Public Support for Global Climate Cooperation[1]

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Abstract

Climate change mitigation requires international cooperation and for this cooperation to be sustainable over the long term, formal global agreements to reduce CO2 emissions need broad public support. Using data from an experimental conjoint survey, we provide estimates of the political demand for different types of climate agreements in France, Germany, the United Kingdom, and the United States. Specifically, we explore how three key dimensions of climate cooperation — costs and distribution, participation, and enforcement — affect demand for global climate agreements. We find that citizens' sentiment toward climate agreements most strongly depends on costs. Our estimates imply that an increase of household costs equivalent to 0.5% of gross domestic product decreases the probability that an individual supports an agreement by 20% percent. Our results, however, also suggest that citizens are sensitive to the principles that govern the international distribution of costs, prefer more encompassing forms of climate cooperation, and support agreements that include a low sanction for failing emission reduction targets. Overall, our findings suggest that an important mechanism through which interests, norms, and institutions can support international cooperation is their influence on public opinion.

1 Introduction

The consensus view among scientists is that anthropogenic emissions of greenhouse gases have and will continue to contribute to global warming with serious environmental, economic, and social consequences. As such, reducing greenhouse gas emissions to levels consistent with relatively modest temperature increases over the long run have become a major policy objective of most countries around the world. However, since greenhouse gases uniformly mix in the atmosphere and so the location of damages is independent of the location of emissions, the provision of manageable greenhouse gases is nonrival in consumption and nonexcludable—it is the paradigmatic global public good. Consequently, the international politics of providing this good involve all of the canonical elements of global cooperation problems—free-riding, international and domestic distributive conflict, etc.—magnified by the fact that cooperation on climate change must be sustained for decades to successfully address the policy problem.

The dynamic sustainability element of climate change cooperation heightens the importance, especially in democratic states, of understanding public support for climate cooperation. Effective and sustainable cooperation must rely on individuals incurring costs, changing their consumption patterns, and rewarding policymakers' electorally for their international policy choices. Moreover, this support has to remain robust against the inevitable economic and partisan cycles of each state's domestic political economy. Although there exists informative survey evidence on individuals' general attitudes and beliefs about climate change (O'Connor, Bord, Yarnala and Wiefek 2002; Krosnick, Holbrook, Lowe and Visser 2006; Viscusi and Zeckhauser 2006; Nisbet and Myers 2007; Malka, Krosnick and Langer 2009; Krosnick and MacInnis 2012), very little is known on how variation in different features of global climate agreements influence individual support for international cooperation.

This paper uses a conjoint experiment embedded in large-scale, representative surveys to explore how different features of global climate agreements affect individual support for these policies in France, Germany, the United Kingdom, and the United States. We examine how three key dimensions of climate cooperation—costs and distribution, participation, and enforcement—affect individual preferences for global climate agreements. Our experimental approach allows us to estimate the causal effect of variation in these dimensions on the probability that individuals support a climate agreement, to construct useful comparisons of these effects across different dimensions, and to estimate individuals' willingness to pay for specific agreement features.

We find that mass support for global climate agreements responds similarly to key features of potential agreements in all four countries included in our study. Among these common agreement features influencing opinion, the cost of climate change mitigation is the most important driver of support for international cooperation. Our estimates based on pooled data from all four countries imply that an increase of household costs equivalent to 0.5% of gross domestic product decreases the probability that an individual supports an agreement by 20% percent. To put the importance of costs slightly differently, our country-specific analyses suggest that an increase of €10, €10, £10, and $10 per month in average household costs is associated with a 2.7, 1.9, 6.3, and 1.7 percentage point reduction in the probability that an individual supports an agreement in France, Germany, the United Kingdom, and the United States respectively.

We also find that individuals seem to care about the principles that govern the international distribution of costs. There exists some evidence that fairness norms like the "polluter-pays" principle may be a relatively compelling logic to justify the international distribution of the costs associated with emissions reduction. At the same time, the results also suggest that citizens find an "ability-to-pay" logic persuasive,

especially if that logic demands more of wealthy countries than developing countries but with contributions from both types of countries.

Further, our results suggest that publics in all four countries generally have a preference for more encompassing forms of climate cooperation, as participation of other countries increases support for a climate change agreement. We estimate that the probability of an individual supporting a global climate agreement increases by about 20% if 80 countries participate compared to an agreement with only 20 countries participating. We observe a further 10% increase if 160 countries participate. This result is consistent with the idea that citizens support reciprocal strategies between states. Using pre-treatment measures of environmentalism and a quasi-behavioral measure of individuals' levels of reciprocity, we find that these effects seem to be driven by citizens deeming more encompassing agreements as more effective and more fair. For example, we find that the more respondents value emissions reductions in general, the more positively their support for a given agreement responds to the number of countries participating. Similarly, we present evidence that individuals that pretreatment demonstrate higher levels of reciprocal behavior in a public good game are more likely to condition their support for agreements based on the number of countries included. We also find support for the argument that citizens are more likely to favor agreements monitored by an independent third party and that including low sanctions for failing to meet emission targets tends to increase public support. Our analysis suggests that these two results are also likely driven in part by the belief these features of an agreement are more likely to make it effective in reducing emissions.

Overall, our findings help to better understand the behavioral foundations of international cooperation and specifically suggest that an important mechanism through which interests, norms, and institutions can support international cooperation is their influence on public opinion. The remainder of the paper starts with a theoretical

discussion about how different features of climate change cooperation may influence public support. Section 3 presents the design of our original conjoint survey experiments and our methods for analyzing the data. Section 4 presents the results of our experiments and the final section discusses the implications both for understanding international economic cooperation and for future policy initiatives to reduce greenhouse gas emissions.

