

# Climate Change Policy Implementation and Citizens' Willingness to Pay within a Federal System<sup>1</sup>

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## Abstract

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Policy implementation is a critical process in any form of government. The many players involved dictate the effectiveness and efficiency of public policies. Consequently, citizens have preferences for the organization responsible for implementation. This paper examines how these preferences effect citizens' willingness to pay for public policy, and more specifically two forms of climate change policy, within a federal system. I focus on the four bodies found within the federal form of government: national government, state government, local government, and private agencies/industries. I find that citizens who prefer that the national government implement climate change policies are willing to pay for mitigation-style policies. Those who prefer that the state and local levels of government are willing to pay for adaptation policies. Citizens who hold the opinion that private industries should implement climate change policies are unwilling to pay for any policy. These findings have implications for policymakers, scholar, and citizens alike not only for climate change policies, but also other policies such as education, healthcare, and welfare.

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**Keywords:** policy preferences, climate change, policy implementation, federal system

## 1. Introduction

Public policy implementation involves the participation of many different stakeholders within a federal style government such as the United States. In general, there are four different entities that are responsible for implementation: national government, state government, local government, and the private sector (Kraft & Furlong, 2018). In some cases, is it evident what entity should be responsible for addressing a particular public concern. For example, providing for the national defense is clearly a responsibility of the national government. However, these responsibilities are not always so obvious. Much of the conflict within a federal system is trying to identify what entity has the authority, or constitutional right, to address a specific political, social, or economic issue.

Climate change is one of those issues. Most people readily agree that it is a public concern, and that policies must be created and implemented (National Aeronautics and Space Administration [NASA], 2018). However, that is where the consensus ends. Citizens not only disagree about what type of policy must be implemented, but also which entity holds the responsibility to create and implement the policy. This paper seeks to accomplish two goals: to explore the relationship between citizens' opinions of these entities and their willingness to pay for the implementation of two types of climate change policies and to improve the predictive power of the current willingness to pay model. I find significant relationships that may allow policymakers to better understand when, where, and what policies may be supported.

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<sup>1</sup> This research was partially supported by the Institute of Science, Technology and Public Policy at Texas A&M University. I thank the Institute for providing the data necessary for this manuscript.

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## 2. Federalism

Federalism is somewhere in the middle between a unitary state and a confederacy (Harrison, Harris, & Deardorff, 2017). In its inception, the United States' form of federalism afforded states the ability to retain sovereignty but provided a central government that had more power than it did under the Articles of Confederation. The two sovereign governments coexisted rather peacefully as each level did not overstep its boundaries. Even when issues came before the Supreme Court, the national government avoided engagement in state affairs (Harrison et al., 2017).

However, as time progressed there was a need for the national government to become more involved in state affairs and policy creation and implementation. This was during the Great Depression, and the national government used intergovernmental transfers of money, or fiscal federalism, in order to help states implement a group of national welfare policies known as the New Deal (Harrison et al., 2017). The national government's efforts created the idea of it being a "safety net" for the American people. Whenever new issues arose, a significant number of people and groups turned to the national rather than state or local government for help. This blurred the lines that had once separated the levels of government.

The election of Nixon, however, began the progress of devolution in which the national government returned some of the policy creation and implementation power used during the Great Depression and New Deal back to states (Harrison et al., 2017). Citizens and politicians alike cried that the national government had encroached on state's right, yet others claimed that it was well within the national government's right to be pass policies for some issues in the name of being responsive to citizens' needs. In today's form of federalism, it is difficult to tell where the national government's responsibility ends, and where the state and local government's responsibility begins. Consequently, citizens must make decisions on what level of government they deem responsible for policy implementation on a case-by-case basis (Kraft & Furlong, 2017).

### 2.1 National Management

Within a federal system, the national government's management of climate change policy can have many advantages. The national government has the ability to issue mandates, provide funding in the form of grants, and in a federal system, has the power of preemption (Kraft & Furlong, 2017). This, for example, allows for the creation of uniform pollution and emissions standards. Each industry is monitored and held accountable by the same body using the same protocol. Punishment for violating restrictions is also more uniform, which theoretically should allow for better policy results.

However, there are potential problems that can arise from national management of climate change policy (Ostrom, 2012; Zimmerman & Faris, 2012). These are related more to the physical effects of climate change. Predicting the effects of these events is extremely difficult due to the great variation in climates and vulnerability of each region, state, and city (Tompkins & Adger, 2005; Stookey 2017). This may make management by a large, slow, and distant national organization challenging, and in some instance, may result in disastrous consequences.

