What Determines Climate Policy Preferences If Reducing Greenhouse-Gas Emissions Is A Global Public Good?*

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Abstract

Many international policy problems, including climate change, have been characterized as global public goods. We adopt this theoretical framework to identify the baseline determinants of individual opinion about climate policy. The model implies that support for climate action will be increasing in future benefits, their timing, and the probability that a given country's contribution will make a difference while decreasing in expected costs. Utilizing original surveys in France, Germany, the United Kingdom, and the United States, we provide evidence that expected benefits, costs, and the probability of successful provision as measured by the contribution of other nations are critical for explaining support for climate action. Notably, we find no evidence that the temporality of benefits shapes support for climate action. These results indicate that climate change may be better understood as a static rather than a dynamic public goods problem and suggest strategies for designing policies that facilitate climate cooperation.

1 Introduction

The perceived failure of policymakers to engage in effective climate action has become a politically contentious issue that has mobilized millions of protesters around the world and resulted in climate movements such as Fridays For Future.[1] At the same time, governments willing to ramp up the costs of carbon to reduce emissions may experience fierce public backlash. In France, for example, the mere intention to increase taxes on fuel provoked a series of mass protests and riots that became known as the yellow vests movement.[2] Climate policy is contentious but broad, sustained public support is necessary in democracies to implement reforms that will dramatically reduce greenhouse gas emissions. What are the dividing lines that characterize the mass politics of climate action and why is building a broad coalition for policy change so difficult?

We consider three explanations for why addressing global warming may be particularly challenging and offer a unified theoretical model to study them. First, climate action could be difficult because of concerns about whether the efforts of other countries will be enough to make adopting domestic policies worthwhile. Second, publics may not sufficiently value the benefits of climate action or may find the associated costs or their distribution to be prohibitive. Third, even if voters valued the beneficial effects of climate policy, publics may have short time horizons which means that they heavily discount these benefits as they will only be realized in the distant future.

To study these questions we build on large literatures in international relations in which many international cooperation challenges are viewed at least in part, if not centrally, as global public goods problems. Prominent examples include security (Sandler and Hartley, 1995), free trade (Kindleberger, 1981), development (Kaul, Grunberg and

[1] *Protesting Climate Change, Young People Take to Streets in a Global Strike*, The New York Times, https://www.nytimes.com/2019/09/20/climate/global-climate-strike.html, last accessed on Nov 27th, 2019; *Global warning: climate protests around the world–in pictures*, The Guardian, https://www.theguardian.com/environment/gallery/2019/oct/09/international-rebellions-to-save-the-planet-in-pictures, last accessed on Nov 27th, 2019.

[2] *Yellow vest protests: More than 100 arrested as violence returns to Paris*, BBC News, https://www.bbc.com/news/world-europe-50447733, last accessed on Nov 25th, 2019.

Stern, 1999), and the enforcement of bargaining agreements (Fearon, 1998). The public goods view of international cooperation has also been emphasized as central to understanding global climate politics (Barrett, 2003; Stavins, 2011; van der Ploeg and Rezai, 2019; Nordhaus, 2019). At the same time, there exists a large literature in international relations generally and specifically on climate politics that emphasizes the importance of public opinion and voting, particularly in democracies, for sustaining international cooperation. Putnam (1988) provides the canonical analysis of the importance of domestic audiences in determining the possibility of cooperation but a host of other scholars have pursued variations on this theme (Milner, 1997; Tarar, 2001; Schultz, 2005; Tomz, 2007; Chapman, 2009; Tomz and Weeks, 2013; Mattes and Weeks, 2019).

We present a formal model of the provision of discrete public goods applied to climate change and derive comparative statics about the factors that are likely to influence public policy preferences over climate action. The model predicts that support for climate policy is increasing in expected benefits, the extent to which individuals are patient and value future benefits, and expectations about the probability that a given country's greenhouse-gas emission reductions are pivotal to securing sustainable global emissions levels while support is decreasing in the costs of climate action. Clearly, many important determinants of public support for climate action will remain unaccounted for by the model. Nonetheless, we show that the global public goods framework captures three of the most common explanations for why building broad, sustained political coalitions for policy change has proven so difficult and, therefore, might be thought of as offering a productive baseline model of the determinants of public support for greenhouse gas emission reductions.

We explore the role of these factors using data from two experiments in original surveys conducted in France, Germany, the United Kingdom, and the United States in 2018 and 2019.[3] The surveys are representative of the adult population in each country and include 10,081 respondents. The first experiment manipulates the extent that a policy

[3]This study has been pre-registered at AEA RCT Registry under #Anonymous. Analyses not specified in the pre-registration plan are identified as exploratory.

change reducing greenhouse-gas emissions would avoid the economically and environmentally damaging consequences of climate change and how soon that benefit would be realized in addition to manipulating the magnitude of household costs that the policy would entail.

We further explore these factors by investigating whether there are heterogeneous treatment effects by beliefs about climate change, political ideology, individual time preferences, and income. We argue that individuals who are more sure that climate change is happening and individuals who adopt left-leaning political orientations value stabilizing climate change more and therefore will be especially supportive of costly policies when these policies are more effective. Similarly, we employ convex time budgets (Andreoni and Sprenger, 2012) to measure individual levels of patience since our experimentally manipulated information about how long emissions reduction policies will take to yield any benefits should be more effective among less patient respondents. Finally, we explore heterogeneous treatment effects for costs by individual income under the assumption that utility losses from a given nominal level of costs are greater for those with lower incomes.

Our experimental estimates suggest that the expected benefits of reducing emissions have a large and significant effect on support for climate action. In contrast, we find that the timing of those benefits does not affect climate policy approval. We also find that increasing costs significantly decrease support for reducing emissions. We find little heterogeneity in these results across countries. Previous work has not yet explored the role of climate benefits and timing and therefore these estimates are new to the literature on the determinants of public opinion about climate action. Our investigation of heterogeneous treatment effects further highlights the importance of expected benefits since individuals who value stabilizing the climate more, as measured by climate beliefs and ideology, are more affected by our expected benefit treatments. However, we find little evidence that time preferences account for differences in how individuals assess climate policy.

We then explore whether and why collaborative climate efforts between states affect public opinion by conducting a second experiment in France, Germany, and the United Kingdom. This experiment focuses on whether a given country's contribution will make a difference on policy opinions by experimentally manipulating the extent of multilateralism and estimating its effect on support for a carbon tax. We argue that the relevant concern in assessing the probability that a country is pivotal is whether enough other countries are contributing and therefore, learning that other countries are also implementing policies that will reduce emissions makes it more likely that the good of stabilizing climate change will be provided if a country participates. We also explore mechanisms that may explain why multilateralism might matter in the context of the model—for example, by increasing voters' expectations about whether a policy will generate environmental and social benefits and by influencing voter assessments of costs and whether those costs will be distributed fairly.

Our estimates indicate that multilateralism has a large effect on the probability that respondents support a carbon tax. When exploring the mechanisms that link participation and climate policy support we find that participation by other countries causes respondents to have higher assessments of the environmental, social, and economic benefits of climate action and lower assessments of its costs. These findings are consistent with the central idea underlying the public goods framework that climate change can be viewed as a problem of strategic interaction in which the success of policy efforts depend on the actions of other countries.

This study contributes to the literature on public preferences over climate cooperation (see e.g. Egan and Mullin, 2017; Bechtel, Genovese and Scheve, 2017; Tingley and Tomz, 2014; Bechtel and Scheve, 2013) and recent research that has questioned how useful the public goods framework is for understanding the mass politics of climate action. First, some have emphasized the relative importance of other aspects of the underlying policy challenge such as domestic and international distributional conflict (Aklin and Mildenberger, 2018; Colgan, Green and Hale, 2019). Our findings indicate that the public goods framework is able to accommodate some of these considerations. Second, existing research has argued that support for climate policy is essentially unilateral as it does not meaningfully depend on whether other countries are contributing or not (Tingley and Tomz, 2014; Gampfer, Bernauer and Kachi, 2014; Mildenberger, 2019; Beiser-McGrath and Bernauer, 2019). In the absence of concerns related to strategic interaction, the public goods framework would have considerably less to offer for understanding the mass politics of climate change. Our results suggest, however, that international participation plays an important role for understanding support for climate action because it affects individual expectations about a climate policy's environmental, social, and economic effects. Therefore, it may be productive to build from a public goods baseline rather than abandoning a powerful lens for understanding this important policy problem.

2 Theoretical Framework

The most common theoretical approaches for studying the international politics of climate change policymaking start by defining the policy problem of greenhouse-gas emissions reduction as a global public good (Stavins, 2011; Barrett, 2003; Nordhaus, 2019). This paper considers the implications of this framework for understanding the mass politics of climate change policymaking. To do so clearly, it is useful to formalize the provision of greenhouse-gas emissions reduction and derive a set of hypotheses regarding the considerations that the model predicts are likely to be important as citizens evaluate climate action.

