.028)**
Trust experts	0.061 (0.038)	0.113 (0.036)**	0.096 (0.039)*	0.074 (0.035)*	0.063 (0.038)†	0.029 (0.007)***
Trust media	0.051 (0.041)	−0.059 (0.040)†	−0.023 (0.043)	0.010 (0.038)	0.039 (0.041)	−0.0002 (0.007)
Ideology	0.021 (0.042)	−0.123 (0.040)**	−0.115 (0.043)**	−0.081 (0.038)*	−0.102 (0.041)*	−0.028 (0.007)***
Education	0.022 (0.032)	0.041 (0.031)	0.132 (0.033)***	0.039 (0.028)	0.036 (0.031)	0.015 (0.006)*
Republican	0.029 (0.171)	−0.339 (0.161)*	−0.209 (0.173)	−0.549 (0.155)***	−0.150 (0.166)	−0.101 (0.032)***
Democrat	−0.054 (0.156)	−0.004 (0.150)	−0.294 (0.161)†	0.233 (0.142)	−0.155 (0.154)	−0.008 (0.029)
Age	−0.003 (0.006)	0.005 (0.003)	−0.0009 (0.004)	0.011 (0.003)**	0.009 (0.003)*	0.002 (0.0007)**
Black	−0.251 (0.230)	0.064 (0.213)	−0.544 (0.226)*	−0.190 (0.202)	−0.342 (0.219)	−0.064 (0.042)
Asian	−1.202 (0.435)**	−0.482 (0.422)	−0.907 (0.443)*	0.226 (0.395)	−0.520 (0.436)	−0.142 (0.081)†
Hispanic	0.453 (0.288)	0.237 (0.290)	0.010 (0.310)	0.656 (0.264)*	−0.376 (0.287)	0.049 (0.055)
Religious attendance	−0.173 (0.124)	0.329 (0.290)	−0.107 (0.128)	0.277 (0.112)*	0.440 (0.224)*	0.016 (0.023)
Male	−0.396 (0.198)*	−0.148 (0.114)	0.207 (0.126)	−0.022 (0.109)	−0.030 (0.119)	−0.005 (0.022)
Income	0.003 (0.002)	−0.0001 (0.001)	0.006 (0.002)**	0.005 (0.001)**	0.004 (0.002)*	0.001 (0.0003)**
2004	−0.523 (0.214)*	0.458 (0.291)	−0.292 (0.373)	0.979 (0.174)***	0.580 (0.225)**	−0.058 (0.024)*
Variables in Violation of the Parallel Lines Assumption						
	2004	2004	2004	2004	2004	
Level 2	*−0.949 (0.141)******	0.359 (0.159)*	*−0.907 (0.138)******	*0.541 (0.134)******	*−0.593 (0.135)******	
Level 3	—	*−0.431 (0.149)***	—	*−0.120 (0.185)*	—	
	Ecolog. Values	Relig. Attendance			Concern	
Level 2	*0.532 (0.159)***	0.100 (0.156)			*0.413 (0.121)***	
Level 3	—	*−0.286 (0.147)*†			—	
	Age				Relig. Attendance	
Level 2	*0.010 (0.004)**				*−0.039 (0.130)*	
	Male				—	
Level 2	*0.027 (0.133)*					
Cut point 1/Constant	1.735 (0.841)	−1.282 (0.705)	−0.308 (0.768)	−3.284 (0.655)	−3.572 (0.741)	0.806 (0.132)***
Cut point 2	−4.065 (0.734)	−3.327 (0.684)	−3.700 (0.728)	−5.333 (0.663)	−4.231 (0.708)	
Cut point 3	—	−5.563 (0.692)	—	−7.051 (0.674)	—	
Number of cases	1,295	1,307	1,316	1,306	1,320	1,257
Wald χ^2/F-test	163.51***	378.39***	200.94***	312.88***	288.76***	40.77***
Pseudo R^2/R^2	0.0805	0.1540	0.1199	0.1072	0.1490	0.3722
Log likelihood/RMSE	−1,070.234	−1,267.903	−907.394	−1,492.104	−1,039.644	0.384

Standard errors in parentheses. Two-tailed tests. †$p < 0.100$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

For variables in violation of the parallel regression assumption: Level 1 corresponds to the contrast between 0 against all of the other ordered categories; Level 3 examines the contrast between the 0, 1, and 2 categories against the 3 category. When 0 and 1 were collapsed, Level 1 is the same as Level 2, and Level 2 is the same as Level 3.

Italicized coefficients and standard errors at Levels 2 or 3 represent estimates that the Gamma test identifies as being significantly different from Level 1 at the $p < 0.100$ level.

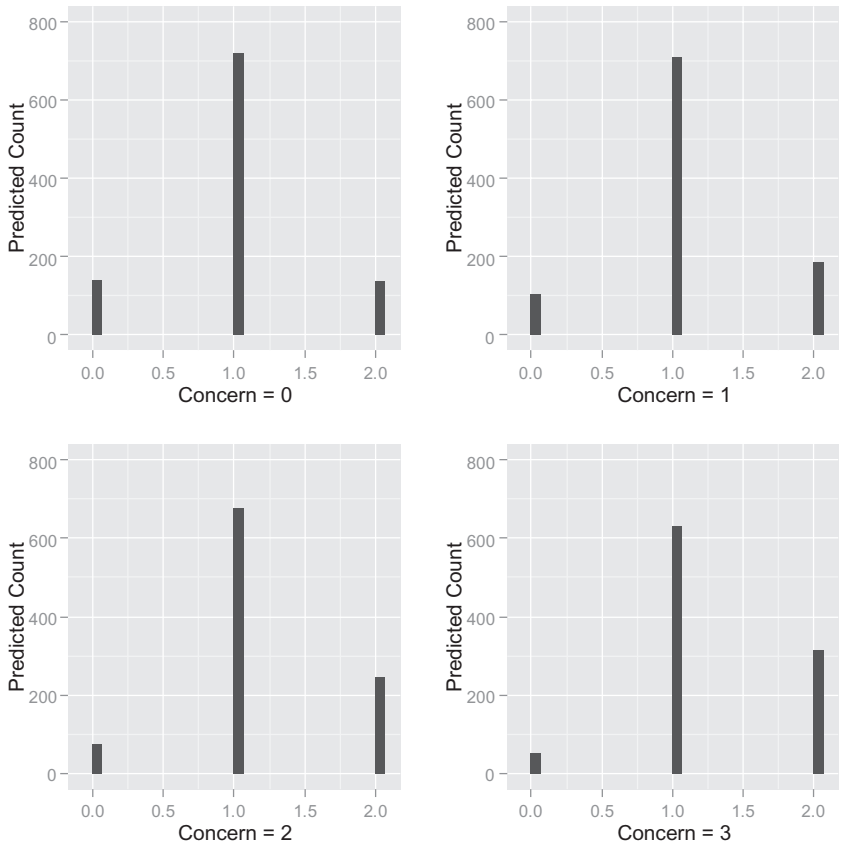

Figure 1. Simulated Distribution of Concern for Climate Change on Support for Market Incentives
Note: Predicted count is out of 1,000.

Market Incentives

We begin with an analysis of the public's support for market incentive policies. The results are presented in Table 2. The analysis indicated that those who had greater concern for climate change were more likely to support market incentive policies, which provided support for H3. The results also suggest that those with greater ecological values were more likely to oppose this alternative. However, the GOLOGIT results indicated that they were also more likely to "strongly support," which suggests that those with stronger ecological values are torn over whether to support a market-based approach. Together, these provided partial support for H2.

The coefficient estimates from the GOLOGIT are not necessarily intuitive. To ease interpretation, Figure 1 provides a visualization of the changes in the probability of different reported levels of support or opposition at varying levels of concern.[15] As Figure 1 illustrates, as concern increases, support for market incentives increases. Similarly, Figure 2 provides visualization for the changes in support or opposition at varying levels of ecological values. Figure 2 demonstrates importance of estimating the models using the GOLOGIT. The simulations indicated that those who have greater ecological values were more likely to both oppose and strongly support the use of market incentives.