Differences in region and local political ideology and partisanship may also hinder national efforts to address climate change (Wilbanks et al., 2003; Stookey, 2017). Some areas may be willing to accept national guidelines dictating changes in resource consumption and preventative efforts, while others may see these regulations as the national government overstepping their boundaries and infringing on state and personal rights (Kraft & Furlong, 2017).

### 2.2 State and Local Management

In a federal system climate change policy can be managed by state and local governments (Bae & Feiock, 2013). State and local governments often volunteer to take action against climate change due to inaction by the national government (Rabe, 2011; Stookey, 2017). These actions include the adoption of more aggressive regulations (Lutsey & Sperling, 2008). State and local policymakers have the opportunity to be more creative than national actors due to the smaller populations and areas affected (Rabe, 2011; Bae & Feiock, 2013). According to Lutsey and Sperling (2008), implementation by these governments allow for the use of local expertise and experience in the management and enforcement of climate change policies to tailor "specific actions to fit more aptly the environmental preferences of constituents" (p. 674).

However, there are problems associated with the management of climate change efforts by state and local governments. If a locality does not have the financial or personnel resources to create, enact, and enforce climate change policies, there is the potential for greater harm (Mesham et al., 2011). There is the possibility that industries that straddle two or more localities may be overburdened by overlapping or contradicting regulations (Rabe, 2011). Moreover, there is also the potential for “cross-boundary mismatch between pollution sources and impacts” (Lutsey & Sperling, 2008, p. 674).

### 2.3 Private Industry

Within the federal system, especially one that embraces capitalism, there is a fourth entity that must be considered. Privately owned corporations play a unique role in this system. While they are regulated to some extent by the government, private companies also have the ability to lobby national, state, and local governments in order to pass policies that will benefit the company (Kraft & Furlong, 2017). In addition, governments within federal systems have the option to contract out (privatize) programs and services if they themselves are unable to effectively and efficiently implement the policy. The ability of these entities to implement policy varies greatly and is dependent on a variety of variables, many of which are unknown to citizens. The ability of those polluting the environment to theoretically affect the entire climate change policy process from creation to implementation dictates that I treat them as a legitimate entity that citizens may place policy implementation responsibility on.

### 3. Theory

My theory builds on the current model in two ways. First and foremost, I add the variable of an individual’s preferred policy implementation entity [see Figure 1]. Second instead of examining willingness to pay for climate change policies in general, I separate the policies into two categories used by scientists: adaptive and mitigating. Doing so allows me to create a more complete model with greater predictive power (McCright, Dunlap, & Xiao, 2013).

I argue that in a federal system, who citizens believe should create and implement climate change policy affects their willingness to pay for these policies. Determining the factors that influence willingness to pay is critical as the “debate about climate-change policy in the United States often centers more directly on the costs of taking action” (Kotchen, Boyle, & Lesierowitz, 2013, p. 617). Multiple factors have been examined (i.e. risk, political, and socioeconomic factors) and have been able to partially explain citizens’ willingness to pay for policies (Busby, 2008; Wilbanks et al., 2013; Mumpower et al., 2013). For example, those who are liberals and Democrats are more willing to pay for climate change policies than are conservatives and Republicans (Kotchen et al., 2013). There is also evidence that the same factors affect how one’s preference for different types of climate change policies. Those with higher education and those who perceive high risk are more willing to support mitigation policies than those who perceive low risk or have lower levels of education (Allo & Loureiro, 2014).



## Figure 1

Before discussing the hypotheses, an explanation of these two categories of climate change policies is in order. Mitigation policies seek to reduce the level of greenhouse gases in the atmosphere that contribute to climate change (Jacoby et al., 2014). These policies refer to those that seek to reduce emissions of methane and carbon dioxide and increase the removal of carbon dioxide. These policies are critical to preventing further damage to our planet and are advocated by scientists because anthropogenic climate change is primarily caused by elevated levels of greenhouse gases in the atmosphere (Jacoby et al. 2014; NASA, 2018).

Adaptation policies refer to actions that respond to the negative physical, social, and economic effects of climate change after they occur (Bierbaum et al., 2014; NASA, 2018). These policies seek to adapt to and minimize the changes that occur due to anthropogenic climate change. Some common adaptation policies are preparing for dangerous events such as stronger storms and increased heatwaves, creating ordinances to make buildings more energy and water efficient, and creating crops that can withstand droughts (Bierbaum et al., 2014). Adaptation policies are important because of the uncertainty regarding the time, type, and intensity of the events that will occur due to climate change.