2 Public Preferences for Global Climate Change Cooperation

Individual opinions about the possibility that their country participates in a global climate agreement designed to reduce greenhouse gas emissions are likely to be the function of a wide range of factors. First, individual beliefs about climate change are likely to be an important determinant (Krosnick et al. 2006; Krosnick and MacInnis 2012). Individuals must believe that there is a problem to be solved or a public good worth providing to justify the costs associated with the types of global climate agreements that are currently being proposed and debated. Individuals who do not believe the earth is warming or do not believe that warming is at least in part due to human activity are not likely to support their country joining a costly agreement. Similarly, individuals who think the consequences of climate change are minimal are also not likely to support an agreement. These beliefs in turn may depend on an individual's social, geographic, and political environment (Viscusi and Zeckhauser 2006; Nisbet and Myers 2007; Egan and Mullin 2012). Second, individual economic interests are likely to be an important factor in opinion formation. In any given country, the reduction of greenhouse gases may entail higher costs for some individuals than others and, of course, individuals vary in their ability to bear abatement costs. Sources of interest heterogeneity include

differences across individuals due to their industry of employment, their consumption patterns, and geographic location. Third, individual variation in time horizons and values are likely to influence opinion about climate change cooperation (Roemer and Veneziani 2007; Roemer 2008). The benefits of reducing greenhouse gas emissions will accrue across future decades and so individuals who discount the future may be less willing to incur the costs of an agreement. Given the global public good nature of climate change mitigation and its expected benefits for future generations, individuals who are more other-regarding should be more likely to support international cooperation. These three sets of factors only begin to highlight the sort of observable and unobservable differences across individuals that may influence opinion formation about global climate change cooperation.[1]

Although the examination of how individual characteristics influence public support for agreements deserves further theoretical and empirical attention, our focus is on how variation in different features of potential global climate agreements influence individual support for international cooperation. Tingley and Tomz (2012) examine the role of reciprocal strategies in opinion formation. They argue that public support for such strategies depends on the policy instruments employed with citizens unwilling to condition their energy consumption on other countries' behavior but willing to support more general forms of economic sanctions. Our study, drawing on the literatures in international political economy (Keohane and Victor 2011; Thompson 2009; Bechtel and Tosun 2009; Mitchell and Keilbach 2001; Downs 2000; Barrett 1997; Victor 2006; Finus and Tjøtta 2003) and climate policy research (Victor 2011; Frankel 2008; Olmstead and Stavins 2010) focuses on three core dimensions of international climate change cooperation: costs and distribution, participation, and enforcement and how they influence public support.

[1]See also discussions in O'Connor et al. (2002), Malka et al. (2009), and Tingley and Tomz (2012).

2.1 Costs and Distribution

The costs arising from international climate policy and their distribution play a key role in public debates and continue to figure prominently in international negotiations about a global climate policy architecture (Victor, Kennel and Ramanathan 2012; Keohane and Victor 2011; Thompson 2009; Mitchell and Keilbach 2001). One of the most salient and obvious ways in which potential agreements differ pertains to how costly commitments to reduce greenhouse gas emissions are likely to be for a given country. Some of the variation observed in policy debates results from different estimates in the extent of reductions necessary to sufficiently curb global warming—e.g. the frequently cited goal of limiting global temperature increases to 2 degrees Celsius above preindustrial levels —or uncertainty about the economic costs associated with a given level of emissions reductions. A second source of variation in the expected costs of alternative climate change agreements may reflect differences in how aggressively the agreement seeks to curb greenhouse gas emissions, what sort of policy instruments governments employ to meet a country's emission targets, or which types of greenhouse gases it targets (Victor et al. 2012). We can view the expected costs associated with an agreement to represent the price of providing the global public good and expect individuals to be sensitive to this price in deciding whether or not to support an agreement.

When theorizing about the effects of costs, a second important aspect pertains to how these should be distributed. Some have argued that questions of distributive justice will eventually determine success or failure of international climate policy efforts (Bodansky, Chou and Jorge-Tresolini 2004; Frankel 2008). Thus, we would expect that the overall distribution of costs across countries also matters for public support. International climate policy efforts naturally provoke questions of distributive justice because the costs arising from these efforts have to be distributed and there exists disagreement about which principles should guide the allocation of these costs (Victor

et al. 2012; Page 2007; Lasse, Torvanger and Underdal 2002).

A range of possible principles for distributing these costs have informed current policy debates. These include various interpretations of an "ability-to-pay" norm and a "polluter-pays" norm. "Ability-to-pay" norms have been shown to be widely influential in individual fairness assessments about public policy questions. For the problem of global climate change, however, the norm is sometimes interpreted as implying developed countries should pay for all of the costs associated with reducing greenhouse gas emissions to sustainable levels while it is sometimes interpreted as implying that developed countries should pay more than developing countries. Similarly, "polluter-pays" norms are sometimes interpreted in terms of the stock of greenhouse gas emissions—for which developed countries are almost entirely responsible—and sometimes interpreted in terms of current and future emissions—for which developing countries are also significant contributors. We expect that agreements which tap into such norms will receive greater support than than agreements that fail to do so.

2.2 Participation

The level of participation in international agreements constitutes a key aspect of international cooperation generally and for the issue of climate change specifically. The participation of other countries in an agreement may indicate states are pursuing reciprocal strategies of cooperating as long as other countries do the same. Citizens may be more likely to support global agreements with high participation because such agreements are likely to more effective at providing the global public good and because the contributions to the good are perceived as fair (Keohane and Victor 2011; Thompson 2009; Mitchell and Keilbach 2001; Downs 2000; Barrett 1997). First, we can think of participation simply in terms of how many countries join an agreement. Second, one can conceptualize participation levels by looking at the share

of greenhouse gas emissions represented by the participating countries. The latter conceptualization appears particularly interesting as climate agreements that represent a larger share of emissions may potentially be more effective than agreements that represent only a small share of global emissions, even if participating countries eventually reach a lower reduction in greenhouse gas emissions than those participating in the less encompassing agreement. Generally, we expect that individuals will have a preference for more encompassing agreements both because such agreements are more effective and because they are perceived to be more fair.

2.3 Enforcement

International climate policy ultimately aims at reducing greenhouse gas emissions to prevent or at least mitigate global warming and its adverse consequences on societies. However, as is typical with the production of public goods, there exists an incentive to freeride on the mitigation efforts of other countries. To counter these enforcement problems, a large literature (Keohane 1988; Fearon 1998; Abbott and Snidal 1998) has highlighted that the effectiveness of international institutions often depends on two aspects of enforcement efforts: monitoring and sanctions. While monitoring provides information about the degree of compliance, which allows for blaming and shaming mechanisms, sanctions directly punish freeriding and thereby increase the level of compliance. Unsurprisingly, these mechanisms also play a crucial role in proposals for an effective international climate policy architecture and we expect public support for agreements to be sensitive to whether and how agreements are monitored and enforced (Frankel 2008; Olmstead and Stavins 2010; Tingley and Tomz 2012). Specifically, we expect that support for an agreement increases if it is monitored by an independent expert body rather than self-monitored by national governments, because independent institutions will provide more reliable information that will have higher credibility

among citizens. Moreover, we expect that sanctions will increase support because they make it more likely that governments will meet their obligations.