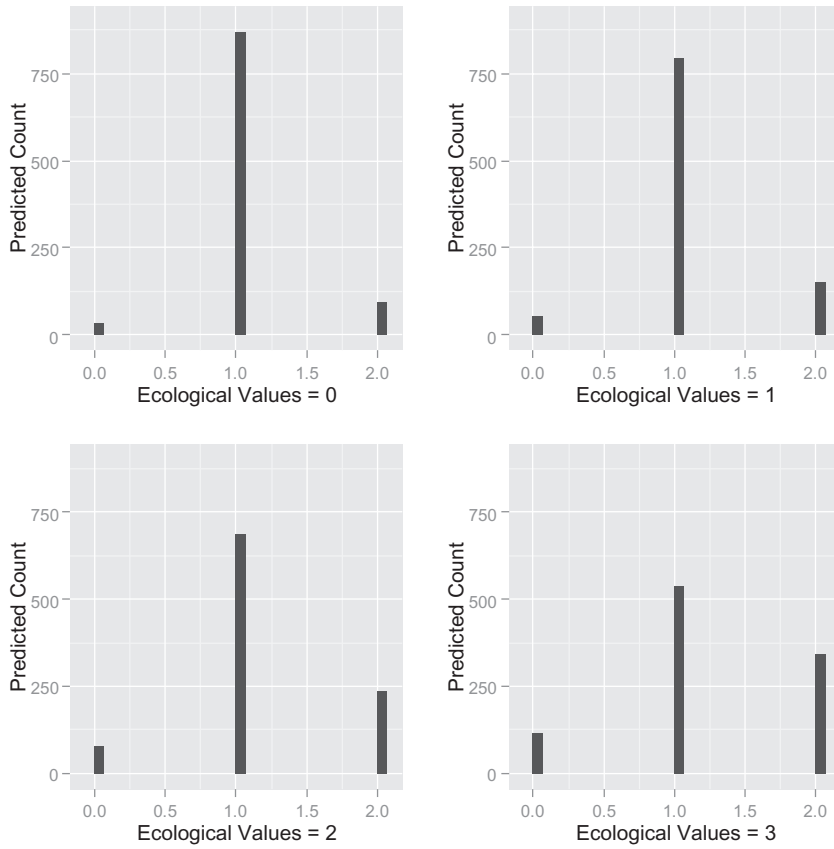

Figure 2. Simulated Distribution of Ecological Values on Support for Market Incentives
Note: Predicted count is out of 1,000.

The analysis also indicated that Asians were less likely to support market incentives. The GOLOGIT revealed that men were more likely to oppose these incentives but were no more or less likely to "strongly support." Conversely, the GOLOGIT indicated that those older in age were no more or less likely to oppose or support the policy, but they were more likely to "strongly support." Finally, those who took the survey in 2004 were less likely to support, which suggests that by 2007 public support was more intense than in 2004.

Tax Industry

The results of public support for a tax on industry are also presented in Table 2. These estimates revealed that liberals, those with greater ecological values, trust in experts, concern for climate change, and those who have less trust in the media were more likely to support a tax on industry, which supported H2, H3, H6, H7, and H8.

Figure 3 provides a visualization of the changes in the probability of different reported levels of support or opposition at varying levels of concern. As Figure 3 illustrates, as concern increases, support for a tax on industry increases. Similarly,

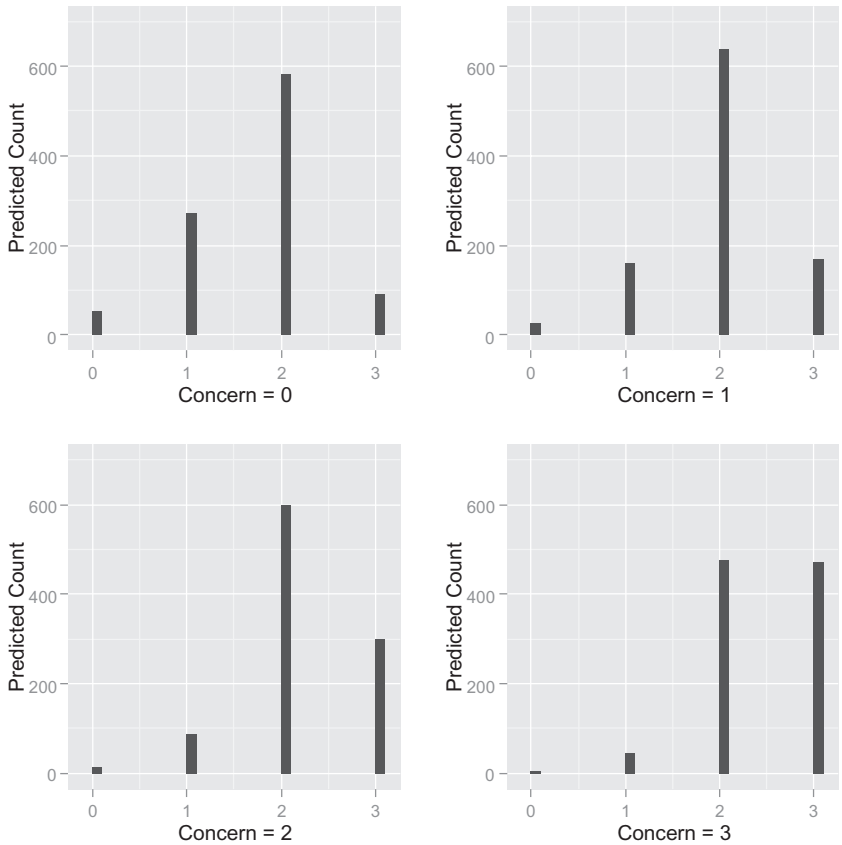

Figure 3. Simulated Distribution of Concern for Climate Change on Support for a Tax on Industry
Note: Predicted count is out of 1,000.

Figure 4 provides visualization for the changes in support or opposition at varying levels of ecological values. Figure 4 demonstrates that an increase in ecological values is associated with an increase in support for a tax on industry.

The analysis indicated that Republicans were less likely to support a tax on industry. The GOLOGIT found that there was not a significant difference between religious attendees at the "strongly oppose" level (Level 1) or the oppose to support level (Level 2), but those who attend religious meetings were less likely to "strongly support" the policy. Additionally, the GOLOGIT revealed that those participating in the 2004 sample were no more likely to "strongly oppose," more likely to support than oppose (Level 2), and less likely to "strongly support," which suggests that by 2007 public support was more intense than in 2004.

Renewable Energy

The examination of the public's support for increased spending on renewable energy is presented in Table 2. The model revealed that liberals, those with greater ecological values, greater concern, and trust in experts were more likely to support this policy solution. This provided support for H2, H3, H6, and H8.

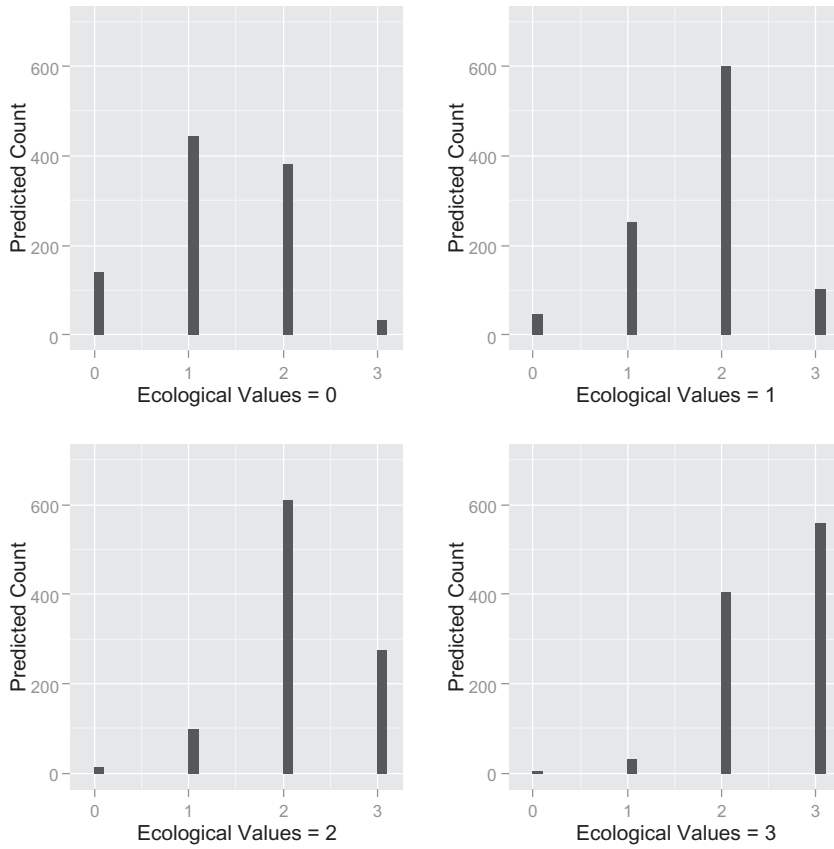

Figure 4. Simulated Distribution of Ecological Values on Support for a Tax on Industry
Note: Predicted count is out of 1,000.