Our framework is based on the extensive formal literature on the provision of discrete public goods (Palfrey and Rosenthal, 1984; Suleiman, 1997; McBride, 2006). The key characteristic of these types of collective benefits is that the good is provided only if the contributions of the actors in the model exceed the required threshold of contributions. We think of each country's decision to contribute emission reductions and the need for a sufficient number of countries to do so for the world to generate sustainable emissions as approximating the discrete public goods problem. It is especially helpful if the problem is posed as participation in a climate cooperation agreement. One important characteristic of the emission reduction problem is countries are unsure exactly what the threshold is to ensure sustainable emissions.[4] We follow Suleiman (1997) and McBride (2006) in allowing for an uncertain threshold and generally follow McBride's formalization of discrete public goods problems to generate our predictions about public support for climate cooperation policies.

Let there be $N = \{1, ..., n\}$ countries $(n > 2)$ and indexed by i each with a representative citizen who decides whether or not the country should contribute to greenhouse-gas emissions reduction and participate in a global climate agreement. We relax the assumption of a representative citizen in our discussion below and empirically investigate various sources of heterogeneity within countries. Our initial discussion can also be thought to refer to a median voter who decides participation.

Let $P = \{0, 1\}$ index the participation decision with $p_i = 0$ indicating a decision not to contribute and $p_i = 1$ indicating a decision to contribute. The cost of participation is fixed at $c > 0$. An essential feature of climate cooperation is that the costs of participation must be incurred now while most of the benefits are realized in the distant future. Consequently, it is best to think of the collective action problem in terms of a two period model in which costs are incurred in sooner time $t = 0$ and benefits are realized in later time $t = 1$. That said, the participation decision can be simplified to weigh the costs and discounted benefits. Let $b > 0$ be the benefits at $t = 1$, δ be the discount factor, and δb be the discounted benefits at $t = 0$ when the participation decision is made. Although δb could be simplified into a single benefits term in the formalization, we will use both terms in order to highlight the importance of both the timing and the size of policy benefits in

[4] See Hsiang and Kopp (2018) for a discussion of sources of uncertainty in climate science and emissions forecasting. It is critical to understand that the future emissions of one's own country and those of the rest of world are hard to predict as well as the physical consequences of those emissions. Both create uncertainty about the necessary threshold of emissions reduction contributions necessary to stabilize climate change.

our empirical work.

The contribution threshold or hurdle h is a random variable from a known unimodal, discrete distribution F (cdf) and f (pdf) where $F(0) = 0$. The probability of the public good being provided is equal to $F(\sum_{j=1}^{n} p_j)$. The expected payoff for country/representative individual i is $U(p_i) = F(\sum_{j=1}^{n} p_j)\delta b - p_i c$. All the parameters are known, except for, of course, the realization of h and the countries make their participation choices simultaneously.

In a pure strategy Nash equilibrium p^*, it must be the case that all countries/representative citizens who choose to participate receive payoffs from contributing that are at least as high as the payoff from not contributing and analogously for those who choose not to participate. For a contributor, this condition is equivalent to the requirement that the marginal increase in the probability of provision due to i's decision to participate $f(\sum_{j \neq i} p_j^* + 1)$ is greater or equal to the ratio of the costs c to benefits δb. For a non-contributor, this condition means that the marginal increase in the probability of provision due to i's decision to participate $f(\sum_{j \neq i} p_j^* + 1)$ is less than the ratio of the costs c to benefits δb (assuming indifferent individuals participate).

Let p^* be a pure strategy equilibrium profile of participation and P^* be the number of participating countries in the equilibrium p^*. In any equilibrium, a contributing country must believe that exactly $P^* - 1$ other countries are participating so that they are pivotal. The probability of being pivotal for a contributing country is equal to the marginal increase in the probability of provision due to i's decision to participate $f(\sum_{j \neq i} p_j^* + 1)$ which is equal to $f(P^*)$. The probability of being pivotal for a non-contributing country is $f(P^* + 1)$.

As shown in McBride (2006, Proposition 1), there exists a unique equilibrium with no countries participating $P^* = 0$ if and only if the density, evaluated at unimodal point m is such that $f(m) < \frac{c}{\delta b}$ and there is a unique equilibrium with all countries participating $P^* = n$ if and only if $f(x) \geq \frac{c}{\delta b}$ for all $x \in N$. If any $P^* > 0$ equilibria exist, there are at most two equilibria and one of them is the trivial $P^* = 0$ case with no countries contributing while for the other equilibrium $P^* > 0$. Assuming the condition for all countries participating is not met, the equilibrium with positive participation will be such that $f(P^*) \geq \frac{c}{\delta b}$ but $f(P^* + 1) < \frac{c}{\delta b}$.

The key idea of the model is that countries only participate and contribute to the public good if their probability of being pivotal is greater than the ratio of costs to the discounted future benefits. While the model is essentially designed to highlight the collective action problem between nations in providing sustainable greenhouse-gas emissions, it also suggests that costs, expected benefits, and the extent of discounting are important factors in the decision to cooperate. What often gets lost in the focus on free-riding in the provision of the global public good of sustainable emissions is that the model yields useful comparative statics about the conditions in which contributions to the collective good are more or less likely. While we have presented a specific model here, our comparative statics resonate with a much larger interdisciplinary literature on the factors that contribute to the successful provision of public goods (see e.g. Olson (1965), Ostrom (1990), and Barrett (2003)).

For the representative citizen, the model makes three predictions that we evaluate experimentally.

Hypothesis 1. Support for climate policies and participation in international climate agreements is increasing in expected benefits.

Hypothesis 2. Support for climate policies and participation in international climate agreements is increasing (decreasing) in patience (discounting).

Hypothesis 3. Support for climate policies and participation in international climate agreements is decreasing in costs.

The fourth parameter that will influence the representative citizen's decision is their expectation regarding how many other countries will choose to make a contribution. Unless $f(x) \geq \frac{c}{\delta b}$ for all x, there is always an equilibrium in which no country participates.

If a second equilibrium with positive participation exists, the representative citizen has to expect that other countries are also participating but not so many that the country's contribution is not pivotal for providing the good. As the number of other countries expected to contribute increases, this initially increases the probability that the own country's contribution will be sufficient to meet the required hurdle for the public good to be provided. But after a certain point, the probability of provision is already high and probability of being pivotal begins to decrease with the number of additional other countries expected to contribute. In the context of climate change, we would suggest that the representative citizen of any of the major emitting economies is unlikely to be worried about overprovision. Collectively, the global community is mostly receiving messages that not enough is being done to address climate change. In this setting, we think that expectations of other countries participating are likely to raise the probability that a given country is pivotal—that their domestic policies can make a difference—and therefore increase the probability of participation.

Hypothesis 4. Support for climate policies and participation in international climate agreements is increasing in the expectation of the number of other countries implementing similar policies or participating in international agreements.

Participation of other countries can affect the willingness to support climate action because of two types of mechanisms. First, from the perspective of the public goods framework, multilateralism changes the likelihood of the policy being effective at providing benefits. These benefits may be of environmental, social, and economic nature. For example, a multilateral approach to climate action could be more likely to improve the lives of future generations and save animals and plants from extinction. Individuals could also view climate policies that enjoy widespread participation by other countries to offer a more cost-effective approach to addressing climate action: if a country acts in cooperation with other nations that are also transitioning to a low-carbon economy this would reduce costs compared to a world in which a country would attempt to enforce such a transition unilaterally. This would reinforce the effect on pivot probabilities in the context of the model. Second, participation could increase support because it resonates with reciprocal fairness norms and improves expectations about whether the costs of climate action will be distributed fairly. We will investigate several of these mechanisms below.

Our theoretical discussion so far has focused on the preferences of a representative citizen (or alternatively a median voter) in each country. The framework, however, also has interesting implications for conflict over climate action within each country. We can index each of the parameters c_k, b_k, and δ_k and predict different policy and participation preferences across individuals facing different costs, having different expectations about the benefits, and varying degrees of patience. One way to interpret the experimental treatments that we present below is that they are manipulating c_k, b_k, and the importance of δ_k and so those results provide information about the extent to which variation across individuals in these considerations is an important source of conflict over climate action.

The model presented in this section follows much of the existing literature on the international politics of climate change and treats reducing greenhouse-gas emissions as a global public good and asks what are the predictions of that model for determinants of public support for climate action. The resulting comparative statistics, focused on benefits, patience, costs, and expectations of the actions of other countries, provide a baseline model of policy preferences that we evaluate in the remainder of the paper.

3 Empirics: Public Support for Climate Policies

We evaluate these four hypotheses using two vignette experiments that we embedded in surveys of the adult population in France (N=2,000), Germany (N=2,000), the United Kingdom (N=2,000), and the United States (N=4,081). The surveys were fielded between December 2018 and April 2019. Appendix A provides a detailed description of the sampling frame. The survey instrument is part of the replication archive for this study. Appendix Table A.1 offers a comparison of the distribution of sociodemographic characteristics in the target population, the raw sample, and the weighted sample.