3 Data and Methods

Our evaluation of how these different features of climate change cooperation influence public support for alternative international agreements is based on original choice-based conjoint survey experiments conducted in the summer of 2012 in France, Germany, the United Kingdom, and the United States. All four surveys were conducted by YouGov over the internet on representative samples of the adult population.[2] The sample size was 2,000 for France, Germany, and the United Kingdom and 2,500 for the United States.

The core of our analysis draws on respondent choices between alternative global climate agreements presented within a conjoint framework. Conjoint analysis methods were developed in psychology and marketing and involve having respondents rank or rate two or more hypothetical choices that have multiple attributes with the objective of estimating the influence of each attribute on respondent choices or ratings.[3] Hainmueller, Hopkins and Yamamoto (2012) and Bechtel, Hainmueller and Margalit (2012) develop conjoint methods using fully randomized designs and analyze the properties of conjoint analysis in the potential outcomes framework for causal inference.[4] We devised a fully-randomized conjoint in which each respondent is shown two international agreements in comparison and asked to choose between them. This forced-choice de-

[2]YouGov employs matched sampling to approximate a random sample of the adult population. Matched sampling essentially involves taking a stratified random sample of the target population and then matching available internet respondents to the target sample. Rivers (2011) provides more details about this methodology.

[3]For discussion of early work, see Luce and Tukey (1964), Green and Rao (1971), and Green, Krieger and Wind (2001).

[4]Political science applications of conjoint analysis include Shamir and Shamir (1995), Malhotra and Margalit (2010), Bechtel et al. (2012), and Hainmueller and Hopkins (2012).

sign allows us to assess the influence of different features of climate change agreements on how individuals evaluate a given agreement relative to another. Each respondent was shown four such binary comparisons. For each agreement that a given respondent considered, we constructed the variable *Agreement Support* and coded it 1 if an individual chose that agreement and 0 if they did not. In addition to asking respondents which of the two agreements they prefer, we ask: "If you could vote on each of these agreements in a referendum, how likely is it that you would vote in favor or against each of the agreements? Please give your answer on the following scale from definitely against (1) to definitely in favor (10)." This measure provides an assessment of the absolute support for a given agreement. We constructed the variable *Vote for Agreement* ranging from 1 to 10 indicating an increasing likelihood of voting for a given agreement in a referendum.

Table 1 shows the dimensions and values used in the conjoint experiment. The dimensions that we focus on follow closely our emphasis in the previous section on costs, participation, and enforcement as potentially important features of a climate agreement which may influence public support. For each agreement alternative presented to a respondent, the values for each dimension are randomly assigned.[5]

The values for the costs to average households directly mirror the different cost scenarios discussed in the public and scientific debate. According to Stern (2007) and others (Cline 1992; Cline 2004) stabilizing CO2 concentration at 550 particles per million (ppm)—a level thought to be consistent with limiting the global temperature increase to 2 degrees Celsius above its preindustrial level—will require abatement costs in the order of 2 percent of GDP in industrialized countries. Nordhaus (2007), however, has argued that the discount rates used by Stern (2007) are too low and that the costs of

[5]The order of the dimensions was randomly assigned for each respondent but remained consistent across the four binary comparisons. See Appendix for further information on the explanation and presentation of the conjoint experiment. Table A-1 presents balance tests showing that attribute value treatments did not vary by the demographic characteristics of respondents.

abatement in the near term should be somewhat lower. Moreover, one could imagine a range of agreements that are more or less ambitious in the extent of emissions reductions targeted, are more or less efficient in the policies developed to meet emission targets, or target reductions of short-lived pollutants instead of carbon dioxide emissions (Victor et al. 2012).[6] All these difference could bring about variations in the costs that countries and their publics face. To incorporate variation in agreement costs, we computed monthly abatement costs to the average household for five different cost scenarios, ranging from 0.5 to 2.5% of a country's GDP in steps of 0.5 percentage points (OECD 2010; Ackerman and Bueno 2011).

Our choice of allocation principles guiding the distribution of costs mirrors the public debate and includes variants of the "polluter-pays" principle (proportional to current emissions and proportional to the history of emissions), as well as the "ability-to-pay" principle (only rich countries pay and rich countries pay more than poor countries). For participation, we simply varied the number of countries participating from 20 to 80 to 160 out of 192 and the percent of emissions accounted for by participating countries from 40% to 60% to 80% of current emissions. For monitoring, respondents considered agreements that would monitor obligations by national governments, the United Nations, an independent commission, and Greenpeace. Finally, for sanctions, we used an approach similar to that used for the calculation of costs and normalized the size of sanctions for a country missing its emission reduction targets to the average household, distinguishing between no sanction and a low, medium, and high sanction. For each country, the low, medium, and high sanction values correspond to 5%, 15%, and 20% of the monthly household costs for the the 2% of GDP scenario.

The analysis of choice-based conjoint experiments is often motivated in a standard

[6]Carbon dioxide remains in the atmosphere for hundreds of years while short-lived pollutants, e.g., black carbon, chlorofluuorcarbons, hydrofluorocarbons, methane, or lower atmospheric ozone, have much shorter life spans (several weeks). At the same time, short-lived pollutants account for about 40% of global greenhouse gas emissions, see Victor et al. (2012).

random utility model framework with each survey response interpreted as reflecting the utility difference between the choices under consideration. Utility is modeled as a function of observed characteristics of the choice set, individual characteristics of the respondent, possibly interactions between these observables, and an error term capturing unobserved factors. Based on the assumption of individuals selecting the choice that gives them the greatest utility, researchers can directly derive an equation to be estimated from the response model—typically a probit or logit (Phillips, Maddala and Johnson 2002; Miguel, Ryan and McIntosh 2000). However, given that our research design fully randomizes the attributes of the climate agreements under consideration, it is possible to nonparametrically compare levels of support across attribute levels for any given dimension of an agreement to determine the average causal effect of a given attribute on support for an agreement (Bechtel et al. 2012).