Figure 5 provides a visualization of the changes in the probability of different reported levels of support or opposition at varying levels of concern. As Figure 5 illustrates, as concern increases, support for renewable energy increases. Similarly, Figure 6 provides visualization for the changes in support or opposition at varying levels of ecological values. Figure 6 demonstrates that an increase in ecological values is associated with an increase in support for renewable energy.

The analysis also found that those who are more educated and have higher incomes were more likely to support renewable energy. Conversely, those who are black or Asian and those who identify as Democrats were less likely to support renewable energy. The GOLOGIT also revealed that those in 2004 were less likely to "strongly support," which again suggests that the public was more intense in its support of renewable energy in 2007 than 2004.

Increase Fossil Fuel Price

Not surprisingly, the analysis of the policy option to increase fossil fuel prices tended to polarize the respondents. The results of this analysis can be found in Table 2. The model indicated that liberals, those with stronger ecological values, greater efficacy, trust in experts, greater concern, and believe scientists understand climate change

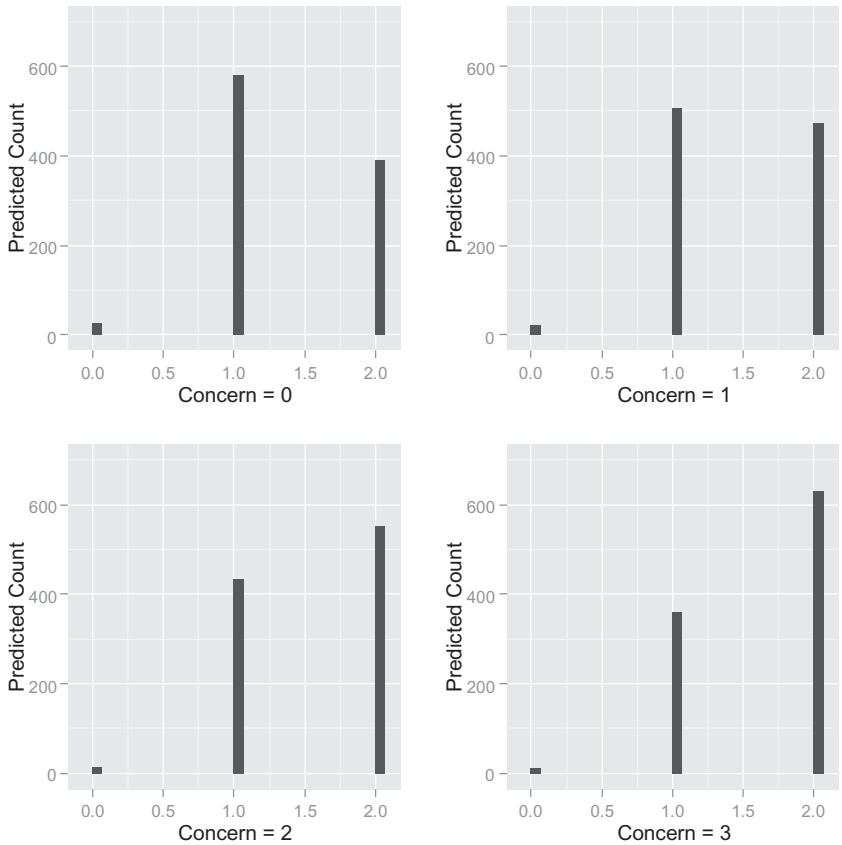

Figure 5. Simulated Distribution of Concern for Climate Change on Support for Renewable Energy
Note: Predicted count is out of 1,000.

were more likely to support increasing prices. This supported all of the hypotheses except H5.

Figure 7 provides a visualization of the changes in the probability of different reported levels of support or opposition at varying levels of concern. As Figure 7 illustrates, as concern increases, support for an increase in fossil fuel prices increases. Similarly, Figure 8 provides visualization for the changes in support or opposition at varying levels of ecological values. Figure 8 demonstrates that an increase in ecological values is associated with an increase in support for an increase in fossil fuel prices.

The analysis also revealed that those older in age, Hispanics, those who attend religious services, and those with more income were more likely to support this policy. Not surprisingly, Republicans were less likely to support. The GOLOGIT found that respondents in 2004 were less likely to "strongly oppose" or generally oppose but were no more likely to "strongly support." This suggests that attitudes have not intensified over time.

Fuel Efficient Vehicles

The final policy alternative concerned the government requiring more fuel-efficient vehicles. The results of this analysis are found in Table 2. The analysis revealed that

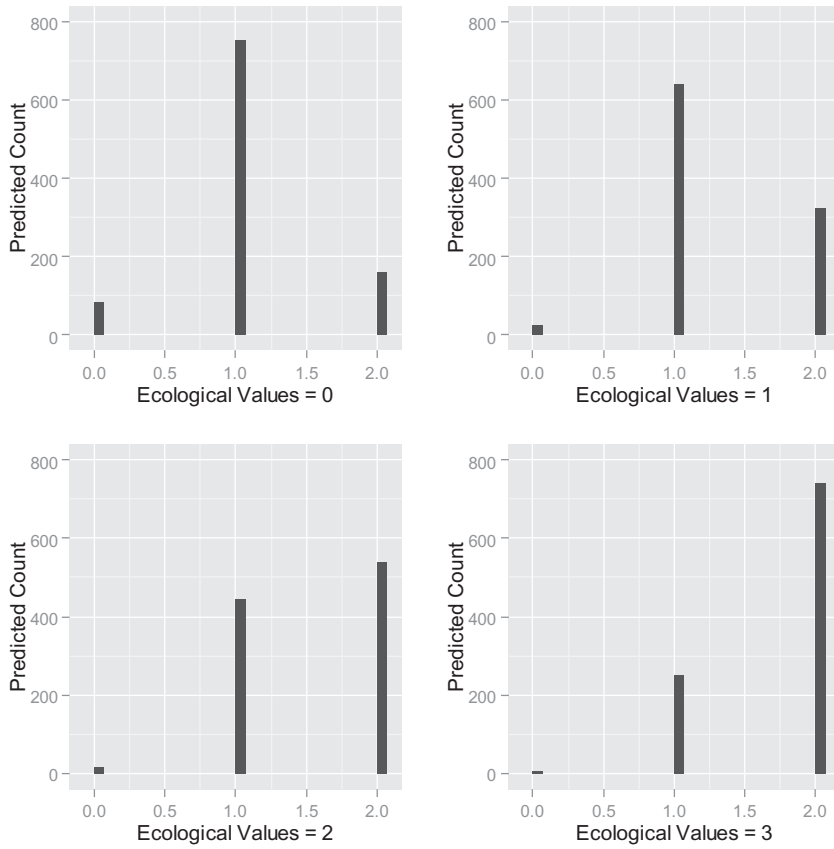

Figure 6. Simulated Distribution of Ecological Values on Support for Renewable Energy
Note: Predicted count is out of 1,000.

liberals, those with greater ecological values, and greater concern were more likely to support this alternative, providing support for H2, H3, and H8. The GOLOGIT found that those with greater concern were more likely to support than oppose and more likely to "strongly support," but the magnitude of this influence at the highest level was substantially smaller.