3.1 Research Design: Climate Benefits, Timing, and Costs Experiment

We designed a vignette experiment that informed respondents about a potential climate policy to reduce greenhouse-gas emissions along with randomized information about the expected policy benefits (low, medium, high, very high) and when they would be realized (2030, 2040, 2050). The surveys in France, Germany, and the United Kingdom also randomized information about the associated costs of climate action in terms of increased energy prices (low, high). The cost levels are taken from Bechtel and Scheve (2013) who compute cost scenarios as a function of each country's gross domestic product and number of households based on available estimates of the aggregate costs of climate action (Stern, 2007; Nordhaus, 2007; UNEP, 2012). The low cost scenario corresponds to 0.5% percent and the high cost scenario is equivalent to 2% of gross domestic product. The exact question wording was as follows:

"Experts suggest that COUNTRY and other major economies should reduce greenhouse-gas emissions today and over the coming years at a level that would raise energy prices in COUNTRY by about [France: €28, €113, Germany: €39, €154, United Kingdom: £15, £60] per month and household.

Suppose that this would avoid [most, some, few, very few] of the economically and environmentally damaging consequences of climate change by [2030, 2040, 2050].

Do you approve or disapprove of COUNTRY implementing those policies?"

For each respondent we randomly selected one of the benefits and timing information stated in parentheses above. For the European surveys we also randomly assigned one of the cost levels. Respondents expressed their policy support on a 1-10 scale ranging from strongly approve to strongly disapprove. We recode answers so that higher values indicate higher levels of approval.

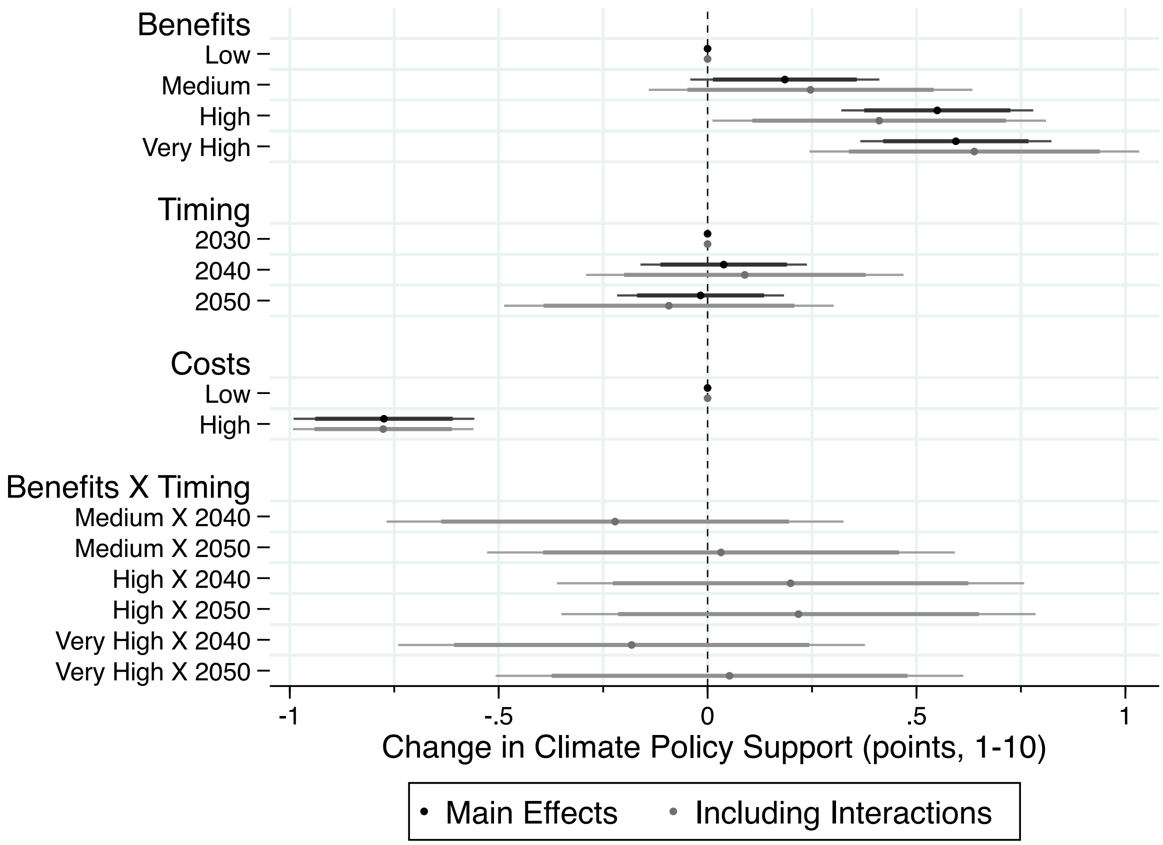
3.2 The Causal Effects of Climate Policy Benefits, Timing, and Costs

We estimate the causal effects of policy benefits, their timing, and costs by regressing the 1-10 climate policy approval measure on a full set of treatment indicators, a large set of sociodemographic covariates and country fixed effects. We employ survey weights although these results and all others in the paper remain qualitatively the same if re-estimated on the raw data (see Appendix Table A.2). Model 1 in Figure 1 reports the point estimates along with 99% and 95% confidence intervals. We find that greater benefits have a significantly positive impact on climate policy support. Compared to the reference group of low benefits, a policy that promises medium benefits increases climate policy approval by about 0.2 points. If the effectiveness of climate action increases to high levels, policy support increases by 0.6 points. Compared to the level of climate policy approval in the control group (which is 6), this effect is equivalent to a 10 percent increase over the baseline. We estimate a somewhat similar effect for the very high benefits treatment. These results lend empirical support to Hypothesis 1.

We now turn to the issue of temporality (Hypothesis 2). We find that none of the timing treatments has a significant impact on climate policy approval. This means that although the size of the policy benefits are significant drivers of public support, the willingness to back more progressive climate action is not driven by when in the more or less distant future the policy effects will be realized. We also test whether temporality moderates the impact of policy benefits by including a full set of interaction terms between benefits and timing indicators. The results for Model 2 in Figure 1 suggest that delay does not affect the effect of policy benefits on climate policy approval which contradicts Hypothesis 2. Finally, policy approval decreases significantly by about 0.8 points if the climate action entails high costs. This result confirms Hypothesis 3. In absolute terms this effect size is slightly larger than the impact of an effective policy that promises high or very high benefits.

We disaggregate these results by the four countries included and report the estimates

Figure 1: Climate Policy Support: Benefits, Timing, and Costs (France, Germany, United Kingdom, United States, N=10,081)



Note: This figure shows coefficients from linear regressions of climate policy support (1-10) on randomly assigned policy benefits, their timing, and policy costs. All models include a full set of sociodemographic covariates and country fixed effects. Sample has been weighted. Weighted and unweighted results are reported in Appendix Table A.2. Error bars indicate 99% and 95% confidence intervals. Point estimates without confidence intervals denote reference categories. Model 2 includes interactions between benefits and timing indicators. *** p<0.01, ** p<0.05, * p<0.1. N(France)=2,000, N(Germany)=2,000, N(United Kingdom)=2,000, N(United States)=4,081.

in Appendix Figure A.2. The results indicate that the timing of climate benefits does not affect policy support across all four countries. Higher household costs have a very similar negative effect on policy support in all three European countries (costs were not experimentally varied in the US survey). We find some variation in the treatment effects when examining the impact of benefits. Respondents in Germany and France are especially sensitive to whether a policy promises to mitigate more of climate change's negative impacts. Consistent with the idea that respondents in the United States care less about climate change on average, our estimates suggest that U.S. respondents are not on average sensitive to the climate benefits treatment. Moreover, in the United Kingdom these effects are small.

We also test whether costs have different effects by income by re-estimating the treatment effects for low and high earners separately. This test is informative about the importance of costs under the assumption that those with lower incomes experience greater utility losses from a given nominal level of costs. Since costs were only varied experimentally in the European surveys these subgroup estimations exclude the US data. Table 1 reports the results. For both groups we find that policy benefits and costs are significant drivers of climate support. We test whether there exist significant differences in these treatment effects by estimating a model that includes interaction terms between income and each of the treatment indicators. The results are reported in Model 3 in Table 1. None of the interactions reaches statistical significance. Therefore, the causal effects of policy benefits and costs do not seem to be related to income differences.

One explanation for the absence of timing effects could be that they are masked by an intergenerational cleavage. An egoistic account of this argument suggests that the timing of benefits should matter for younger generations and far less so for older individuals who may not expect to live long enough to experience the positive effects of climate action. This would be consistent with anecdotal evidence, for example, the "Act Now for Future Generations" slogan of the Fridays For Future movement. However, when re-estimating the causal effects of timing by age group, we find that this prediction fails to find empirical support (see Appendix Figure A.3).

As an additional test of whether delay in the benefits of climate action matters, we explore heterogeneity by individuals' time horizons. According to the theory, more patient individuals would expect a higher net present value of climate policy benefits than impatient respondents. Patient respondents, therefore, should be less sensitive to delays in the benefits of climate action. Andreoni and Sprenger (2012) propose the convex time budget approach to measure individual-level discounting as it offers advances over previous techniques that tend to rely on stated preference measures or multiple price lists. This technique asks respondents to choose between combinations of sooner and later payments and convex combinations of these. The appendix provides details about this measurement approach and estimation. We use the median of the estimated temporal discount factor to generate a binary indicator that distinguishes between more and less patient individuals. When re-estimating the treatment effects separately by patience, we find little differences in how benefits, timing, and costs affect climate policy approval. Most importantly, the estimands in Table 1 do not suggest that patient individuals are significantly less sensitive to delays in policy benefits.