Hainmueller et al. (2012) provide a formal analysis that defines a number of potential causal estimands of interest for conjoint analyses and shows that with a fully randomized design simple difference-of-means estimators yield unbiased estimates.[7] Our primary substantive focus in this paper is estimating the *average marginal component-specific effect* which corresponds in our application to the average effect of a change in values of one of our six dimensions of a global climate agreement on the probability that that agreement is chosen by the respondent. To help interpret the main findings, our analysis will also explore how these treatment effects vary across different types of respondents in our sample. These conditional treatment effects are also nonparametrically identified in our fully randomized conjoint experiment as long as the respondent characteristics are not affected by the treatments.

We obtain the difference-of-means estimators by regressing the variable *Support*

[7]In addition to randomization of the agreement attributes, it is also useful to assume that the potential outcomes in each decision made by a respondent would be the same if the agreement attributes were the same regardless of what comparisons they had previously considered and that the order of the dimensions presented in a given comparison does not affect respondent choices.

Agreement on a set of dummy variables for each value of each dimension (with the exclusion of one value in each dimension as the baseline).[8] The regression coefficient for each dummy variable indicates the average marginal component-specific effect of that value of the dimension relative to the omitted value of that dimension. We report standard errors for these estimates clustered by respondent to account for within respondent correlations in responses.

4 Results

4.1 Costs and Distribution

Figure 1 reports our estimates of the overall influence of the costs, participation, and enforcement characteristics of global climate agreements on public support if we pool our data from France, Germany, the United Kingdom, and the United States. The plot shows estimates of the average marginal component-specific effect of a given value for each characteristic of a climate agreement on the probability of supporting an agreement. The bars indicate 95% confidence intervals and the points without bars indicate that that value is the reference category for a given agreement dimension. The interpretation of each estimate is relative to the reference category for that dimension.

Costs are the most important drivers of support for international climate change cooperation. For example, we estimate that an agreement that will cost 1% of a country's GDP (which is equivalent to €56 per household and month in France, €77 in Germany, £30 in the United Kingdom, and $107 in the United States) decreases individual support by 10 percentage points on average as compared to an agreement that will cost 0.5% of GDP. Doubling the costs of an agreement roughly doubles the

[8]The regressions are weighted by sampling weights although there is no significant differences between the weighted and unweighted estimates.

negative treatment effect: An agreement that implies costs in the order of 2% of GDP —the estimate that corresponds to the costs often discussed in public policy debates, e.g., Stern (2007)—will reduce public support by about 25% on average relative to the baseline 0.5% of GDP scenario. This suggests that the dose-response function for the cost dimension of global climate agreements is approximately linear. As we will show in more detail below, this pattern is surprisingly similar across countries.

This finding is consistent with a standard theoretical framework in which manageable greenhouse gases is a global public good which individuals would like to consume but their demand for it is sensitive to its price. This price-sensitivity is broadly consistent with the view that economic interests are an important determinant of global climate policy preferences. Most likely, public opinion depends on both a concern for costs to the respondent's country generally and to the respondent individually. The high degree of sensitivity to price demonstrated also seems important because it sets an important qualification to the common characterization in the public opinion literature that there exists strong public support for addressing climate change. As we explore in further detail below, we also find broad support for climate change cooperation but this support strongly depends on the required costs.

Although the importance of costs suggests a central role for price considerations in evaluating potential agreements, the results also clearly indicate that the principles governing their international distribution also matter. The probability of supporting an agreement increases by about 5 to 7 percentage points when the agreement distributes costs "proportional to current emisssions" compared to an agreement in which "only rich countries pay." This effect may be evidence that the "polluter-pays" principle more powerfully appeals to individuals' perceptions of fairness as opposed to a strong version of the "ability-to-pay" principle. This conclusion is bolstered by the fact that the estimates for an agreement which distributes costs "proportional to the history of

emissions" are quite similar to the estimates for the "proportional to current emissions" alternative. This comparison is especially telling because practically there is exists very little difference in the contribution of developing countries if contributions reflect historical emissions or if rich countries pay everything. That said, this interpretation requires some caution because the weaker ability-to-pay principle "rich countries pay more than poor countries" also has a similar effect on agreement support relative to the "only rich countries pay" baseline. Therefore, it seems possible that both distributive principles influence agreement support but for an agreement to be viewed as fair, developing countries have to contribute something to the public good.

4.2 Participation

This discussion poses the more general question of the importance of participation for agreement support. As expected, citizens generally have a preference for more encompassing forms of climate cooperation. An increase in the number of participating countries from 20 to 80 increases the probability that an agreement is chosen by 9 percentage points on average, which is equivalent to about 20% over the baseline probability of support (which is .51). If the number of participating countries increases to 160, support for an agreement rises by 15 percentage points. We find a similar, yet, less pronounced pattern when conceptualizing participation in terms of emissions represented by the countries joining an agreement.

Environmentalism

These results raise the theoretically important question whether voters' preference for more encompassing treaties is driven by an effectiveness concern in that they expect those agreements to be more effective or by a general norm of conditional coopera-

tion.[9] To explore this question, we examined our results by subgroups, distinguishing between individuals with high and low levels of environmentalism and respondents that show more and less reciprocal behavior. We measured climate-related environmentalism and reciprocity norms pre-treatment. Climate change concerns are measured by asking individuals about how much they approve or disapprove of international climate change cooperation in general. The exact text of the pre-treatment question is "As you probably know, many experts say that countries have to reduce their greenhouse gas emissions to address global warming. Generally speaking, how strongly do you support or oppose international cooperation to reduce greenhouse gas emissions even if this involves significant costs?"