Figure 9 provides a visualization of the changes in the probability of different reported levels of support or opposition at varying levels of concern. As Figure 9 illustrates, as concern increases, support for more fuel efficient vehicles increases. Similarly, Figure 10 provides visualization for the changes in support or opposition at varying levels of ecological values. Figure 10 demonstrates that an increase in ecological values is associated with an increase in support for more fuel efficient vehicles.

The results also indicated that those older in age and with higher income were more likely to support. The GOLOGIT suggested that religious attendees were more likely to support than oppose and that there was no difference between the likelihood of "strongly supporting" and the lower categories. Finally, the 2004 respondents were more likely to support than oppose but were less likely to "strongly support," suggesting a lower intensity of support.

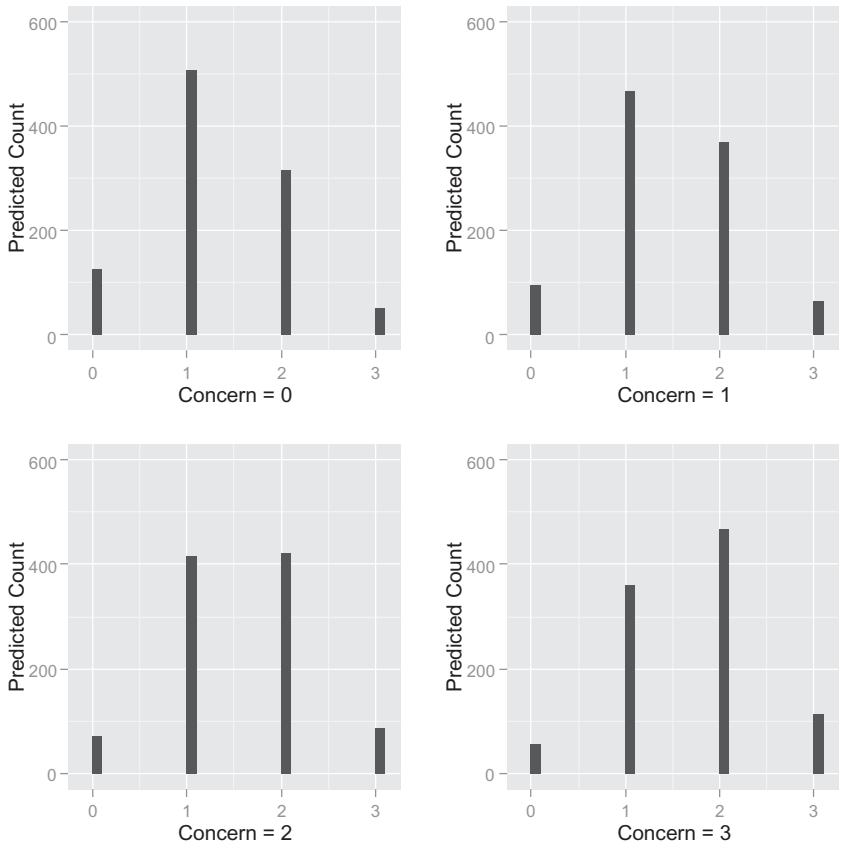

Figure 7. Simulated Distribution of Concern for Climate Change on Support for Increasing the Price of Fossil Fuels
Note: Predicted count is out of 1,000.

Aggregated Policy Support

As the analyses have thus far illustrated, there appears to be a number of inconsistent indicators of specific policy support. How does this compare with an aggregated measure of policy support? Are the aggregated results a reasonable approximation of specific policy support? The results of our OLS analysis of aggregated policy support are presented in the final column of Table 2. Similar to support for increasing the price of fossil fuels, the model indicated that liberals, those with stronger ecological values, greater efficacy, who trust experts, have greater concern, and believe scientists understand climate change were more likely to support climate policy. This supported all of the hypotheses except H5.

Additionally, we find that those with greater education, non-Republicans, greater income, non-Asian, and those older in age were more likely to generally support climate policy, as defined by the five policies examined in this project. We also find that the public was generally less likely to support in 2004 than in 2007.

Discussion

We began this project seeking to understand the extent to which climate change-related values and attitudes influence public support for specific policy options and

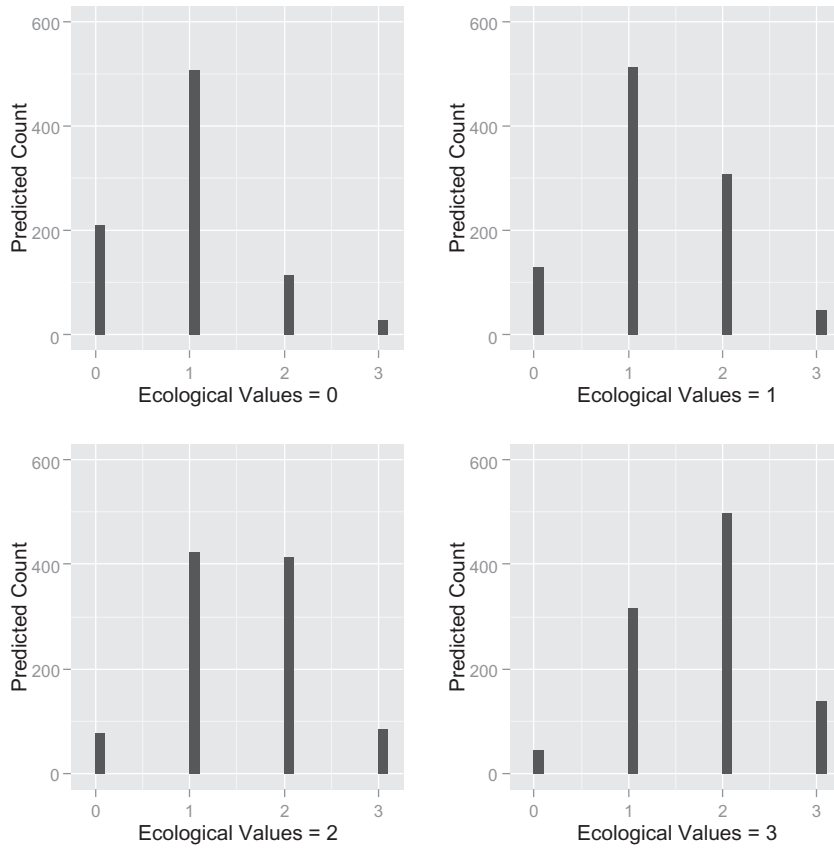

Figure 8. Simulated Distribution of Ecological Values on Support for Increasing the Price of Fossil Fuels
Note: Predicted count is out of 1,000.

to determine whether these factors are consistent across policies, or over time. Utilizing two unique surveys of public views on climate change, we were able to examine support for five specific policy proposals that would limit the country's impact on climate change. Several implications can be drawn from the results of this project.

First, we are able to identify attitudes and values that may have a universal, or near universal, influence on support for climate policy. We outlined nine hypotheses pertaining to climate change-related values and attitudes as well as general attitudes that extant literature has suggested may influence policy support. Table 3 presents a summary of the results of these hypothesis tests. As the results indicated, those with greater concern for climate change and those with stronger ecological values consistently supported these policy options, though only concern was fully supported in all five models.