### 4. Hypotheses

#### **Hypotheses 1: Citizens who believe state and local governments should implement climate change policies will be more willing to pay for adaptation climate change policies**

Citizens may believe that lower levels of government should implement climate change policy because they feel that state and local governments are more knowledgeable about the specific needs of the community (Measham et al., 2011; Kraft & Furlong, 2017). These governments, rather than the national government, should know how to best address the threats associated with climate change that are most likely to threaten their locality. In addition, a significant portion of Americans view climate change as a pressing local issue rather than national (Lutsey and Sperling, 2008; Stookey 2017).

As mentioned before, Meashma et al. (2011) also find that due to their proximity, citizens living within federal systems associate more tangible and relevant benefits with lower levels of government (Measham et al., 2011). Adaptation policies offer these types these benefits. Citizens can see adaptation policies being implemented in the form of preparations taking place, structures being reinforced, burn bans being implemented during sudden drought, and changes in water conservation policies (Lutsey & Sterling, 2008). In addition, the policy changes associated with adaptation can be used in the event that any threat, whether natural or man-made, happens, even if it is not directly tied to climate change.

Citizens cannot, however see the benefits of mitigation policies directly as these changes take place more gradually (Vine, 2012; NASA, 2018). The effects of stricter emissions standards on private corporations and the production of new vehicles are not so evident. This may deter some from supporting these types of policies. This especially may be the case given the uncertainty surrounding when the events associated with climate change may occur, how often they occur, and their severity (Tompkins & Adger, 2005; Measham et al., 2011). An individual therefore, may be willing to pay more for local adaptation policies than national mitigation policies.

#### **Hypotheses 2: Citizens believing the national government should implement climate change efforts will be more willing to pay for mitigation policies.**

On the other hand, some citizens living within federal systems view climate change as a national and/or global problem rather than local issue (Busby, 2008; United Nations, n.d.). Thus, they may believe that the national government is responsible for implementing uniform climate change policies and engaging in global efforts to address climate change. These citizens perceive climate change as threatening things they see as public goods (Busby, 2008; Vine, 2011). Public goods are things that everyone living within the territory has unlimited access to, and the use of these goods by one individual does not prevent another from using the same good (Harrison et al., 2017). An example is access to clean air, water, or protection from extreme temperatures. Mitigation policies work to protect public goods from the negative consequences tied to climate change (NASA, 2018). For example, reducing emissions improves air quality for all. Likewise, reducing the amounts of halocarbons and chlorofluorocarbons helps to protect the ozone layer and allow it to “recover” on its own (National Oceanic and Atmospheric Administration [NOAA], 2008).

The ozone layer “acts as a filter for the shorter wavelength and highly hazardous ultraviolet radiation (UVR) from the sun, protecting life on Earth from its potentially harmful effects” (Gies, 2012). While these policies are effective, it may take up to 50 years for the ozone layer to heal (NOAA, 2008).

Since these policies may take time to work, citizens who believe climate change policies should be implemented by the national government may be more willing to pay for them knowing the benefits are worth waiting for and are beneficial to the public and future citizens worldwide.

### **Hypotheses 3: Citizens who prefer that private entities implement climate change efforts will be unwilling to pay for climate change policies.**

It is no secret private entities have benefited from lax laws and environmental regulations that have contributed to climate change. It is also well known that private entities play a major role in the public policy process (Harrison et al., 2017). In federal systems, national, state, and local governments can be trapped in iron triangles given the nature of the policy process. An iron triangle is a symbiotic relationship between congress, government agencies, and private interests (Harrison et al., 2017). Private interests provide information (and campaign contributions) to members of the legislature and executive branches. The resulting policies may be better for the private industries’ bottom line than the environment and citizens (Huang, 2017).

Americans are untrusting of private interest for these very reasons. They believe private corporations influenced the creation of policies that benefit them even if they exacerbate or ignore climate change. Consequently, citizens who believe that private organizations are responsible for implementing climate change policy, such as reducing emissions or cleaning up local pollution, may be unwilling to pay for any type of policy. They may hold the opinion that those who have benefited from lax policies that have exacerbated climate change should be responsible for paying for the policies created to protect the environment.