Table 1: Climate Policy Support: Benefits, Timing, and Costs by Subgroups (France, Germany, and the United Kingdom)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Moderator	Income			Patience			Ideology					Global Warming Belief		
	Low	High	Interaction	Low	High	Interaction	Left	Middle	Right	Left vs. Middle	Left vs. Right	Low	High	Interaction
Benefits: Medium	0.304*	0.735***	0.301*	0.337	0.435**	0.351	0.526**	0.365**	0.326	0.361**	0.366*	-0.039	0.562***	-0.092
	(0.173)	(0.188)	(0.173)	(0.224)	(0.201)	(0.224)	(0.208)	(0.165)	(0.218)	(0.167)	(0.221)	(0.287)	(0.132)	(0.299)
Benefits: High	0.714***	1.108***	0.713***	1.028***	0.638***	1.026***	0.857***	0.497***	1.156***	0.509***	1.165***	0.726***	0.920***	0.693**
	(0.174)	(0.195)	(0.175)	(0.216)	(0.214)	(0.217)	(0.212)	(0.179)	(0.225)	(0.182)	(0.229)	(0.277)	(0.133)	(0.297)
Benefits: Very High	0.750***	1.099***	0.739***	1.230***	0.849***	1.213***	1.346***	0.686***	0.406*	0.660***	0.428*	0.554*	1.036***	0.564*
	(0.172)	(0.194)	(0.172)	(0.219)	(0.209)	(0.219)	(0.194)	(0.167)	(0.225)	(0.168)	(0.229)	(0.286)	(0.134)	(0.301)
Timing: 2040	0.176	-0.055	0.157	0.061	-0.119	0.060	0.065	-0.130	0.279	-0.140	0.246	-0.042	0.112	-0.099
	(0.151)	(0.169)	(0.152)	(0.186)	(0.183)	(0.186)	(0.169)	(0.150)	(0.198)	(0.151)	(0.201)	(0.234)	(0.116)	(0.243)
Timing: 2050	0.108	-0.065	0.088	0.095	-0.051	0.102	0.141	-0.158	0.257	-0.155	0.257	-0.014	0.098	-0.068
	(0.147)	(0.169)	(0.147)	(0.188)	(0.183)	(0.188)	(0.186)	(0.145)	(0.198)	(0.146)	(0.199)	(0.237)	(0.115)	(0.248)
Costs: High	-0.757***	-0.879***	-0.760***	-0.674***	-0.827***	-0.689***	-0.873***	-0.749***	-0.690***	-0.759***	-0.726***	-0.598***	-0.801***	-0.615***
	(0.124)	(0.138)	(0.123)	(0.154)	(0.152)	(0.153)	(0.146)	(0.120)	(0.161)	(0.121)	(0.162)	(0.195)	(0.095)	(0.201)
Moderator M			0.125			0.496*				0.162	1.260***			0.612**
			(0.249)			(0.294)				(0.255)	(0.293)			(0.305)
Benefits: Medium X Moderator			0.443*			0.108				0.168	0.154			0.652**
			(0.256)			(0.302)				(0.269)	(0.304)			(0.327)
Benefits: High X Moderator			0.403			-0.365				0.338	-0.316			0.223
			(0.263)			(0.305)				(0.281)	(0.311)			(0.325)
Benefits: Very High X Moderator			0.381			-0.322				0.722***	0.950***			0.478
			(0.261)			(0.303)				(0.258)	(0.301)			(0.330)
Costs: High X Moderator			-0.127			-0.134				-0.125	-0.162			-0.188
			(0.186)			(0.217)				(0.191)	(0.220)			(0.222)
Timing: 2040 X Moderator			-0.216			-0.172				0.227	-0.153			0.216
			(0.227)			(0.261)				(0.228)	(0.264)			(0.269)
Timing: 2050 X Moderator			-0.153			-0.147				0.323	-0.081			0.170
			(0.225)			(0.262)				(0.237)	(0.274)			(0.274)
Constant	5.855***	5.751***	5.834***	5.519***	6.067***	5.542***	6.199***	5.965***	4.697***	6.083***	4.848***	5.706***	6.083***	5.526***
	(0.253)	(0.340)	(0.221)	(0.369)	(0.379)	(0.304)	(0.374)	(0.279)	(0.393)	(0.244)	(0.317)	(0.437)	(0.236)	(0.329)
Sociodemographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,726	2,280	5,006	1,869	1,873	3,742	1,981	2,409	1,610	4,390	3,591	782	4,418	5,200
R-squared	0.061	0.081	0.071	0.073	0.077	0.072	0.131	0.053	0.066	0.097	0.138	0.086	0.073	0.089

Note: This table reports coefficients from linear regressions of climate policy support on randomly assigned policy benefits, timing, and costs by subgroups. The results have been estimated using survey weights. Model 10 includes interaction terms between a binary indicator *Ideology: Left vs. Center* that is 1 for left ideology respondents and 0 for center ideology respondents. This model excludes right ideology respondents. Model 11 includes interactions between *Ideology: Left vs. Right* that is 1 for left ideology respondents and 0 for right ideology individuals. Standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

The results we have presented so far carry three main implications. First, the expected benefits of climate action are systematic drivers of mass support. Second, given that the timing of policy benefits seems to play a limited role, the dynamic nature of climate politics may be less important for understanding global climate (in-)action than is often believed, at least when applied to the policy's potential payoffs. Third, public opinion on climate issues is sometimes portrayed as largely independent of costs.[5] Our results, however, suggest that mass support for climate action is strongly influenced by the costs it entails.

Next we explore whether the causal effects vary by left-right ideology and climate beliefs, both of which could be understood as proxies for whether an individual is a high demander of climate action more generally. We find that those on the ideological left are highly sensitive to climate policy benefits. Moving from low to medium benefits significantly increases support by about 0.5 points among those on the left whereas this effect is not significant among those on the right. More generally, the positive impact of policy benefits decreases as we move from the left to the center to the right. We test whether these differences are significant in Models 10 and 11 in Table 1. Model 10 includes interaction terms between a binary indicator *Ideology: Left vs. Center* that is 1 for left ideology respondents and 0 for center ideology respondents while excluding right ideology respondents. The results indicate that very effective policies have a significantly stronger impact on policy approval among leftist individuals compared to those in the ideological center. Model 11 includes interactions between *Ideology: Left vs. Right* that is 1 for left ideology respondents and 0 for right ideology individuals. These results confirm that leftist respondents are significantly more supportive of climate action if it promises very large benefits than those on the right.

To generate a more precise measure of climate policy demand, we asked respondents the following question: "How sure are you that global warming is happening?" Answers

[5]See, e.g., "The climate majority", *New York Times*, June 9, 2010.

are given on a 1 to 4 scale (not at all sure, somewhat sure, quite sure, extremely sure) and we recode respondents as *Global Warming Belief: High* if they score 3 or higher on this measure. When re-estimating the causal effects separately we find that those who are more certain that global warming is happening value the policy benefits more than those who are less certain. Model 14 in Table 1 again tests whether the causal effects of policy benefits are significantly different between the two groups. We find that the impact of medium benefits is systematically stronger among those who are quite or extremely sure that climate change is happening.

3.3 Multilateralism and Climate Policy Support

According to the public goods framework for climate policy the level of international participation affects the prospects of successfully addressing global warming. Therefore, support for climate action should be causally linked to whether climate action is unilateral or multilateral (Hypothesis 4). To explore this expectation we added the following randomized experiment to the European surveys:

"Suppose COUNTRY (decides, and other major economies decide) to implement a carbon tax, which is an additional tax on the CO2 content of fuels, to address climate change. Generally speaking, do you approve or disapprove of COUNTRY implementing such policies?

We randomized whether a respondent saw a question in which the carbon tax would be also implemented in other major economies or not. Respondents were given a 1-10 (strongly approve-strongly disapprove) answer scale to express their level of support for a carbon tax.

We also added a randomized vignette experiment that provided information about whether the policy is expected to be effective. This experiment allows us to probe whether the prevailing baseline belief among respondents indeed is that climate policy will yield benefits or not.[6] The experiment was crossed with the other treatments and consisted

[6]The effectiveness treatment and the corresponding analyses were not pre-registered and are therefore

of one control group – which received no additional information – and two treatment groups (*Effectiveness: Low* and *Effectiveness: High*):

Effectiveness: Low: "Most experts think this will avoid a few of the economically and environmentally damaging consequences of climate change."
Effectiveness: High "Most experts think this will avoid most of the economically and environmentally damaging consequences of climate change."

We are also interested in how multilateralism affects expectations about the likelihood of different benefits and costs of climate action and whether policy interventions are viewed to be fair. We used the following question to elicit expectations about the benefits and costs of climate policy with three statements that relate to potential benefits, three statements that capture potential costs, and one statement on fairness:

"In addition, if this policy is implemented by (COUNTRY, COUNTRY and other major economies), which of the following statements below do you think are true? Will this ...

- ...provide better life for children and grand children
- ...save many plant and animal species from extinction
- ...improve people's health
- ...lead to more government regulation
- ...cause energy prices to rise
- ...cost jobs and harm the economy
- ...help with distributing the costs of climate change more fairly.