Conversely, Table 3 indicates that efficacy, the belief that scientists understand climate change, and trust in the media provide inconsistent to virtually nonexistent influence on climate change policy support. All three were significant predictors in only one of the five specific policy models. The two remaining indicators, trust in experts and ideology, were generally predictors of policy support. However, they were both associated with distinctly insignificant estimates in one specific policy

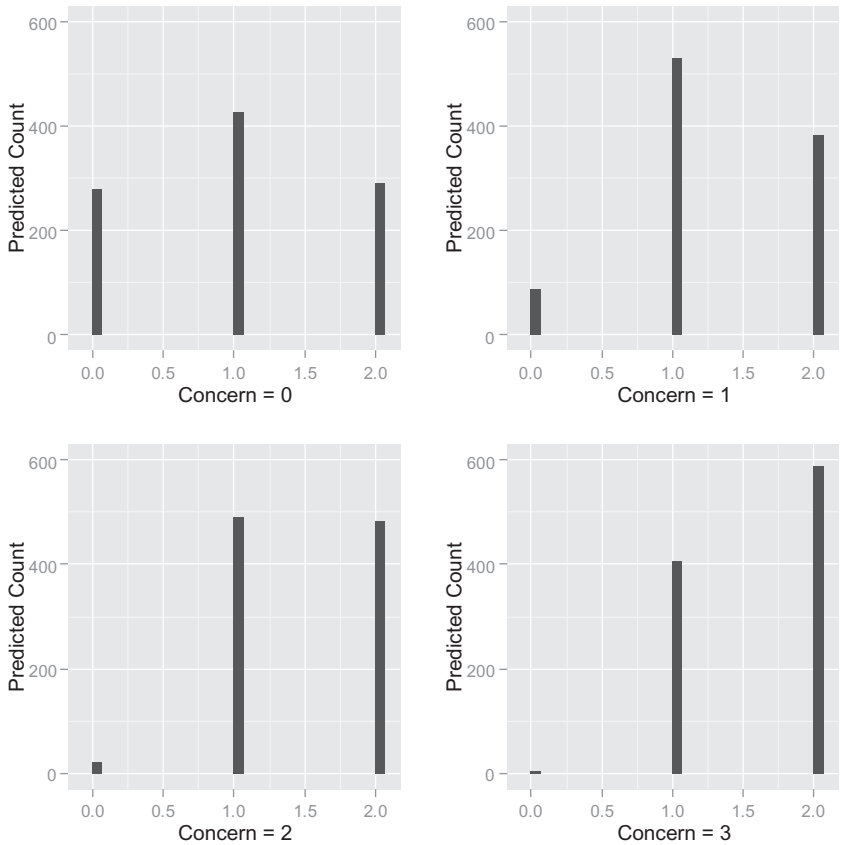

Figure 9. Simulated Distribution of Concern for Climate Change on Support for More Fuel-Efficient Vehicles
Note: Predicted count is out of 1,000.

model. If we are to generalize, it would be that these are important indicators. However, we are not comfortable suggesting that these influences are universal.

Although consistent factors appear relevant (or irrelevant as the case may be), it is also important to note the variance in relevant factors for specific policy options. The policy option that stands out the most, in terms of clear differences in relevant factors, is market incentives. This option had relatively few predictors and yielded a negative coefficient for ecological values when comparing general opposition with general support. However, the comparison between those who "strongly support" and the lower levels of the dependent variable revealed that those with strong ecological values were also more likely to "strongly support" the use of market incentives, which reflects our expectations. When compared with the result at the lower level, this suggests that those with strong ecological values are generally predisposed to "strongly support" policies designed to mitigate climate change, but there may have been some cognitive dissonance by those with strong values who chose to oppose a market solution. It is probable that attitudes related to economic self-interest, which were not measured in either survey, may be influencing policy support when options like taxing industry and using market incentives are supported, but increasing the price of fossil fuels is not. Future research will need to address the cross-domain influence of various attitudes.

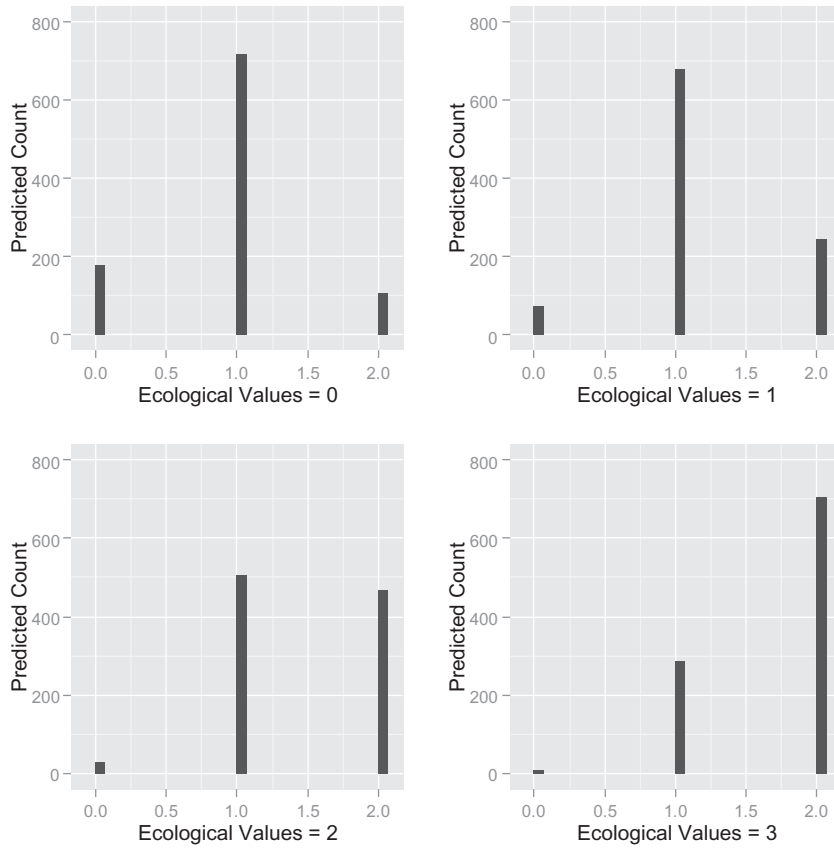

Figure 10. Simulated Distribution of Ecological Values on Support for More Fuel-Efficient Vehicles
Note: Predicted count is out of 1,000.

As a whole, the models suggest that we are unable to reject the null hypothesis for H1. Clearly, there are variations in the predictive influences of all but two of the variables—concern and ecological values. With the exception of these two, the results suggest that the basic assumption of aggregated studies does not hold. Indeed, the variations tell an interesting story, which is lost when the data are aggregated. Certainly, understanding why a specific attitude is unable to predict specific policy support when it is a predictor in the aggregated model is an important step toward truly understanding what drives policy support.

We find that many of these values and attitudes also have influences that are time-invariant. By controlling for the year the first survey was conducted, we are able to capture changes in opinions due to the advance of time. Consequently, the influence of the other variables should represent those that are impacted by time. Accordingly, we feel confident concluding that four attitudes or values—concern, ideology, trust in experts, and ecological values—are likely important predictors of support for most climate policies, regardless of time.

Third, this project allows us to draw inferences concerning the intensity of the public's views toward climate policy. First, the public was much more likely to support these policies in 2007 than in 2004, which suggests that the public felt more

Table 3. Hypothesis Test Summary

	Market Incentives	Tax Industry	Renewable Energy	Fossil Fuel Price	Fuel Efficiency	H1: No Variation	Aggregated Policy
H2: Those who hold stronger ecological values are more likely to express support for climate change policy options.	1/2 Support	Support	Support	Support	Support	Support	Support
H3: Those who indicate higher levels of concern over climate change will express a greater degree of support for climate change policy options.	Support	Support	Support	Support	Support	Support	Support
H4: Those who report that climate scientists do not understand climate change will be less likely to express support for climate change policy options.	—	Support	—	Support	—	—	Support
H5: Those with higher efficacy will be more likely to express support for climate change policy options.	—	—	—	Support	—	—	Support
H6: Those with greater trust in the experts are more likely to express support for climate change policy options.	—	Support	Support	Support	Support	—	Support
H7: Those with greater trust in the media are less likely to express support for climate change policy options.	—	Support	—	—	—	—	—
H8: Those who are more liberal are more likely to support climate change policy options.	—	Support	Support	Support	Support	—	Support

Note: The fractions represent the number of levels of the dependent variable where the hypothesis was supported in situations where the variable representing a hypothesis violated the parallel regression assumption.
The precise wording of H1: Predictors for each climate change policy option will not vary based on the policy option considered.

intensely concerning these options in 2007. This is likely a reflection of the public generally warming to the reality of climate change. However, it is likely these levels of support fell following the "Climategate" memos and recession. Second, the models regularly found that measures were not significantly different than zero in the lower levels of the analyses, particularly between oppose and support. Instead, there were significant differences in the highest level, where "strongly support" was compared with the lower categories. This suggests that different levels of intensity exist within these measures.