Figure 2 shows the effects of climate agreement features on individual support by levels of environmentalism. The results suggest that effectiveness explains a considerable degree of sensitivity to the number of participating countries. Individuals that support climate change cooperation in general—those who presumably have a high demand for providing the global public good—care much more about the number of countries participating in a climate agreement: The effects of the number of participating countries more than double, when moving from individuals with low levels of climate-related environmentalism to respondents with high levels of climate-related environmentalism. For individuals with low levels of general support for climate cooperation, the effect of the "160 out of 192 countries" treatment is about 9 percentage points. In contrast, for respondents with high levels of climate-related environmentalism, the treatment effect equals 20 percentage points. Both effects are estimated with high precision and are significantly different from each other. Similarly, individuals

[9]The most obvious reason that respondents would expect agreements with greater participation to be more effective is that such agreements would result in greater total commitments to reduce greenhouse gases. It is also possible that respondents interpret greater participation as an overall signal of the quality of the agreement which would also suggest a more effective agreement but not necessarily through aggregate commitments.

who support climate change cooperation are also much more sensitive to the proportion of emissions represented in an agreement in choosing between alternatives while individuals with low support are not. This pattern is consistent with the argument that the sensitivity to the participation dimension is at least partly driven by effectiveness concerns. The differences in individuals' sensitivities to the costs of global climate agreements further corroborate this interpretation. Respondents advocating international climate cooperation in general exhibit a much weaker sensitivity to cost increases than individuals with low levels of climate-related environmentalism.

To assess the robustness of this result to different measures of environmentalism, we re-estimated the results using two alternative measures. The first is based on the following question: "How important do you think it is for [name of country] to reduce greenhouse gas emissions?" Answers on a ten-point scale from 1 "not at all important" to 10 "extremely important" were converted into an indicator variable that equals one for those who indicated a level of importance exceeding the average response (which was 6.6) and is zero otherwise. Figure A-6 in the Appendix shows the results if we use this indicator to partition the data. The results remain intact: Individuals that would like to see their country giving emission reductions a higher policy priority are much more sensitive to the participation dimension than those with low levels of environmentalism. We find a comparable pattern if we use a third measure of environmentalism that is based on the following question: "If you consider your monthly income: How much of it would you be willing to invest into reducing greenhouse gas emissions (for example, buying energy efficient electric appliances, installing heat insulation in your home, buying electric power produced from renewable energy sources, buying locally produced food)? Please indicate the amount on a scale from 0 to 100, with 0 meaning 'nothing at all' and 100 meaning 'my whole income'." Answers were converted into a binary indicator variable that equals one for those who indicated an amount higher than the

median response (which was 18%) and is zero otherwise. Figure A-7 in the Appendix shows the results if we use this indicator to distinguish between high and low levels of willingness to pay for emission reductions. We again find that those who score high on this willingness to pay measure put a higher weight on the participation dimension.

Reciprocity

The sensitivity of respondents to the participation dimension may also reflect a general norm of reciprocity. We measure reciprocity using the strategy method within the context of a two-player linear public good game (Fischbacher, Gächter and Fehr 2001; Selten 1967). Specifically, respondents were told that individuals completing the survey had a chance to win one of two Amazon gift cards and that the amount of the gift card would depend on their decision about whether to give some amount of the gift card to another winner and the analogous decision made by that winning respondent. Any amount given to another respondent would be subtracted from the individual's winnings and doubled before it was distributed to the other winner. The strategy method asks individuals how much that they would like to give the other winner if they knew that respondent's gift to them. Individuals are coded as conditional cooperators—high reciprocity—if their gift amount is relatively sensitive to the gift of the other winner. Specifically, we estimated an auxiliary regression for each respondent in which we regressed her/his contribution on a variable that indicated the amount given by the other person (0, 25, 50, 75, and 100). The regression coefficient provides us with a measure of reciprocity. We converted this reciprocity measure into a binary indicator that scores one for respondents that exhibited more reciprocal behavior than the median respondent and is zero otherwise.

Figure 3 breaks down our results by levels of reciprocity. Individuals who pre-treatment exhibit reciprocal behavior in our Amazon lottery game are almost twice

as sensitive to both the number of countries participating and the proportion of emissions represented than individuals who do not. This is consistent with the idea that some individuals exhibit conditional cooperation in many dimensions of their social, economic, and political behavior while others are less likely to behave in this way. We also note that this finding is generally consistent with the idea that reciprocity plays a noteworthy role in building support for international cooperation.

4.3 Enforcement

While costs as well as participation features of global climate agreements have significant effects on public support for these international efforts, we also find that the enforcement structure matters. Figure 1 suggests that individuals prefer agreements with low sanctions over a climate treaty that includes no sanctions for countries that fail to meet emission reduction targets. At the same time, the support for the inclusion of sanctions in global climate agreements is limited: If sanctions reach medium or high levels, individual support decreases significantly by 2 and 5 percentage points, respectively. The differences in individuals' sensitivities to the sanctions of global climate agreements across respondents with low and high levels of environmentalism further corroborate the interpretation that effectiveness concerns play an important role for understanding the effects we document. Figure 2 shows that only individuals that generally support climate cooperation prefer agreements that include a low sanction (the effect is about 4 percentage points). This group of climate-environmentalists is also not more against a climate treaty that has a medium sanction than one that has no sanction. In contrast, medium sanctions significantly decrease support for a climate agreement by about 7 percentage points among those who score low on our environmentalism measure.

Finally, we also find that having an agreement monitored by an independent commission—

that is a new international institution—increases the probability of supporting an agreement over the alternative that national governments monitor themselves. Again, the preference for an independent commission rather than national governments seems to be driven by a concern that the agreement be effective. As Figure 2 shows, individuals with higher levels of climate-related environmentalism prefer agreements with an independent commission more strongly than respondents that exhibit low levels of general support for climate cooperation. Moreover, environmentalists support all climate agreements more strongly that prescribe monitoring by an institution other than their own government. In contrast, having the United Nations or Greenpeace monitor enforcement efforts significantly decreases support for a climate agreement among individuals with low levels of environmentalism. This pattern appears consistent with the idea that those who oppose climate cooperation in general fear that having a pro-environmental institution monitor enforcement efforts might be biased towards pushing for more emission reduction efforts than they would like to see.