We randomized whether respondents saw a question text that indicated the policy to be implemented only in their country or whether it could also be implemented in other major economies. Respondents then indicated for each statement whether they thought it would apply or not.

We estimate the causal effect of multilateralism on carbon tax support by regressing a binary measure of policy support (if carbon tax approval is greater than 5) on a multilateralism treatment indicator. Figure 2 presents the results. We find that a multilateral

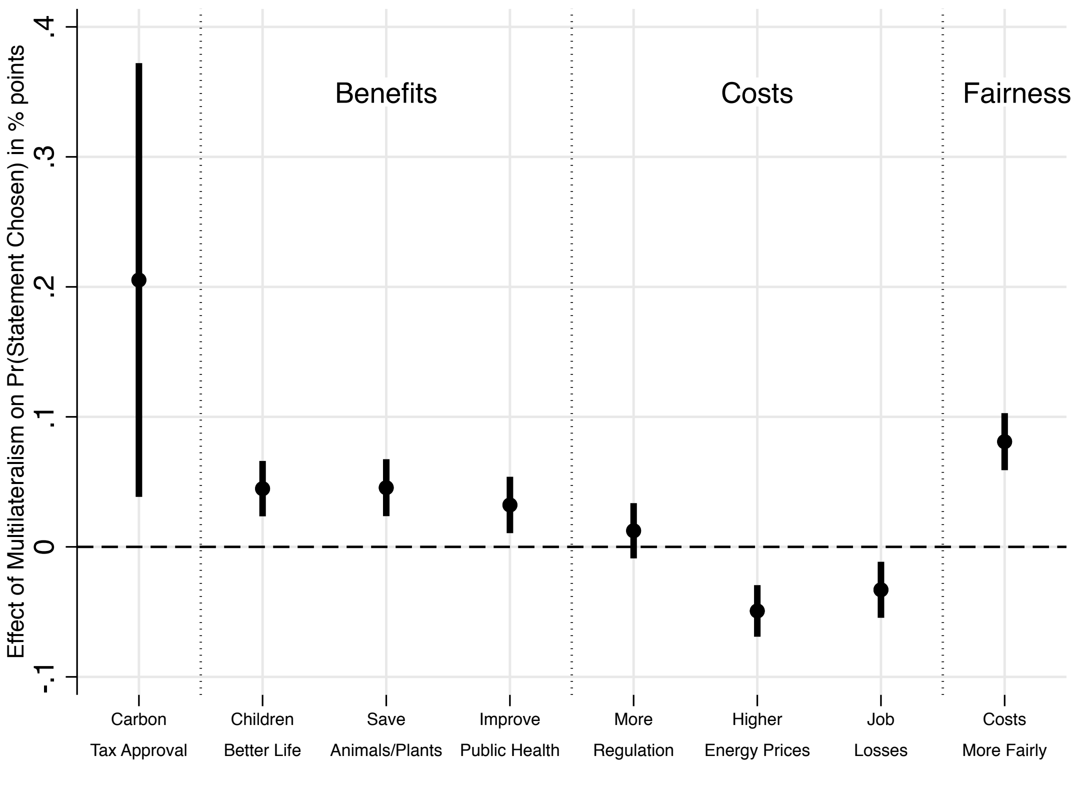
exploratory.

approach causes support for a carbon tax to increase by about 19 percentage points on average and this effect is significant at the 5% percent level. This is in line with our expectation (Hypothesis 4). If the respondent's country is acting alone, then there is a larger risk that this policy is in vain as global climate action is currently well below the levels needed to tackle climate change. But if other countries are implementing similar policies, then the additional contribution of the respondent's country could be pivotal in keeping the planet inhabitable.

To probe why it is that people are more supportive of action in concert with other countries, we also explore the impact of multilateralism on expected benefits, costs, and fairness perceptions by regressing a binary indicator that captures if a statement was chosen on our multilateralism treatment variable. The results in Figure 2 indicate that publics are significantly more likely to expect a multilateral approach to improve the lives of their children and grand children. We find broadly similar effects when analyzing whether the policy will save endangered animals and plants and whether it will improve public health. We further find that a multilaterally implemented carbon tax significantly reduces concerns about large energy price increases and potential job losses. It does not, however, alleviate the public's concerns about increased regulation. Finally, our estimates indicate that multilateralism causes respondents to think that the costs of climate action will be distributed more fairly.

These results provide support for the potential mechanisms that might underlie the effect of multilateralism on policy support. The higher expectation of benefits suggests people think it is more likely that the public good of climate stabilization (and its associated boons) will be realized when other countries are also participating. This is in line with what we would expect if publics are concerned with both underprovision and pivotality. At the same time, individuals also expect policies implemented in multiple countries to be fairer and less costly. Overall, our evidence is consistent with the global public goods model as well as the importance of fairness considerations.

Figure 2: The Causal Effects of Multilateralism on Carbon Tax Support, Benefits, Costs and Fairness in France, Germany, and the United Kingdom (N=6,000)



Note: This plot reports coefficients from linear regressions of statement approval on a binary indicator that is one if climate action is multilateral and is zero if climate action is unilateral. Error bars indicate 95% confidence intervals. The results have been estimated using survey weights. Results for the unweighted data are very similar. N(France)=2,000, N(Germany)=2,000, N(United Kingdom)=2,000.

We also evaluate the role of effectiveness beliefs and find that carbon tax support increases if the policy promises to prevent more of the damaging consequences of climate change (see Appendix Table A.3). The estimate for the low effectiveness treatment, however, is not significantly different from zero which is consistent with the view that low effectiveness is respondents' baseline expectation.

We explore heterogeneity in the importance of multilateralism across societal and political subgroups. We note that these results are meant to reveal heterogeneity in the treatment effect. This means that our interest is in the coefficient on the interactions between the treatment indicator and the subgroup indicator variable.[7] The results suggest that there exist little to no differences across income (see Appendix Table A.4) and, consistent with our findings above, individual time horizons do not help explain when respondents expect greater or smaller benefits due to international cooperation on climate (Appendix Table A.5). We find, however, that respondents with a left political ideology are significantly more likely to believe that multilateralism will help with distributing the costs of climate action more fairly (Model 3 in Appendix Table A.6). We find few differences across climate beliefs (Appendix Table A.7).

4 Discussion

Why is climate change such a thorny policy problem? In this study we have applied the global public goods framework to consider three possible reasons. First, climate action could be difficult because of concerns about whether the efforts of other countries will be enough to make adopting domestic policies worthwhile. Second, the allocation of climate costs and benefits can create distributive conflict that may hinder attempts to implement policy changes needed to address global warming. Third, reluctance to backing ambitious climate policy efforts may reflect that benefits will not be realized until the distant future. Using a set of novel experiments that we fielded in France, Germany, the United Kingdom, and the United States, we can speak to the relative usefulness of these explanations for understanding the mass politics of global climate action.

Consistent with the predictions of our formalization of the global public good model, support for climate action depends on the size of benefits, policy costs, and expected contribution of other nations. This implies that support for the provision of the global public good of climate protection depends on building multilateral coalitions and keeping

[7] We note that the coefficient on the multilateralism indicator has to be interpreted accordingly, i.e., the marginal effect is a linear function of the main effect and the interaction terms. For example, the marginal causal effect of multilateralism on carbon tax support among high earners is 0.043 with a p-value of 0.08 (Model 1 in Appendix Table A.4).

costs low while assuring citizens of the benefits. The fact that the rewards of climate action will not materialize until the distant future seems like it would dampen public support, as people often discount the future. Yet strikingly our results suggest that the delayed nature of the payoffs is not a significant driver of climate policy preferences. This result holds across both groups characterized by different levels of patience and age groups.

We deem it important to reflect on this finding as it is central to the model as well as many other analyses of international cooperation. The null result could suggest that climate action is not made difficult politically because the benefits are temporally distant. This does not necessarily contradict that citizens prefer climate action to take place sooner rather than later (Rinscheid and Wüstenhagen, 2019). It does suggest, however, that much of the mass politics of reducing greenhouse-gas emissions may be better captured by static public goods models that do not explicitly incorporate the temporality of the policy benefits. At the same time, we acknowledge the intuitive importance of benefit timing for explaining the reluctance of mass publics to adopt costly climate policies and believe future research could consider alternative experimental designs and measurement strategies to further probe the relevance of this factor.

A number of scholars have argued that the crucial challenge to climate action is the distribution of costs, rather than the collective action problem of public goods provision (Aklin and Mildenberger, 2018; Colgan, Green and Hale, 2019). Recent setbacks for pricing carbon, with the "Yellow Vests" movement in France being perhaps the most salient, certainly seem to resonate with the critique. Our study suggests that the public goods framework may be used productively while also allowing for concerns such as distribution within that structure. Since costs and benefits matter for the decision to contribute to a public good, any differences in these across individuals are a likely source of political conflict over climate action. Work on factors influencing the likely distribution of costs of a given climate policy, such as geographical location and sector of employment, need not be viewed as contradicting the challenges created by the public good characteristics of reducing greenhouse gas emissions. Future research could investigate in greater detail how these considerations interact, what their relative magnitudes are, and what shapes people's perceptions of the size of expected benefits, costs, and the likely cooperation of other countries. Subsequent research may also explore whether the impact of participation, benefits, and costs depends on partisan-motivated rhetoric (Schuldt, Konrath and Schwarz, 2011) and policy instruments (e.g., climate dividends) and how these factors affect climate-relevant consumption behavior.