Now that we have an idea that public support was more intense in 2007 than it was in 2004, future examinations need to test Key's (e.g., 1961) assertions that policy makers ought to be more likely to act in response to this intensity. From our descriptive results of support for these climate policy options, we can see that support varies for each option and increases over time. A number of these options have been taken up by states (Matisoff, 2008), particularly those that have the

highest level of support. For instance, a number of states have enacted more stringent automobile standards in recent years, and this policy option is fairly popular. Northeastern states have also adopted a market incentives approach through their carbon cap and trade programs. Although the states have largely taken the lead on climate change policy, the federal government has recently made significant investments in renewable energy. This policy option garners the highest degree of support over the two survey years. It is unclear, however, if this activity is related to policy makers recognizing public intensity, which future work should address.

Finally, these results raise concerns about the utility of examining public policy perceptions using aggregate or proxy data. We found a great deal of variation in support for climate policy. As noted, only one attitude, concern, exerted a significant influence on all five specific policies. The demographic indicators were substantially less consistent. Three demographic indicators—age, religious attendance, and income—exhibited a significant influence on at least three of these policies, and, for two of these, it was only because the GOLOGIT found an influence in one of the higher levels. The significant influences for religious attendance differed in directionality. In all, each demographic indicator averaged a statistically significant influence in only 1.8 of the five policies.

Consequently, these results all suggest that it may be imprudent to conclude that certain demographic groups or holders of specific attitudes are more, or less, likely to support certain policy domains given the inconsistency in support for specific policies. The differences found between the specific policy models and the aggregated policy model demand additional attention. For example, the models clearly indicate that efficacy does not have the influence that extant research and the aggregated model suggest. These differences could dramatically change the way in which policy makers and interested parties pursue policy change if they had more accurate information from which to draw these interpretations.

Acknowledgment

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The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration or the Department of Commerce.

Notes

1 For instance, the following have been used as proxies: support for environmental spending (Elliott, Seldon, & Regens, 1997), responses to preferred levels of environmental regulation (Guber, 2003), and preferences for government effort on environmental issues (Konisky, Milyo, & Richardson, 2008).

2 For instance, it is common to find estimates of Cronbach's alpha when aggregating policy support (e.g., Lubell, 2002; Lubell et al., 2006, 2007). The Cronbach's alpha is estimated to assure that the core components of the aggregated score are highly related. The assumption must be made that the predictors of these components must be similar across each component. The greater the differences between components, the less likely the aggregated score can represent a meaningful construct. In

short, for an aggregated score to hold meaning, we must assume that the underlying components are similar. This is the reason Cronbach's alpha is commonly reported with aggregated scores.

3 However, Dietz et al. (2007) have found an inconsistent influence for values in their aggregate analysis of climate policy.

4 The hypotheses presented are expectations within the context of multivariate statistical analyses.

5 An exception to this is found by Kellstedt et al. (2008).

6 Costs can be monetary (e.g., purchasing a more expensive vehicle, remodeling one's home to make it more energy efficient, or any of the other methods that are commonly used by those attempting to limit one's carbon footprint) or related to standard of living (e.g., not driving large, low-efficiency vehicles, keeping home temperatures warmer in the hot season and cooler in the cold season, not taking distant trips, or purchasing items produced far away).

7 Both national public surveys were part of larger National Oceanic and Atmospheric Administration (NOAA) projects. Both used national random samples of adults in the United States that are 18 years of age and older. The 2004 survey was conducted from July 13 to August 10, 2004. The 2007 survey was in the field from April 3 to July 18, 2007. Both telephone-based surveys utilized random digit dialing and were administered by a professional computer-assisted telephone interviewing provider. Samples were provided by the sampling firm Survey Sampling International (SSI). As with other surveys conducted during this period of time, there may be concerns with the representativeness of the sample, as individuals with cell phones were not included in the sampling frame. This is due to federal statutes that prevented survey companies from sampling cell phone numbers. The authors will make available the data and supporting materials necessary to reproduce the results presented in this study at the website for the Institute for Science, Technology and Public Policy (http://bush.tamu.edu/istpp/) no later than 6 months after the paper is published.

8 Survey weights were not used in the analyses. There has been a debate within the literature for decades concerning the use of weights (see Lohr, 1999, pp. 362–65). Many argue weights are not needed when demographic indicators are included in a regression and that this will produce unbiased estimates (e.g., Gelman & Carlin, 2002; Winship & Radbill, 1994). Gelman (2007, p. 153) argues, "Survey weighting is a mess. It is not always clear how to use weights in estimating anything more complicated than a simple mean or ratios, and standard errors are tricky even with simple weighted means." Of particular concern, we are unaware of any discussions of the ability of a generalized ordered logit to estimate unbiased parameter estimates when using weighted data. From a practical perspective, analyses using unweighted data that include typically weighted variables as controls have been found to be unbiased. Therefore, we choose to take the approach that is less likely to potentially bias the analyses.

9 With the removal of cases due to omitted variables, three of these policy options—energy efficiency, market incentives, and renewable energy—are associated with dependent variables that were re-coded to collapse the "strongly oppose" and "oppose" responses into one category. There was an insufficient number of respondents who chose "strongly oppose" for these policies, which created estimation concerns due to a lack of variation within this response (see McCullagh & Nelder, 1989). When this occurs, it can create biased estimators and standard errors. With biased standard errors, we could no longer trust the results of the analyses for these three models. To correct for the empty bin problem in these models, the two opposition response items were combined creating a three-point scale. We believe this approach is the most true to the data while correcting the empty bin problem.

10 We considered treating each model as a binary-dependent variable by dividing support from opposition. However, this approach would remove the added benefit of evaluating intensity, and violations of the parallel regression assumption suggest that we would be creating biased results. Violations of the parallel regression assumption bias standard errors. This violation suggests that there are subpopulation differences within the data. Aggregating the data into a dichotomous variable automatically creates this bias when violations exist within the full data. Additionally, in the models that have four observations in the dependent variable, the second level of the analysis offered results that are the equivalent of a normal logit, though the results were slightly different due to the simultaneous estimations occurring in the GOLOGIT. In the models where the "strongly oppose" and "oppose" options were collapsed, the first level of the analysis represented the equivalent of a normal logit.

11 Appendix B presents a summary of how each variable is measured.

12 Previous research indicates that there may be differences in climate change attitudes based on religious denomination (e.g., Chaudoin et al., 2013). We also estimated models that included dichotomous indicators for respondents that self-identified as Protestant, Catholic, or Jewish. We failed to find a statistically significant relationship between any of these denominations and climate policy

attitudes, even when religious attendance was removed from the model. Moreover, the model fit indicators reveal that the inclusion of these variables resulted in worse specification than when they were included. The results of these analyses are available upon request.

13 As a robustness check, state fixed effects were included in each of the models. Unfortunately, the state fixed effects created a serious empty bin problem, which resulted in biased standard errors. That said, the results were substantively similar to those reported. As suggested by a reviewer, we reestimated the state fixed effects using a reduced number of states. Specifically, we removed the states that contributed to the empty bin problem. For two of the models (Tax Industry and Renewable Energy), this necessitated the removal of more than 50 percent of the state fixed effects. Across the five models, at least 25 percent of the states were removed from each model. It is unclear if the robustness check that state fixed effects are intended to provide still exists when so many of the states are removed from the analysis. However, we again find that the results are substantively similar to what we report. The results of these state fixed effects models are available upon request.

14 The percentages represent the raw support or opposition of a policy and include respondents that were removed from the statistical models due to missing values.

15 The simulations were created by using the "prvalue" command following the estimation of each GOLOGIT in STATA (StataCorp LP, College Station, TX, USA). The other variables were held constant at their median. These predicted probabilities were multiplied by 1,000 to represent the distribution per 1,000 adults in the United States. The figures were created using the ggplot2 command in R. The expected distributions provide a clear visualization of the changes in the expected responses as we change each variable in turn.

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References

Aldy, J. E., Kotchen, M. J., & Leiserowitz, A. A. (2012). Willingness to pay and political support for a U.S. national clean energy standard. *Nature Climate Change*, *2*(5), 596–599.

Bies, A., Lee, D. G., Lindsey, C., Stoutenborough, J. W., & Vedlitz, A. (2013). Citizens, nonprofits and climate change policy. *Nonprofit Policy Forum*, *4*(1), 5–28.