4.4 Robustness

We evaluated the robustness of these results in a number of ways. For example, our initial analyses do not distinguish between citizens' country of origin. Figure 4 breaks down our results by country. The overall patterns of the treatment effects are very similar. Costs decrease public support for a climate agreement and it does so in a roughly linear fashion, although the sensitivities in the United Kingdom and the United States appear slightly more pronounced than in France and Germany. In all four countries, individuals have a preference for agreements that distribute the costs according to principles like "polluter-pays" or "ability-to-pay." Also, we find that citizens generally prefer more encompassing forms of climate cooperation, as the positive point estimates for the participation treatments suggest. A noteworthy difference across countries re-

lates to the role of sanctions. While a low sanction makes an agreement significantly more attractive to citizens in France and Germany than a climate treaty without sanctions, this is not the case for individuals in the UK and the US. Publics in all four countries, however, share the view that high sanctions decrease the attractiveness of a climate agreement. Citizens also are largely in agreement that climate treaties that have an independent commission as a monitoring agency deserve more support than a treaty for which their own government would monitor emission reduction efforts. Overall, we conclude that individuals largely agree on which features of global climate agreements are important and to what extent.[10]

We also considered the possibility that some of our results, such as the importance of costs, were due to the fact that respondents find that dimension easier to understand than other dimensions of an agreement. To investigate this interpretation, we examined the effect of our treatments by high and low education groups, by high and low attention to the survey instrument, and by levels of general political knowledge. Figures A-8, A-9, A-10, and A-11 in the appendix report these estimates. When breaking down the effects by educational attainment (Figure A-8), we find that both groups exhibit the same sensitivity to costs per household up to the 1.5% of GDP scenario. Higher costs have a somewhat more pronounced negative effect among those with lower levels of education, but the effects have the same sign and the differences remain modest even when considering the highest cost scenario. When turning to our measure of attentiveness (Figure A-9), we again find some differences across respondents by how closely they were paying attention to the survey instrument, but these differences also remain substantively small and in the expected directions, that is, if there is a

[10]Note that this does not imply that overall support for global climate agreements is similar across countries, but rather that the sensitivity of public opinion to changes in costs, participation, and enforcement features is broadly the same across these four cases. It is also important to keep in mind that these four cases are all wealthy democracies with a long history of being major greenhouse gas emitters and it remains a question for future research how these agreement features influence opinion in other countries, especially among developing nations.

difference, the treatment effects are larger in magnitude for respondents with high attention. In the case of costs, this actually contradicts the idea that the salience of the cost dimension reflects respondents find it easiest to understand, as the effects are actually more pronounced for those with higher levels of attentiveness.

The differences in treatment effects across high and low knowledge respondents are generally modest if evident at all (A-10 and A-11). Although low knowledge respondents seem to care about costs somewhat more strongly, high knowledge respondents are still very sensitive to the expected costs of alternative climate agreements. Overall, we find little evidence that the importance of costs is simply driven by respondent understanding of this dimension.

We also examined whether some of our findings might have been a result of systematic misunderstanding of the choice task that respondents were being asked to complete. We specifically investigated whether the results were different if we limited our analysis to respondents who chose agreements consistent with their referendum evaluations. Figure A-12 reports the results for those respondents whose binary choice is also rated higher in their answer to the referendum question. These estimates closely mirror our main results including all respondents.[11]

4.5 Willingness to Pay

Our analysis of our choice-based conjoint survey experiments has thus far been non-parameteric and made no assumptions about the functional form of the relationship between variation in attribute values and support for global climate agreements. However, adding one assumption to our analysis—that there is a linear relationship between

[11] In addition to these robustness tests, we estimated a number of other alternative specifications such as those including additional control variables. All of our estimates in these specifications closely mirror those reported in our main figure. We also explored potential interactions between agreement features. The results, however, suggest that there are no systematic interactions between different features of an agreement.

average household costs or roughly the price of an agreement and respondent agreement choices—allows us to calculate willingness-to-pay values for the other dimensions of an agreement. This additional assumption seems plausible given the relatively linear pattern of results for household costs reported in the conjoint plots. The willingness-to-pay values indicate how much on average respondents would pay for a given value in a particular dimension relative to the reference value for that dimension. We calculate these values in two steps. First, we reran our regressions for each country with an identical specification except rather than a full set of dummy variables for the household costs, we included a single variable indicating the amount of the average monthly household cost (e.g. \$53, \$107, \$160, \$213, and \$267 for the United States). Because of the experimental design, these regressions yield identical estimates for the other dimensions. Second, the willingness-to-pay values were calculated by dividing the coefficient for each dummy variable by the negative of the monthly household cost (or price) coefficient.

Before discussing the willingness-to-pay values associated with our estimates, it is also informative to consider the linear estimates for average household costs. For the United States, the coefficient estimate implies that an increase of \$10 per month in average household costs is associated with a 1.7 percentage point reduction in the probability that an individual supports an agreement. The analogous values for a €10, €10, and £10 increase in average household costs for France, Germany,and the United Kingdom respectively are 2.7, 1.9, and 6.3 percentage points. Again costs matter and the magnitude of this effect is large across all four countries.

Table 2 reports our estimates of the willingness-to-pay values for our conjoint experiment. The interpretation of these values can be illustrated by considering the estimate of \$55 for "proportional to current emissions" for the US data. This means that, given individuals' average sensitivity to the costs of a climate agreement, re-

spondents in the United States would pay $55 per month more for an agreement that distributed costs proportional to current emissions relative to an agreement in which only rich countries incur costs. This value illustrates clearly that respondents care a lot about the principles of the distribution of costs. The overall pattern of willingness-to-pay values reported in the table highlights the importance that respondents in all four countries attach to the distribution of costs, the number of participating countries, and the identity of monitoring institutions in addition to the average household costs of an agreement.

4.6 Support for Global Climate Agreements

The forced-choice conjoint experiments present an ideal opportunity for assessing how the various dimensions of potential climate change treaties influence the preferences of individuals between alternative agreements. However, the choice experiment yields a relative rather than absolute measure of public preferences. Some respondents may be generally supportive or opposed to all types of agreements and it is important to assess how the different dimensions of an agreement are likely to influence absolute measures of public support. Moreover, any assessment of the sustainability of international cooperation on climate change needs to be informed by the absolute levels of support associated with different types of an agreement. In this section, we briefly analyze our *Vote for Agreement* absolute measure of agreement support which as described previously indicates how likely respondents think it is that they would vote for their country joining a given agreement in a referendum.