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Online Appendix for "What Determines Climate Policy Preferences If Reducing Greenhouse-Gas Emissions Is A Global Public Good?"

A Description of Climate Policy Survey (France, Germany, United Kingdom, United States, N=10,081)

We fielded our survey in four major economies (France, Germany, the United Kingdom, and the United States). The survey was conducted online by YouGov on representative samples of the adult populations. YouGov employs matched sampling in which interviews are conducted from participants in YouGov's online panel. Matched sampling involves taking a stratified random sample of the target population and then matching available internet respondents to the target sample using propensity scores. The propensity score model included age, gender, years of education, and region for the European countries and gender, age, race/ethnicity, region, and education for the United States.

United States: The field period was December 18, 2018 to January 3, 2019. The sampling frame for the target population was constructed from the full 2016 American Community Survey. All matched respondents were then assigned weights stratified on 2016 presidential vote, age, sex, race, and education to correct for remaining imbalances. The final number of observations was 4,081.

France, Germany, United Kingdom: The field period was March 31, 2019 to April 04, 2019. The sampling frames for the target populations were constructed from the 2018 Eurobarometer survey with selection within strata by weighted sampling with replacements (using the person weights on the public use file). The final number of observations was 2,000 for France, 2,000 for Germany, and 2,000 for the United Kingdom.

Table A.1 reports the distributions of sociodemographic characteristics in the population, the raw samples, and the weighted samples by country.

B Measuring Individual-level Patience: Convex Time Budgets

We implement the convex time budget measure of time preferences as described in Andreoni, Kuhn and Sprenger (2015); Andreoni and Sprenger (2012) and recently adapted for inclusion in mass surveys (Bechtel, Jensen and Scheve, 2019) The CTB method starts with considering the allocation of payments x_t and x_{t+k} between two periods t and $t+k$. Preferences over these two payments are assumed to be described by the following utility function:

$$U(x_t, x_{t+k}) = \begin{cases} x_t^\alpha + \beta\delta^k x_{t+k}^\alpha, & \text{if } t = 0. \\ x_t^\alpha + \delta^k x_{t+k}^\alpha, & \text{if } t > 0. \end{cases} \quad (1)$$

The parameter δ measures long-run exponential time discounting, β measures the preference for payments now $t = 0$ and thus captures present bias, and α measures utility function curvature or the extent of risk aversion/preference for time smoothing. Estimating all three of these parameters for a sample, population, or individual are of potential interest. However, our primary objective is to obtain a valid measure of time preference (δ) at the individual level.

The CTB approach asks respondents to choose repeatedly a bundle of payments that will be received at time t and time $t + k$. Each choice includes both extreme cases in which the full payment is at time t or at time $t + k$ as well as four convex combinations of these payoffs (see Figure A.1 for an example of the choice task). Some choices compare payments now to payments later while other choices compare payments at some $t > 0$ and payments later than that. The differences in those choices allow for the separate identification of β (present bias) from general time discounting (δ) and risk aversion (α). Choices at the extremes are consistent with $\alpha = 1$ and risk-neutrality while interior choices are consistent with $\alpha < 1$ and risk aversion. CTB identifies risk aversion based on the price-sensitivity of the intertemporal choice.

Once the choices have been elicited from respondents, the parameters of interest δ, α, and β can be estimated by ordinary least squares or nonlinear least squares. The estimates can be made for the sample of respondents as a whole and/or for each respondent separately. In this paper, we only use the method for measuring individual time preferences and employ our respondent-specific parameter estimates.

C Appendix Tables

Table A.1: Climate Policy Survey: Distribution of Socio-Demographics in the Target Population, the Raw Sample, and the Weighted Sample by Country (Total N=10,081)

United States			
	Population	Raw Sample	Weighted Sample
Age: 18-34	30	27	30
Age: 35-49	25	23	25
Age: 50-64	25	30	25
Age: 65+	20	22	20
Education: Less than High School	12	7	12
Education: High School Degree	28	29	28
Education: Associate's Degree or Some College	31	32	31
Education: BA or higher	29	32	29
Gender: Male	48	47	49
Gender: Female	51	53	51
Germany			
	Population	Raw Sample	Weighted Sample
Age: 18-29	19	18	19
Age: 30-44	21	21	21
Age: 45-64	35	24	35
Age: 65+	24	25	25
Education: 16yrs or less	38	43	38
Education: 17-18	19	32	19
Education: 19+	43	25	43
Gender: Male	49	48	48
Gender: Female	51	51	51
France			
	Population	Raw Sample	Weighted Sample
Age: 18-29	20	17	20
Age: 30-44	23	25	23
Age: 45-64	32	36	32
Age: 65+	26	22	26
Education: 16yrs or less	26	12	26
Education: 17-18	25	48	26
Education: 19+	49	40	48
Gender: Male	47	46	47
Gender: Female	53	54	53
United Kingdom			
	Population	Raw Sample	Weighted Sample
Age: 18-29	22	19	22
Age: 30-44	26	27	26
Age: 45-64	30	32	30
Age: 65+	22	23	22
Education: 16yrs or less	41	32	41
Education: 17-18	28	21	20
Education: 19+	31	47	38
Gender: Male	50	46	50
Gender: Female	50	55	50

Table A.2: Climate Policy Support: Benefits, Timing, and Costs (France, Germany, United Kingdom, United States)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Benefits: Medium	0.171**	0.185**	0.167**	0.184**	0.302**	0.247	0.289**	0.245
	(0.079)	(0.089)	(0.078)	(0.088)	(0.135)	(0.152)	(0.134)	(0.150)
Benefits: High	0.518***	0.565***	0.505***	0.550***	0.429***	0.403***	0.440***	0.411***
	(0.078)	(0.090)	(0.078)	(0.089)	(0.136)	(0.155)	(0.135)	(0.155)
Benefits: Very High	0.632***	0.618***	0.609***	0.593***	0.755***	0.677***	0.717***	0.636***
	(0.079)	(0.090)	(0.078)	(0.089)	(0.137)	(0.156)	(0.136)	(0.153)
Timing: 2040	0.103	0.058	0.083	0.040	0.218	0.098	0.202	0.089
	(0.068)	(0.078)	(0.068)	(0.077)	(0.135)	(0.149)	(0.133)	(0.148)
Timing: 2050	0.032	-0.025	0.045	-0.017	0.041	-0.097	0.048	-0.093
	(0.069)	(0.078)	(0.068)	(0.078)	(0.136)	(0.154)	(0.135)	(0.153)
Costs: High	-0.774***	-0.756***	-0.797***	-0.775***	-0.776***	-0.757***	-0.799***	-0.777***
	(0.070)	(0.084)	(0.069)	(0.084)	(0.070)	(0.084)	(0.069)	(0.084)
Benefits: Medium X Timing: 2040					-0.289	-0.203	-0.287	-0.216
					(0.192)	(0.215)	(0.190)	(0.212)
Benefits: Medium X Timing: 2050					-0.106	0.015	-0.080	0.029
					(0.194)	(0.220)	(0.192)	(0.217)
Benefits: High X Timing: 2040					0.125	0.251	0.073	0.198
					(0.192)	(0.219)	(0.189)	(0.217)
Benefits: High X Timing: 2050					0.143	0.233	0.124	0.217
					(0.193)	(0.220)	(0.191)	(0.220)
Benefits: Very High X Timing: 2040					-0.299	-0.210	-0.262	-0.179
					(0.194)	(0.219)	(0.192)	(0.217)
Benefits: Very High X Timing: 2050					-0.072	0.037	-0.059	0.054
					(0.194)	(0.221)	(0.192)	(0.217)
Constant	5.990***	6.053***	5.950***	6.164***	5.950***	6.066***	5.913***	6.179***
	(0.093)	(0.106)	(0.138)	(0.155)	(0.115)	(0.130)	(0.155)	(0.174)
Sociodemographics			Yes	Yes			Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights		Yes		Yes		Yes		Yes
Observations	10,081	10,081	10,081	10,081	10,081	10,081	10,081	10,081
R-squared	0.041	0.044	0.065	0.068	0.042	0.045	0.065	0.068

Note: This table reports coefficients from linear regressions of climate policy support on randomly assigned household costs, policy benefits, and their timing. Robust standard errors are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.3: The Causal Effects of Multilateralism on Carbon Tax Support, Expected Benefits, and Cost Beliefs in France, Germany, and the United Kingdom (Weighted)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Policy Support	*Benefits*			*Costs*			*Fairness*
Outcome:	Carbon Tax: Approve	Children: Better Life	Save: Animals and Plants	Improve Public Health	More Regulation	Higher Energy Prices	Job Losses	Costs: More Fairly
Multilateralism	0.031**	0.042***	0.034**	0.028*	0.023*	-0.031***	-0.023	0.066***
	(0.015)	(0.014)	(0.015)	(0.014)	(0.013)	(0.012)	(0.015)	(0.015)
Effectiveness: Low	-0.010	-0.022	-0.028	-0.022	0.012	0.014	-0.008	-0.018
	(0.019)	(0.017)	(0.018)	(0.018)	(0.017)	(0.014)	(0.019)	(0.019)
Effectiveness: High	0.044**	0.002	0.002	0.013	0.008	0.014	0.003	-0.012
	(0.019)	(0.017)	(0.018)	(0.017)	(0.017)	(0.015)	(0.019)	(0.019)
Constant	0.623***	0.742***	0.723***	0.733***	0.705***	0.763***	0.444***	0.580***
	(0.035)	(0.032)	(0.033)	(0.032)	(0.031)	(0.029)	(0.034)	(0.035)
Sociodemographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
R-squared	0.026	0.025	0.023	0.025	0.036	0.033	0.019	0.015