## **5. Methods**

In order to test these hypotheses, I use data from a National Public Climate Change Survey. This survey was conducted in order to collect data regarding individuals’ knowledge of climate change issues, environmental policy preferences, and perceptions regarding the risks and potential threats of climate change. The survey was in the field from November 13<sup>th</sup>-26<sup>th</sup> and resulted in 1321 completed surveys for a 55.9% completion rate. GfK Custom Research, LLC (formerly Knowledge Networks) administered the survey online by drawing a sample from its KnowledgePanel®, a probability-based web panel designed to be representative of the United States for adults age 18 and over<sup>3</sup>. The median survey completion time was 24 minutes.

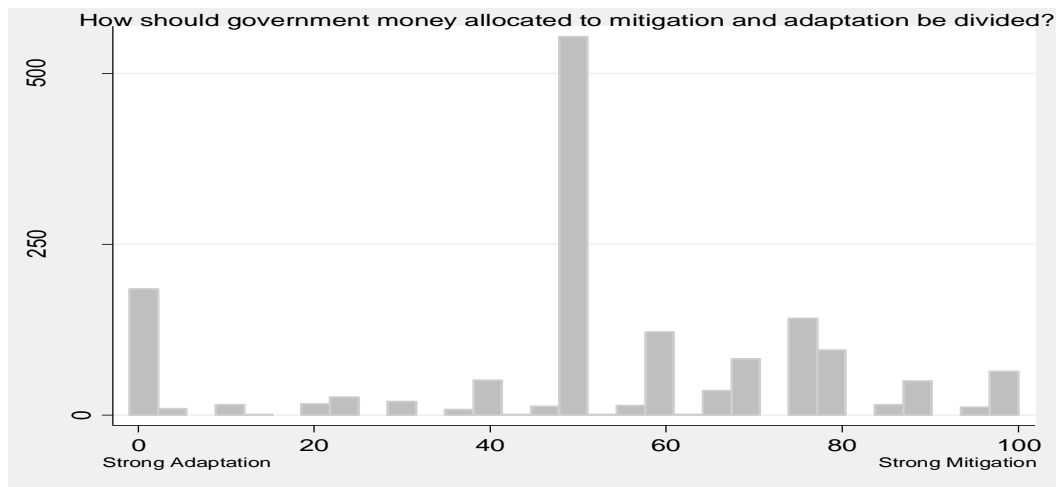
The dependent variable of willingness to pay for mitigation or adaption policies derives from responses to a question that asks people how they think the government should allocate money to two different strategies – mitigation and adaptation. The person has \$100 that may be split between the two strategies. They can divide it anyway they wish, but it must add up to \$100. The derivation of the dependent variable focused on the money they believe should be allocated to the policy of mitigation or adaptation. The scale of the survey responses ranges from \$0 to \$100. Those who allocated \$50 or more to mitigation policies would be considered supporters of mitigation policies. Those who allocated less than \$50 are considered supporters of adaptation policies<sup>4</sup>.

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<sup>3</sup> Since study sample sizes are typically too small to accommodate a complete cross-tabulation of all the survey variables with the benchmark variables, a raking procedure is used for the post-stratification weighting adjustment. Using the base weight as the starting weight, this procedure adjusts the sample data back to the selected benchmark proportions. Through an iterative convergence process, the weighted sample data are optimally fitted to the marginal distributions. After this final post-stratification adjustment, the distribution of the calculated weights are examined to identify and, if necessary, trim outliers at the extreme upper and lower tails of the weight distribution. The post-stratified and trimmed weights are then scaled to the sum of the total sample size of all eligible respondents

<sup>4</sup> The purpose of the single sliding allocation scale between mitigation and adaptation is NOT to get at some absolute position on money allocation to this problem issue, but rather to force a policy choice between the two major policy action response options. This is not intended to imply that some might not want to pay for either. It is intended to measure the relative positions of mitigation and adaptation in the public’s mind now and could inform future policy discussions should events require some governmental response at some future time.

I argue that this is a better measure than simply asking people if they support mitigation policies, as it does not force them to place their preferences into only a few categories, like many surveys do. Instead, it allows those who would typically say “somewhat support” to use an actual value to demonstrate their willingness to pay as the term “somewhat” can mean different things to different people. A simple question of “do you support mitigation policies” would not allow me to study these subtle nuances. In Figure 2, it is evident that the modal category majority fell right in the middle supporting both policies equally. There is, however, a lot of variation along the spectrum for analytic purposes.