Blocker, T. J., & Eckberg, D. L. (1997). Gender and environmentalism: Results from the 1993 general social survey. *Social Science Quarterly*, *78*, 841–858.

Borick, C. P., & Rabe, B. G. (2010). A reason to believe: Examining the factors that determine individual views on global warming. *Social Science Quarterly*, *91*(3), 777–800.

Boykoff, M. T., & Boykoff, J. M. (2007). Climate change and journalistic norms: A case-study of US mass-media coverage. *Geoforum; Journal of Physical, Human, and Regional Geosciences*, *38*(6), 1190–1204.

Burstein, P. (2003). The impact of public opinion on public policy: A review and an agenda. *Political Research Quarterly*, *56*(1), 29–40.

Chaudoin, S., Smith, D., & Urpelainen, J. (2013). American evangelicals and domestic versus international climate policy. *Review of International Organizations*. doi:10.1007/s11558-013-9178-9

Covello, V., & Sandman, P. M. (2001). Risk communication: Evolution and revolution. In A. Wolbarst (Ed.), *Solutions to an environment in peril* (pp. 164–178). Baltimore, MD: Johns Hopkins University Press.

Cvetkovich, G., & Nakayachi, K. (2007). Trust in a high-concern risk controversy: A comparison of three concepts. *Journal of Risk Research*, *10*(2), 223–237.

Dietz, T., Dan, A., & Shwom, R. (2007). Support for climate change policy: Social psychological and social structural influences. *Rural Sociology*, *72*(2), 185–214.

Downs, A. (1972). Up and down with ecology—The issue attention cycle. *The Public Interest*, *28*, 38–50.

Dunlap, R. E., & Jones, R. E. (2002). Environmental concern: Conceptual and measurement issues. In R. E. Dunlap & W. Michelson (Ed.), *Handbook of environmental sociology* (pp. 482–524). Westport, CT: Greenwood Press.

Dunlap, R. E., & McCright, A. M. (2008). A widening gap: Republican and democratic views on climate change. *Environment: Science and Policy for Sustainable Development*, *50*(5), 26–35.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues*, *56*(3), 425–442.

Elliott, E., Seldon, B. J., & Regens, J. L. (1997). Political and economic determinants of individuals' support for environmental spending. *Journal of Environmental Management*, *51*(1), 15–27.

Feldman, S. (1988). Structure and consistency in public opinion: The role of core beliefs and values. *American Journal of Political Science*, *32*(2), 416–440.

Freedman, D. H. (2010). *Wrong: Why experts* keep failing us—And how to know when not to trust them*. New York: Little, Brown and Company.

Gelman, A. (2007). Struggles with survey weighting and regression modeling. *Statistical Science*, *22*(2), 153–164.

Gelman, A., & Carlin, J. B. (2002). Poststratification and weighting adjustments. In R. M. Groves, D. A. Dillman, J. L. Eltinge, & R. J. A. Little (Eds.), *Survey nonresponse* (pp. 289–302). New York: Wiley.

Guber, D. L. (2003). *The grassroots of a green revolution: Polling america on the environment*. Cambridge, MA: MIT Press.

Hetherington, M. J. (2005). *Why trust matters: Declining political trust and the demise of political liberalism*. Princeton, NJ: Princeton University Press.

Jacoby, W. G. (1991). Ideological identification and issue attitudes. *American Journal of Political Science*, *35*(1), 178–205.

Jacoby, W. G. (2000). Issue framing and public opinion on government spending. *American Journal of Political Science*, *44*(4), 750–767.

Kellstedt, P. M., Zahran, S., & Vedlitz, A. (2008). Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. *Risk Analysis*, *28*(1), 113–126.

Key, V. O. (1961). *Public opinion and American democracy*. New York: Knopf.

Klineberg, S. L., McKeeber, M., & Rothenbach, B. (1998). Demographic predictors of environmental concern: It does make a difference how it's measured. *Social Science Quarterly*, *79*, 734–753.

Konisky, D. M., Milyo, J., & Richardson, L. E. (2008). Environmental policy attitudes: Issues, geographical scale, and political trust. *Social Science Quarterly*, *89*(5), 1066–1085.

Krosnick, J. A., Holbrook, A. L., Lowe, L., & Visser, P. S. (2006). The origins and consequences of democratic citizens' policy agendas: A study of popular concern about global warming. *Climatic Change*, *77*(1), 7–43.

Lax, J. R., & Phillips, J. H. (2009). How should we estimate public opinion in the states? *American Journal of Political Science*, *53*(1), 107–121.

Leiserowitz, A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climate Change*, *77*(1–2), 42–72.

Liu, X., Lindquist, E., & Vedlitz, A. (2011). Explaining media and congressional attention to global climate change, 1969–2005: An empirical test of agenda-setting theory. *Political Research Quarterly*, *64*(2), 405–419.

Liu, X., Vedlitz, A., & Alston, L. (2008). Regional news portrayals of global warming and climate change. *Environmental Science & Policy*, *11*(5), 379–393.

Lohr, S. L. (1999). *Sampling: Design and analysis*. Pacific Grove, CA: Brooks-Cole.

Long, J. S. (1997). *Regression models for categorical and limited dependent variables*. Thousand Oaks, CA: Sage.

Lubell, M. (2002). Environmental activism as collective action. *Environment and Behavior*, *34*(4), 431.

Lubell, M., Vedlitz, A., Zahran, S., & Alston, L. T. (2006). Collective action, environmental activism, and air quality policy. *Political Research Quarterly*, *59*(1), 149–160.

Lubell, M., Zahran, S., & Vedlitz, A. (2007). Collective action and citizen responses to global warming. *Political Behavior*, *29*(3), 391–413.

Luszczynska, A., Schwarzer, R., Lippke, S., & Mazurkiewicz, M. (2011). Self-efficacy as a moderator of the planning-behavior relationship in interventions designed to promote physical activity. *Psychology and Health*, *26*(2), 151–166.

Martin, B., & Richards, E. (1995). Scientific knowledge, controversy, and public decision-making. In S. Jasanoff, G. E. Markle, J. C. Petersen, & T. Pinch (Eds.), *Handbook of science and technology studies* (pp. 506–526). Newbury Park, CA: Sage.

Matisoff, D. C. (2008). The adoption of state climate change policies and renewable portfolio standards: Regional diffusion or internal determinants? *Review of Policy Research*, *25*(6), 527–546.

McCright, A. M., & Dunlap, R. E. (2003). Defeating Kyoto: The conservation movement's impact on U.S. climate change policy. *Social Problems*, *50*(3), 348–373.

McCright, A. M., & Dunlap, R. E. (2011). The politicization of climate change and polarization in the American public's views of global warming, 2001–2010. *The Sociological Quarterly*, *52*(2), 155–194.

McCullagh, P., & Nelder, J. A. (1989). *General linear models* (2nd ed.). Boca Raton, FL: Chapman and Hall.

McKelvey, R. D., & Zavoina, W. (1975). A statistical model for the analysis of ordinal level dependent variables. *Journal of Mathematical Sociology*, *4*(1), 103–120.

Miller, J. M., & Krosnick, J. A. (2000). News media impact on the ingredients of presidential evaluations: Politically knowledgeable citizens are guided by a trusted source. *American Journal of Political Science*, *44*(2), 301–315.

O'Connor, R. E., Bord, R. J., Yarnal, B., & Wiefek, N. (2002). Who wants to reduce green-house gas emissions? *Social Science Quarterly*, *83*, 1–17.

Page, B. I., & Shapiro, R. Y. (1983). Effects of public opinion on policy. *The American Political Science Review*, *77*(1), 175–190.

Peterson, R. T. (1996). *Democratic philosophy and the politics of knowledge*. University Park, PA: Pennsylvania State University Press.

Rabe, B. (2004). *Statehouse and greenhouse: The emerging politics of American climate policy*. Washington, DC: Brookings Institution Press.