Note: This table reports coefficients from linear regressions of the outcome on whether the policy would be unilateral or multilateral. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.4: The Causal Effects of Multilateralism on Carbon Tax Support and Expected Benefits and Costs by Income in France, Germany, and the United Kingdom (Weighted)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Policy Support	*Benefits*			*Costs*			*Fairness*
Outcome:	Carbon Tax: Approve	Children: Better Life	Save: Animals and Plants	Improve Public Health	More Regulation	Higher Energy Prices	Job Losses	Costs: More Fairly
Multilateralism	-0.002	0.009	-0.029	-0.011	0.019	-0.031*	0.014	0.026
	(0.023)	(0.020)	(0.021)	(0.021)	(0.021)	(0.019)	(0.023)	(0.023)
Multilateralism X Income: High	0.046	0.049*	0.124***	0.073**	0.015	0.003	-0.065*	0.055
	(0.034)	(0.030)	(0.032)	(0.031)	(0.030)	(0.026)	(0.034)	(0.034)
Income: High	-0.017	-0.013	-0.055**	-0.018	0.030	0.049***	0.024	-0.020
	(0.025)	(0.022)	(0.024)	(0.023)	(0.022)	(0.018)	(0.025)	(0.025)
Effectiveness: Low	-0.003	-0.031*	-0.039**	-0.029	0.001	0.009	-0.017	-0.028
	(0.021)	(0.018)	(0.019)	(0.019)	(0.018)	(0.016)	(0.020)	(0.021)
Effectiveness: High	0.053**	-0.000	-0.015	0.006	0.009	0.011	0.002	-0.028
	(0.021)	(0.018)	(0.019)	(0.019)	(0.018)	(0.016)	(0.021)	(0.021)
Constant	0.634***	0.786***	0.765***	0.772***	0.725***	0.804***	0.403***	0.583***
	(0.035)	(0.030)	(0.032)	(0.031)	(0.031)	(0.028)	(0.035)	(0.035)
Sociodemographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,006	5,006	5,006	5,006	5,006	5,006	5,006	5,006
R-squared	0.023	0.023	0.026	0.026	0.037	0.030	0.021	0.012

Note: This table reports coefficients from linear regressions of the outcome on whether the policy would be unilateral or multilateral. The results have been estimated using survey weights. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.5: The Causal Effects of Multilateralism on Carbon Tax Support and Expected Benefits and Costs by Patience in France, Germany, and the United Kingdom (Weighted)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Policy Support		*Benefits*			*Costs*		*Fairness*
Outcome:	Carbon Tax: Approve	Children: Better Life	Save: Animals and Plants	Improve Public Health	More Regulation	Higher Energy Prices	Job Losses	Costs: More Fairly
Multilateralism	0.018	0.030	-0.002	0.000	0.034	-0.016	-0.024	0.025
	(0.028)	(0.025)	(0.026)	(0.026)	(0.024)	(0.021)	(0.028)	(0.028)
Multilateralism X Patience: High	0.046	0.026	0.070*	0.060*	-0.009	-0.006	0.014	0.037
	(0.039)	(0.035)	(0.037)	(0.036)	(0.034)	(0.030)	(0.038)	(0.039)
Patience: High	-0.002	-0.002	-0.041	-0.037	0.004	0.011	-0.029	-0.046*
	(0.028)	(0.025)	(0.027)	(0.026)	(0.025)	(0.020)	(0.027)	(0.028)
Effectiveness: Low	0.010	-0.063***	-0.051**	-0.042*	-0.010	0.021	-0.027	-0.028
	(0.024)	(0.021)	(0.023)	(0.023)	(0.021)	(0.018)	(0.024)	(0.024)
Effectiveness: High	0.063***	-0.017	0.008	0.016	-0.027	0.012	-0.007	-0.013
	(0.024)	(0.021)	(0.023)	(0.022)	(0.021)	(0.019)	(0.024)	(0.024)
Constant	0.594***	0.760***	0.735***	0.743***	0.767***	0.769***	0.460***	0.626***
	(0.046)	(0.042)	(0.044)	(0.043)	(0.041)	(0.038)	(0.045)	(0.046)
Sociodemographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,742	3,742	3,742	3,742	3,742	3,742	3,742	3,742
R-squared	0.031	0.033	0.025	0.030	0.042	0.031	0.025	0.016

Note: This table reports coefficients from linear regressions of the outcome on whether the policy would be unilateral or multilateral. The results have been estimated using survey weights. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.6: The Causal Effects of Multilateralism on Carbon Tax Support and Expected Benefits and Costs by Ideology in France, Germany, and the United Kingdom (Weighted)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Policy Support	*Benefits*			*Costs*			*Fairness*
Outcome:	Carbon Tax: Approve	Children: Better Life	Save: Animals and Plants	Improve Public Health	More Regulation	Higher Energy Prices	Job Losses	Costs: More Fairly
Multilateralism	0.035	0.026	0.014	0.045	0.014	-0.023	-0.021	0.018
	(0.030)	(0.029)	(0.029)	(0.029)	(0.026)	(0.022)	(0.030)	(0.031)
Multilateralism X Ideology: Left	0.010	0.024	0.035	0.000	0.010	-0.002	-0.028	0.098**
	(0.040)	(0.036)	(0.038)	(0.037)	(0.035)	(0.030)	(0.039)	(0.040)
Ideology: Left	0.181***	0.124***	0.101***	0.136***	-0.022	-0.011	-0.168***	0.072**
	(0.029)	(0.026)	(0.028)	(0.027)	(0.025)	(0.021)	(0.028)	(0.029)
Multilateralism X Ideology: Center	-0.020	0.014	0.018	-0.046	0.014	-0.018	0.027	0.037
	(0.038)	(0.036)	(0.037)	(0.037)	(0.033)	(0.029)	(0.039)	(0.039)
Ideology: Center	0.106***	0.029	0.044	0.071***	-0.019	-0.026	-0.030	0.018
	(0.028)	(0.026)	(0.027)	(0.027)	(0.024)	(0.020)	(0.028)	(0.028)
Effectiveness: Low	-0.005	-0.018	-0.025	-0.017	0.012	0.014	-0.015	-0.014
	(0.019)	(0.017)	(0.018)	(0.018)	(0.017)	(0.014)	(0.018)	(0.019)
Effectiveness: High	0.048**	0.005	0.004	0.016	0.007	0.014	-0.002	-0.009
	(0.019)	(0.017)	(0.018)	(0.017)	(0.017)	(0.015)	(0.018)	(0.019)
Constant	0.510***	0.685***	0.667***	0.653***	0.721***	0.779***	0.516***	0.544***
	(0.040)	(0.036)	(0.037)	(0.037)	(0.035)	(0.032)	(0.039)	(0.040)
Sociodemographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
R-squared	0.046	0.040	0.033	0.039	0.037	0.034	0.046	0.026

Note: This table reports coefficients from linear regressions of the outcome on whether the policy would be unilateral or multilateral. The results have been estimated using survey weights. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

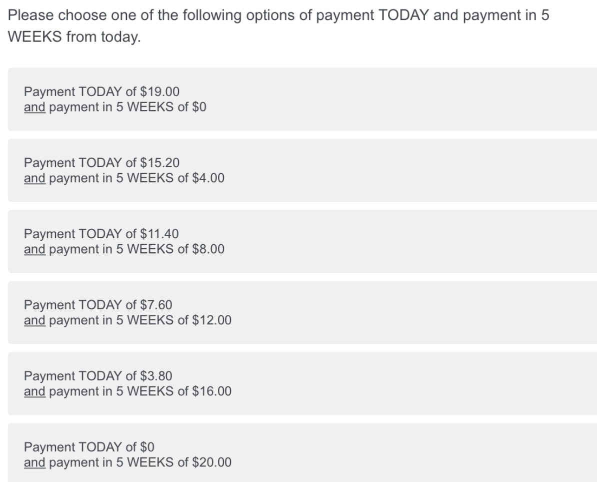
Table A.7: The Causal Effects of Multilateralism on Carbon Tax Support and Expected Benefits and Costs by Climate Beliefs in France, Germany, and the United Kingdom (Weighted)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Policy Support	*Benefits*			*Costs*			*Fairness*
Outcome:	Carbon Tax: Approve	Children: Better Life	Save: Animals and Plants	Improve Public Health	More Regulation	Higher Energy Prices	Job Losses	Costs: More Fairly
Multilateralism	0.085**	0.073*	0.056	0.057	-0.004	-0.054*	-0.085**	0.095**
	(0.042)	(0.039)	(0.041)	(0.041)	(0.037)	(0.030)	(0.042)	(0.043)
Multilateralism X Warming: Sure	-0.053	-0.028	-0.017	-0.028	0.038	0.031	0.075	-0.024
	(0.046)	(0.042)	(0.044)	(0.044)	(0.040)	(0.033)	(0.045)	(0.046)
Warming: Sure	0.128***	0.129***	0.102***	0.152***	0.008	-0.049**	-0.148***	0.149***
	(0.033)	(0.031)	(0.032)	(0.032)	(0.029)	(0.022)	(0.033)	(0.033)
Effectiveness: Low	-0.005	-0.027	-0.032*	-0.030	0.024	0.003	-0.023	-0.025
	(0.020)	(0.017)	(0.019)	(0.018)	(0.018)	(0.015)	(0.020)	(0.020)
Effectiveness: High	0.045**	-0.004	0.005	0.010	0.018	0.014	-0.001	-0.020
	(0.020)	(0.017)	(0.018)	(0.018)	(0.017)	(0.015)	(0.020)	(0.020)
Constant	0.549***	0.686***	0.690***	0.641***	0.715***	0.807***	0.545***	0.513***
	(0.046)	(0.043)	(0.044)	(0.044)	(0.042)	(0.036)	(0.046)	(0.047)
Sociodemographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200
R-squared	0.033	0.034	0.029	0.039	0.032	0.031	0.027	0.023