Before discussing this analysis of absolute support for specific alternative agreements, it is useful to consider the levels of general support for international cooperation on climate change to establish the comparability of our study to previous work. Before the conjoint experiment, we asked respondents "As you probably know, many

experts say that countries have to reduce their greenhouse gas emissions to address global warming. Generally speaking, how strongly do you support or oppose international cooperation to reduce greenhouse gas emissions even if this involves significant costs?" Respondents could answer that they "strongly oppose," "somewhat oppose," "neither oppose nor support," "somewhat support," or "strongly support" cooperation. This question was meant to elicit general support *without* the inclusion of all the detailed agreement features included in the conjoint experiment. The question obviously includes key phrases such as "global warming" and "significant costs" that could influence responses as could the expert endorsement of cooperation in the preface to the question. Keeping these caveats in mind, overall responses to the question are consistent with previous polling indicating that the majority of citizens in most countries support international action and that there is stronger support in Europe than the United States for such measures. Specifically, in our data 68%, 73%, 63%, and 51% of respondents either "strongly support" or "somewhat support" international cooperation in France, Germany, the United Kingdom, and the United States respectively.

Our *Vote for Agreement* measure of absolute support ranges in values from 1 to 10 indicating an increasing likelihood of voting for a given agreement in a referendum. The proportion of individuals giving responses of six or greater vary from 32% in the United States to 45% in France with the United Kingdom (35%) and Germany (40%) falling in between. This pattern, of course, reflects both the fact that the conjoint experiments are much more specific about exactly what international cooperation on climate change might look like and the specific distribution of scenarios considered by respondents.

To assess the effect of agreement features on absolute levels of support, we regressed *Vote for Agreement* on a full set of treatment indicators. We find that the results from

our initial conjoint analysis remain unchanged (see Figures A-2, A-3, A-4, and A-5 in the Appendix for the results plots for the *Vote for Agreement* measure) and use these estimates to generate predicted levels of support that alternative agreements receive. We focus on two scenarios: The first scenario very roughly corresponds to current and ongoing efforts at cooperation. We assume: average household costs of 2% of GDP; only rich countries pay; 160 countries will participate; emissions represented will be 60%; monitoring will be by the United Nations; and no sanctions will be levied if commitments are not met. The second scenario generally maximizes support: average household costs of 0.5% of GDP; costs are proportional to current emissions; 160 countries will participate; emissions represented will be 80%; monitoring will be by an independent commission; and a low sanction will be levied if commitments are not met.

Under the first scenario, the predicted levels of support are 5.4 in France, 4.8 in Germany, 4.7 in the United Kingdom, and 4.0 in the United States. These values suggest that the configuration of characteristics that most closely matches current global climate efforts elicit rather modest levels of support. On average, voters in Europe can be expected to be about 50/50 in their probability of supporting such an agreement in a referendum while this probability is substantially less than 50/50 in the United States. The second scenario, however, generates considerably higher levels of support. The predicted values for *Vote for Agreement* are 6.4, 5.9, 5.6, and 5.2 in France, Germany, the UK, and the United States respectively. These increases may constitute decisive shifts in public support as a majority of respondents are expected to favor such an agreement in each of the four countries.

At the same time, however, we emphasize that a large part of the increases in support result from the lower costs of the second scenario. One might argue that the low costs (0.5% of GDP) assumed in the second scenario are only consistent with a

very modest agreement that would be unlikely to bring about a significant reduction in emissions. An alternative view might be that only an incremental agreement that at least starts with modest costs is likely to receive sustained public support across all four cases. In addition, the second agreement represents a larger share of global emissions. Therefore, even if it entails lower costs, it may result in global emission reductions that are as large or even larger than the first scenario that involves higher costs but where member countries represent a smaller share of global emissions.

5 Conclusion

International efforts to effectively address climate change require long-term public support that incentivizes policymakers to make sustainable contributions to curbing greenhouse gas emissions. However, we do not yet know which types of global climate agreements are likely to receive more or less support in democratic countries. This paper explores how different features of international climate agreements affect mass support for these policies in France, Germany, the United Kingdom, and the United States. We examine how three key dimensions of climate cooperation—costs and distribution, participation, and enforcement—affect individual preferences for global climate change agreements.

We find, somewhat surprisingly, that, despite variation in overall levels of support for policies to mitigate climate change, individual support for climate agreements responds quite similarly to variation in key features of potential agreements in all four countries included in our study. Among these common agreement features influencing opinion, the cost of climate change mitigation is the most important driver of support for international cooperation. Our estimates suggest that increasing average household costs associated with an agreement from 1 to 2 percent of GDP decreases support for

an agreement by about 20 percentage points. Although public concern about global warming and support for policies to address the issue have been well documented across many countries, our findings suggest that scholars and policymakers should appreciate the sensitivity of this support to the costs of mitigation policies.

Citizens generally have a preference for more encompassing forms of climate cooperation, since global climate agreements that have a larger number of participating countries receive higher public support. Individuals also seem to care about the principles that govern the international distribution of costs. The evidence is suggestive of the "polluter-pays" principle being a relatively powerful logic to publicly justify the international distribution of the costs associated with emission reductions. That said, the results also suggest that citizens find an "ability-to-pay" logic persuasive, especially if that logic demands more of wealthy countries than developing countries but with contributions from both types of countries. We also find support for the argument that citizens are more likely to favor agreements monitored by an independent third party. Finally, we find that small sanctions elicit more support for a climate agreement as compared to a climate treaty that includes no sanctions for failing emission reduction targets. Higher sanctions, however, generally have no or a negative effect on support. We also explore the sensitivities we find across different subgroups to learn something about the mechanisms that underlie the treatment effects. Our results are consistent with the interpretation that effectiveness concerns drive the results with reciprocity norms being important only when trying to explain why individuals prefer more encompassing forms of global climate cooperation.

These results improve our understanding of the more general behavioral foundations of international cooperation and carry policy implications for addressing some of the practical issues of future international cooperation on climate change. The findings should, of course, be viewed with some caution. Our experimental design ensures the

internal validity of our estimates. It may be productive in future research to evaluate whether and how these estimates vary across different periods in the political and economic cycles of these countries. It is obviously an open question how citizens in developing and nondemocratic countries react to variation in salient features of potential climate change agreements. Future studies could also adopt the conjoint methods employed here to explore other potential dimensions of agreements or to manipulate other factors that have been suggested to be important in influencing opinions about climate change.