Robinson, S. E., Liu, X., Stoutenborough, J. W., & Vedlitz, A. (2013). Explaining popular trust in the department of homeland security. *Journal of Public Administration Research and Theory*, *23*(3), 713–733. doi: 10.1093/jopart/mus025

Sapolsky, H. M. (1968). Science, voters, and the fluoridation controversy: Conflict among perceived experts leads voters to act negatively on the fluoridation innovation. *Science*, *162*(3852), 427–433.

Sarewitz, D. (2004). How science makes environmental controversies worse. *Environmental Science & Policy*, *7*(5), 385–403.

Schultz, W. P., & Zelezny, L. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology*, *19*(3), 255–265.

Séguin, C., Pelletier, L. G., & Hunsley, J. (1999). Predicting environmental behaviors: The influence of self-determined motivation and information about perceived environmental health risks. *Journal of Applied Social Psychology*, *29*(8), 1582–1604.

Stavins, R. N. (1998). What can we learn from the grand policy experiment? Lessons from SO2 allowance trading. *The Journal of Economic Perspectives*, *12*(3), 69–88.

Stoutenborough, J. W., & Vedlitz, A. (2012). Public opinion and climate-related policy solutions: A comparison of the policy preferences of the public, stakeholders, and climate scientists. Presented at the annual meeting of the Midwest Political Science Association, Chicago.

Stoutenborough, J. W., & Vedlitz, A. (2014). The effect of perceived and assessed knowledge of climate change on public policy concerns: An empirical comparison. *Environmental Science & Policy*, *37*(March), 23–33.

Stoutenborough, J. W., Sturgess, S. G., & Vedlitz, A. (2013). Knowledge, risk, and policy support: Public perceptions of nuclear power. *Energy Policy*, *62*(11), 176–184.

Stoutenborough, J. W., Fette, R. N., & Vedlitz, A. (2014). "Climate change: Climate scientists' perspectives of various information sources and policy makers." *ISTPP Working Papers*. College Station, TX: Bush School of Government, The Institute for Science, Technology, and Public Policy.

Tingley, D., & Tomz, M. (2014). Conditional cooperation and climate change. *Comparative Political Studies*, *47*(3), 344–368.

Trumbo, C. (1996). Constructing climate change: Claims and frames in the US news coverage of an environmental issue. *Public Understanding of Science*, *5*(3), 269–283.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*, 453–458.

Weber, E. U., & Stern, P. C. (2011). Public understanding of climate change in the United States. *American Psychologist*, *66*(4), 315–328.

Williams, R. (2006). Generalized ordered logit/partial proportional odds models for ordinal dependent variables. *Stata Journal*, *6*(1), 58–82.

Winship, C., & Radbill, L. (1994). Sampling weights and regression analysis. *Sociological Methods & Research*, *23*(2), 230–257.

Zahran, S., Brody, S. D., Grover, H., & Vedlitz, A. (2006). Climate change vulnerability and policy support. *Society & Natural Resources*, *19*(9), 771–789.

Appendix A

Table A1. Descriptive Statistics

	2004					2007				
	$\bar{x}$	SD	Minimum	Maximum	Population Estimates	$\bar{x}$	SD	Minimum	Maximum	Population Estimates
Education[A]	15.38	2.03	11	18	13.35	15.33	1.96	11	18	13.33
Republican	0.24	0.43	0	1	0.33	0.40	0.49	0	1	0.28
Democrat	0.34	0.47	0	1	0.34	0.46	0.46	0	1	0.34
Age[B]	47.31	16.39	18	90	46.67	52.33	1.96	18	99	46.97
Black	0.08	0.27	0	1	0.127	0.07	0.26	0	1	0.128
Asian	0.02	0.14	0	1	0.042	0.01	0.12	0	1	0.044
Hispanic	0.02	0.16	0	1	0.141	0.06	0.24	0	1	0.150
Religious attendance[C]	0.42	0.49	0	1	0.42	0.45	0.49	0	1	0.405
Male	0.44	0.49	0	1	0.491	0.47	0.49	0	1	0.492
Income[D]	57.18	30.32	5	10	53.692	63.50	30.23	5	10	61.173

2004: $n = 1093$. 2007: $n = 935$

Note: Population estimates calculated using data provided by the U.S. Statistical Abstract collected by the U.S. Census Bureau for 2004 and 2007 with the exception of the estimates for Republican, Democrat, and Religious Attendance, which are from Pew Research.

[A]We were unable to find a source that identified the average number of years of education of adults 18 and over. The Census provides data on adults 25 and older, which we used to estimate the average number of years of education. Given the rate of those between 18 and 25 that are pursuing or achieved a college education, we presume that the Census data is an underestimation.

[B]We were unable to find a source that identified the average age of adults 18 and over. The population estimates are based on age ranges from 20 to 85. The reported values underestimate those 18 to 20 and those over the age of 85.

[C]We were unable to find perfectly equivalent religious attendance estimates for either 2004 or 2007. The 2004 estimates are provided by Pew Research based on national exit polls, and the 2007 are the average between 2004 and 2008.

[D]The population estimate for income is the median family income.

Appendix B

Table B1. Variable Definitions

Variable	Operation
Values	
Ecological Values	Measured as an index that average respondent concern for GW using a 4-point scale where 3 = strongly agree and 0 = strongly disagree, respondents were asked to state their agreement with (1) We are approaching the limit of people the earth can support; (2) When humans interfere with nature it produces disastrous consequences; (3) Plants and animals have as much right to exist as humans; (4) The earth is like a spaceship with limited resources; (5) Balance of nature is delicate; (6) If things continue on their present course, we will experience a major ecological catastrophe; and (7) Today's policies must consider the needs of future generations.
Attitudes	
Trust Media	Measured as an index that averages responses to 4 items. Using an 11-point scale, respondents were asked to indicate the trustworthiness of information on climate change provided by newspapers, television news, radio, and the Internet, with 10 = very trustworthy, and 0 = not trustworthy at all. Rescaled such that 0–1 = 0, 2–3 = 1, 4–6 = 2, 7–8 = 3, and 9–10 = 4.
Trust Experts	Measured as an index that averages responses to 4 items. Using an 11-point scale, respondents were asked to indicate the trustworthiness of information on climate change provided by government agencies, nonprofit organizations, environmental interest groups, and other interest groups, with 10 = very trustworthy, and 0 = not trustworthy at all. Rescaled such that 0–1 = 0, 2–3 = 1, 4–6 = 2, 7–8 = 3, and 9–10 = 4.
Concern	Average concern for GW using a 4-point scale where 3 = strongly agree and 0 = strongly disagree, respondents were asked their agreement with (1) GW having a noticeably negative impact on their health, (2) GW will have a noticeably negative impact on their economic and financial situation, and (3) GW will have a noticeably negative impact on the environment where they live.
Scientists Understand CC	Measured using a 4-point scale. Respondents were asked "How clearly do you think scientists understand Global Warming and Climate Change," with 1 = very unclear understanding and 4 = very clear understanding.
Efficacy	Measured as an index that averages respondents' concern for GW using a 4-point scale where 3 = strongly agree and 0 = strongly disagree, respondents were asked to state their agreement with (1) I believe my actions have an influence on GW, (2) My actions to reduce the effects of GW in my community will encourage others to reduce their effects, (3) I have an obligation to future generations to reduce my impact on GW.
Ideology	Measured as a 7-point scale, with 1 = strongly liberal, and 7 = strongly conservative
Demographics	
Male	Measured nominally as 1 = male, and 0 = female
Religious Attendance	Measured nominally as 1 = yes (attended a religious service in the last 7 days), 0 = no (did not attend a religious service)
Income	Measured as the estimated annual household income (11 ordered categories representing $10,000 increments, such that "less than $10,000" is coded 5, "50,000 to $59,999" is coded 55, and "more than $100,000" is coded 100)
Black	Measured nominally as 1 = Black, and 0 = non-Black
Asian	Measured nominally as 1 = Asian, and 0 = non-Asian
Hispanic	Measured nominally as 1 = Hispanic, and 0 = non-Hispanic
Age	Measured in years
Education	Measured in years of education
Republican	Measured nominally as 1 = Republican, and 0 = Democrat or no preference
Democrat	Measured nominally as 1 = Democrat, and 0 = Republican or no preference
2004	Measured nominally as 1 = 2004 participant, and 0 = 2007 participant