Note: This table reports coefficients from linear regressions of the outcome on whether the policy would be unilateral or multilateral. The results have been estimated using survey weights. Standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

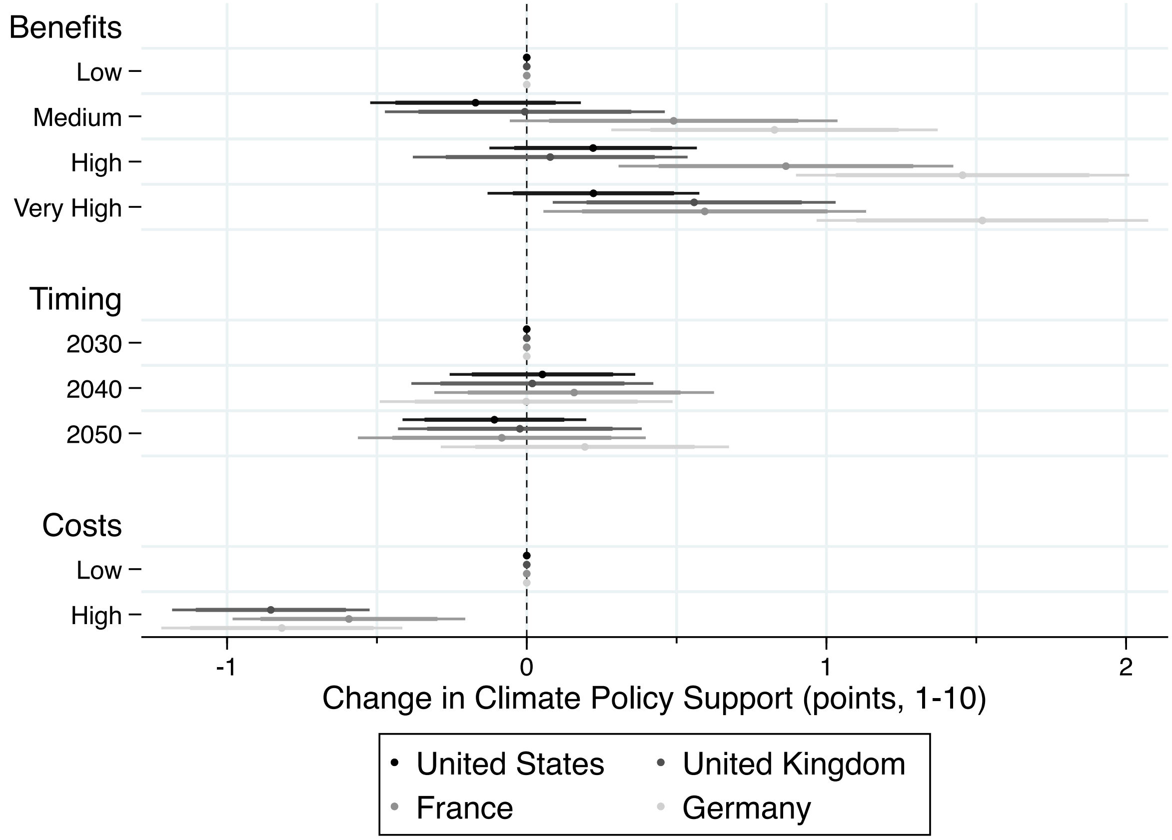
D Appendix Figures

Figure A.1: CTB Example Screenshot



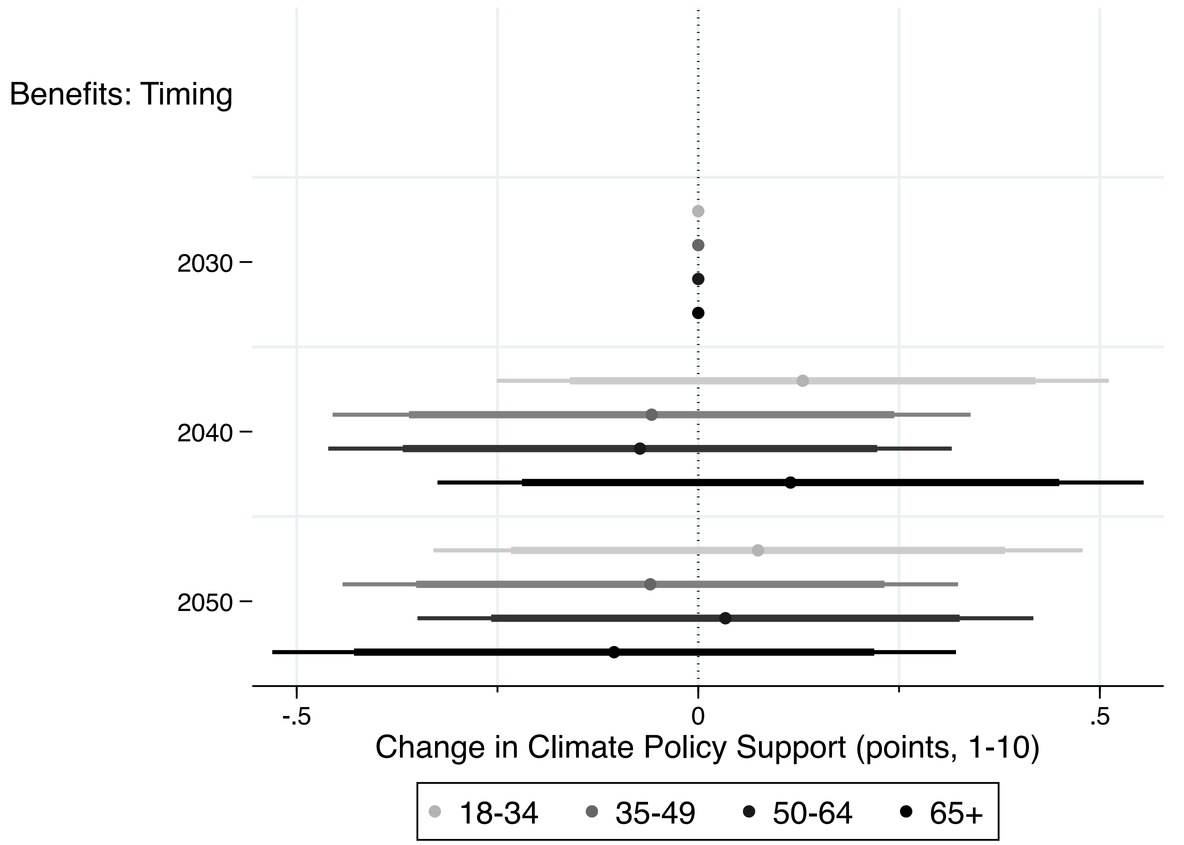
Note: This figure shows a screenshot of a CTB choice task.

Figure A.2: The Causal Effects of Benefits, Timing, and Costs on Climate Policy Support by Country



Note: This figure shows coefficients from linear regressions of climate policy support (1-10) on randomly assigned policy benefits, their timing, and policy costs. All models include a full set of sociodemographic covariates. Sample has been weighted. Error bars indicate 99% and 95% confidence intervals. Point estimates without confidence intervals denote reference categories. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. N(France)=2,000, N(Germany)=2,000, N(United Kingdom)=2,000, N(United States)=4,081.

Figure A.3: Climate Policy Support: The Causal Effect of Timing by Age Groups (France, Germany, United Kingdom, United States)



Note: This figure shows coefficients from linear regressions of climate policy support (1-10) on the randomly assigned timing of benefits estimated by age group. All models include a full set of sociodemographic covariates and country fixed effects. Sample has been weighted. Error bars indicate 99% and 95% confidence intervals. Point estimates without confidence intervals denote reference categories. *** p<0.01, ** p<0.05, * p<0.1. N(France)=2,000, N(Germany)=2,000, N(United Kingdom)=2,000, N(United States)=4,081.