**Figure 2 Distributions of Survey Responses**

In order to ensure that the slope from the regression was a clear indication of support for mitigation or adaptation policies I used this variable to create two new willingness to pay variables. These new variables isolated values so that I was left with two outcomes either willingness to pay for mitigation or adaptation. The first willingness to pay variable was created in order to be biased against the first hypothesis. Those values that were less than 50 were given a value of 0 and considered as support for adaptation policies. Those that were greater than or equal to 50 were given a value of 1 and considered as support for mitigation policies. A positive relationship would indicate support for mitigation policies while a negative relationship would demonstrate support for adaptation policies. The second variable was created in order to be biased against the second hypothesis. Those values that were less than or equal to 50 were given a value of 0 and considered as support for adaptation policies. Those that were greater than 50 were given a value of 1 and considered as support for mitigation policies. Thus, a positive slope would indicate support for mitigation policies while a negative slope would indicate support for adaptation policies. Due to the binary nature of these variables I chose to use logit regressions<sup>5</sup> (Hosmer & Lemeshow, 2000; Long & Freese, 2006).

As noted, risk is controlled for given its relationship to policy preferences and willingness to pay (Leiserowitz, 2006). Risk is measured as “How would you rate the level of risk posed to the American people by the following potential threats?” This is measured on a scale running from 0 (very low) to 10 (very high) and includes feelings for the threats of increased flooding, increased droughts, rising temperatures, increased wildfires, sea level rise, and stronger storms/hurricanes<sup>6</sup>. I also control for the other variables that the climate change literature identifies as important: party identification, party ideology, religious service attendance, member of an environmental group, age, climate change knowledge, education, race/ethnicity, gender, head of household, income, region, employment, marital status, and internet access<sup>7</sup> (McCright, 2010).

<sup>5</sup> I also ran regressions without the modal category (those that equally supported both mitigation and adaptation) and saw similar results.

<sup>6</sup> The risk variables were collapsed into two factors. The loadings can be seen in the Appendix.

<sup>7</sup> VIF is 1.59.

**6. Findings**

From table 1 we see that the first hypothesis is supported. Those who believe that climate change policy implementation is the responsibility of state and local governments are more willing to pay more for adaptation policies. Those who believe that the state and local government are responsible may understand that their local tax dollars are used to cover the expenses needed to regulate, monitor, and adapt to changes in climate that specifically effect their location (Rabe, 2011; Stookey, 2018).

**Table 1 Adaptation Policies**

VARIABLE	COEFFICIENT (STANDARD ERROR)	VARIABLE	COEFFICIENT (STANDARD ERROR)
FEDERAL GOV'T	.111 (.036)	<b>Head of Household</b>	-.046 (.237)
STATE GOV'T	.406* (.043)	<b>Gender</b>	.360* (.177)
LOCAL GOV'T	.400* (.052)	<b>Ethnicity</b>	-.111 (.079)
PRIVATE INDUSTRY	.030 (.032)	<b>Education</b>	.012 (.049)
RISK 1	.318* (.095)	<b>Age</b>	.002 (.006)
RISK 2	.115* (.099)	<b>Member of Environmental Group</b>	.363* (.439)
KNOWLEDGE	-.112* (.038)	<b>Ideology</b>	-.002 (.060)
INTERNET ACCESS	-.172 (.244)	<b>Religious Attendance</b>	-.050 (.047)
EMPLOYMENT	-.004 (.042)	<b>Party Identification</b>	.121* (.033)
RENT	.057 (.186)	<b>State</b>	.002 (.002)
INCOME	.008 (.025)	<b>Marital Status</b>	-.039 (.039)
		<b>Constant</b>	-.385* (.967)
N=1215	Pseudo R <sup>2</sup> =.148 * if p< .05		

In addition, the structures, systems, and services put in place to address climate change, provide non-climate change benefits. For example, the money used to build or reinforce existing structures that can withstand the high wind speeds associated with tornados and hurricanes also work to relieve traffic congestion and improve the transportation of goods. In Chicago, for examples, the local government has begun to repave streets with “cool pavements”. Cool pavements “reflect more sunlight and absorb less heat” and can reduce the city’s air temperature (Soete, 2017). Factors such as these may be considered when citizens are asked to pay for adaptation policies at the state and local levels.

The second hypothesis is also supported. Those who believe that the national government should be responsible for climate change policy implementation are more willing to pay for mitigation policies. This finding suggests that those holding this opinion may see the climate as a public good and are willing to pay for mitigation policies because they provide benefits to everyone. While they do not provide tangible and immediate results like adaptation policies, they are preventative in nature. Given the uncertainty of climate change events, prevention may seem at the most rational option (NASA, 2018).

**Table 2 Mitigation Policies**

VARIABLE	COEFFICIENT (STANDARD ERROR)	VARIABLE	COEFFICIENT (STANDARD ERROR)
FEDERAL GOV'T	.133* (.040)	<b>Head of Household</b>	-.046 (.237)
STATE GOV'T	.104 (.062)	<b>Gender</b>	.364* (.177)
LOCAL GOV'T	.004 (.052)	<b>Ethnicity</b>	-.111 (.079)
PRIVATE INDUSTRY	.013 (.037)	<b>Education</b>	.011* (.049)
RISK 1	.396* (.107)	<b>Age</b>	.002 (.006)
RISK 2	.130* (.105)	<b>Member of Environmental Group</b>	.364* (.439)
KNOWLEDGE	-.113* (.038)	<b>Ideology</b>	-.003 (.060)
INTERNET ACCESS	-.214 (.268)	<b>Religious Attendance</b>	-.049 (.047)
EMPLOYMENT	-.007 (.042)	<b>Party Identification</b>	.121* (.049)
RENT	.057 (.186)	<b>State</b>	.003 (.003)
INCOME	.007 (.025)	<b>Marital Status</b>	-.037 (.056)
		<b>Constant</b>	-.378 (.131)
N=1215	Pseudo R <sup>2</sup> =.175	* if p < .05	

The third hypothesis was also supported. There was no significant relationship between willingness to pay and those who feel that climate change policy implementation should be the responsibility of the private sector. While more research is needed in order to determine why, there are a few potential explanations. Individuals may believe that “companies’ actions and their products are [should be] morally and ethically right for the environment” (Huang, 2017). Since private industry played a large part in climate change and have benefited financially, they should be responsible for any costs needed to prevent or adapt to climate change.

## 7. Conclusion

The goal of this analysis was to determine if citizens’ opinions of who should implement climate change policies affected their willingness to pay for two common climate change strategies. I find that, within a federal system, those who believe that climate change policy is the responsibility of the national government are more willing to pay for mitigation policies. Those that hold the opinion that or state and local governments are responsible for climate change policy implementation are more willing to pay for adaptation policies. In addition, those who believe that climate change policy implementation is the responsibility of the private sector unwilling to pay for any type of climate change policy.

These findings offer a valuable contribution to the literature. First, they offer an additional factor to use in order to determine willingness to pay for climate change policies. This is quite beneficial as it allows the creation of more specified models with increased predictive power. These models, in turn, will allow scholars to better understand and predict why and when mitigation and adaptation policies will be supported.



Second, it may aid policymakers in determining why constituents are willing to pay for one policy, but another other. This knowledge may allow them to create policies that are more readily accepted by citizens, as well as how to frame policies in order to garner more public support at the local, state, and national levels.

Third, these findings suggest that there may be a way to predict willingness to pay even if the survey instrument used does not specifically ask the question. If the entity a citizen believes is responsible for climate change policy implementation is known, policymakers and scholars may be able to determine their willingness to pay for mitigation and adaptation climate change policies. Thus, an individual may still be able to an idea of how much support mitigation or adaptation policies will receive even if determining willingness to pay was not the goal of the initial survey.

In terms of future research, I focus on exploring more specifically what climate change policies citizens' support. Knowing that those who feel that climate change policy implementation is the responsibility of the national government are willing to pay for mitigation policies is beneficial, but it is still vague. The term mitigation includes a wide range of possibilities (Jacoby et al., 2014). It is quite feasible that citizens holding this opinion may be more supportive of reducing emissions by business and industries, but only semi-supportive of those that could potentially reduce the amount of land used for food production. Likewise, similar relationships may arise when I examine the specific types of adaptation policies.

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## Appendix A

### Rotated Factor Loadings

	FACTOR 1	FACTOR 2	UNIQUENESS
DREAD SEA LEVEL RISE	<b>.411</b>	<b>.881</b>	<b>.056</b>
DREAD INCREASED FLOODING	<b>.658</b>	<b>.669</b>	<b>.119</b>
DREAD INCREASED DROUGHT	<b>.734</b>	<b>.472</b>	<b>.239</b>
DREAD RISING TEMPERATURES	<b>.713</b>	<b>.516</b>	<b>.226</b>
DREAD INCREASED WILDFIRES	<b>.865</b>	<b>.362</b>	<b>.121</b>
DREAD HURRICANES/STRONG STORMS	<b>.776</b>	<b>.465</b>	<b>.181</b>