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Tables

Dimension	*Values*
Costs and Distribution	
Costs to Average Household	€28, €39, £15, $53 per month
	€56, €77, £30, $107 per month
	€84, €116, £45, $160 per month
	€113, €154, £60, $213 per month
	€141, €193, £75, $267 per month
Distribution of Costs	Only rich countries pay
	Proportional to current emissions
	Proportional to history of emissions
	Rich countries pay more than poor countries
Participation	
Number of Participating Countries	20 out of 192
	80 out of 192
	160 out of 192
Emissions Represented	40% of current emissions
	60% of current emissions
	80% of current emissions
Enforcement	
Monitoring	Own government
	Independent commission
	United Nations
	Greenpeace
Sanctions to Average Household	No sanction
	€6, €8, £3, $11 per month
	€17, €23, £9, $32 per month
	€23, €31, £12, $43 per month

Table 1: *Policy Dimensions and Values for the Global Climate Agreement Experiment.* The table shows the policy dimensions and corresponding values used in the conjoint experiment. For average costs and sanctions, the values are given in order for France, Germany, the United Kingdom, and the United States.

Dimension		*France*	*Germany*	*UK*	*US*
Distribution					
Distribution of Costs	Only rich countries pay				
	Proportional to current emissions	€20	€31	£9	$55
	Proportional to history of emissions	€14	€16	£7	$47
	Rich countries pay more than poor countries	€11	€40	£7	$47
Participation					
Number of Participating Countries	20 out of 192				
	80 out of 192	€31	€57	£17	$46
	160 out of 192	€51	€92	£30	$80
Emissions Represented	40% of current emissions				
	60% of current emissions	€10	€14	£5	$7
	80% of current emissions	€22	€28	£6	$20
Enforcement					
Sanctions to Average Household	No sanction				
	€6, €8, £3, $11 per month	€17	€25	£2	$7
	€17, €23, £9, $32 per month	€3	€6	£-8	$-22
	€23, €31, £12, $43 per month	€-11	€-13	£-11	$-51
Monitoring	Own government				
	Independent commission	€24	€41	£10	$26
	United Nations	€14	€216	£7	$-3
	Greenpeace	€2	€7	£-1	$-19

Table 2: *Willingness to Pay.* The table shows the willingess-to-pay values (per month) implied by respondent choices in the conjoint experiment. Positive values indicate the amount that respondents would be willing to pay for a specific feature in a climate agreement. Negative values indicate the amount required to compensate individuals for an agreement having the specific feature as compare to the reference category on that dimension.

Figures

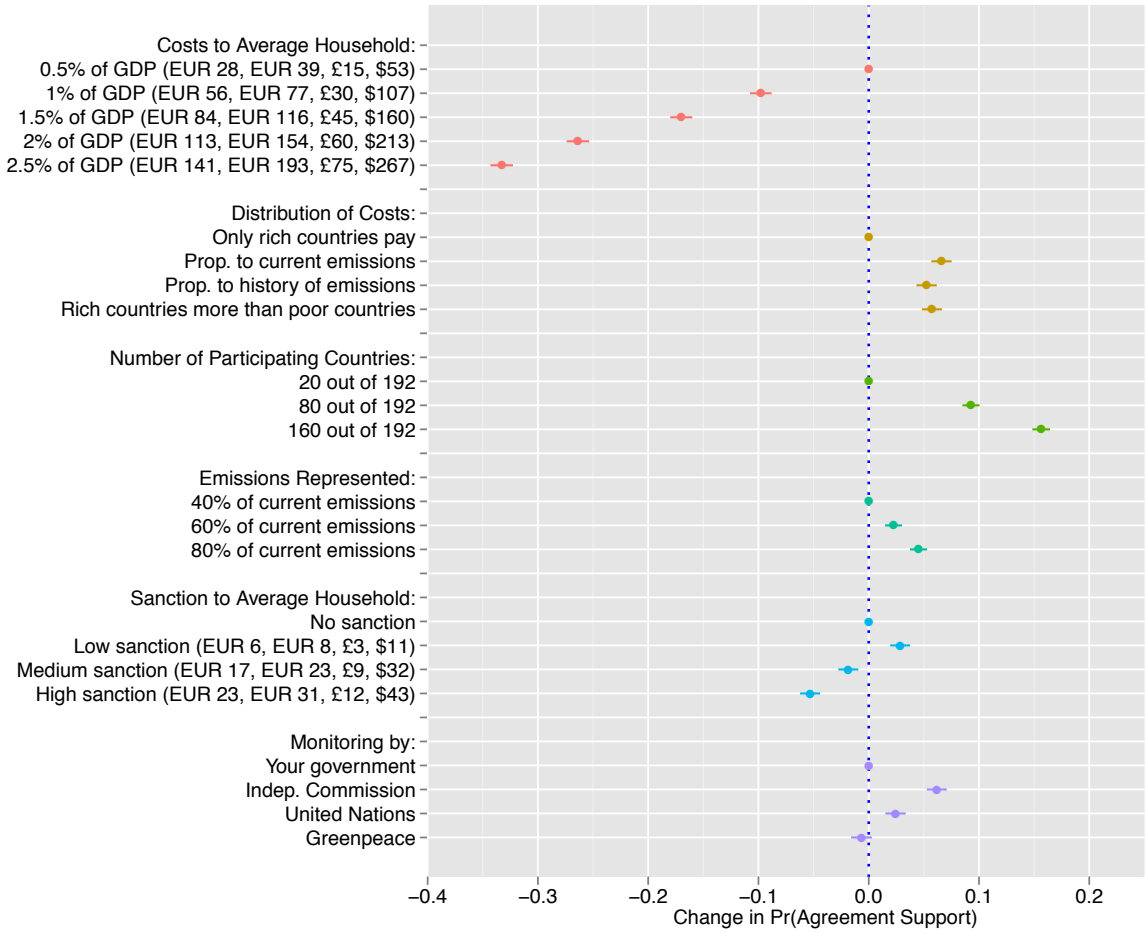

Figure 1: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States (Pooled Data).* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate that that value is the reference category for a given agreement dimension. The unconditional baseline probability of *Agreement Support* is .51.

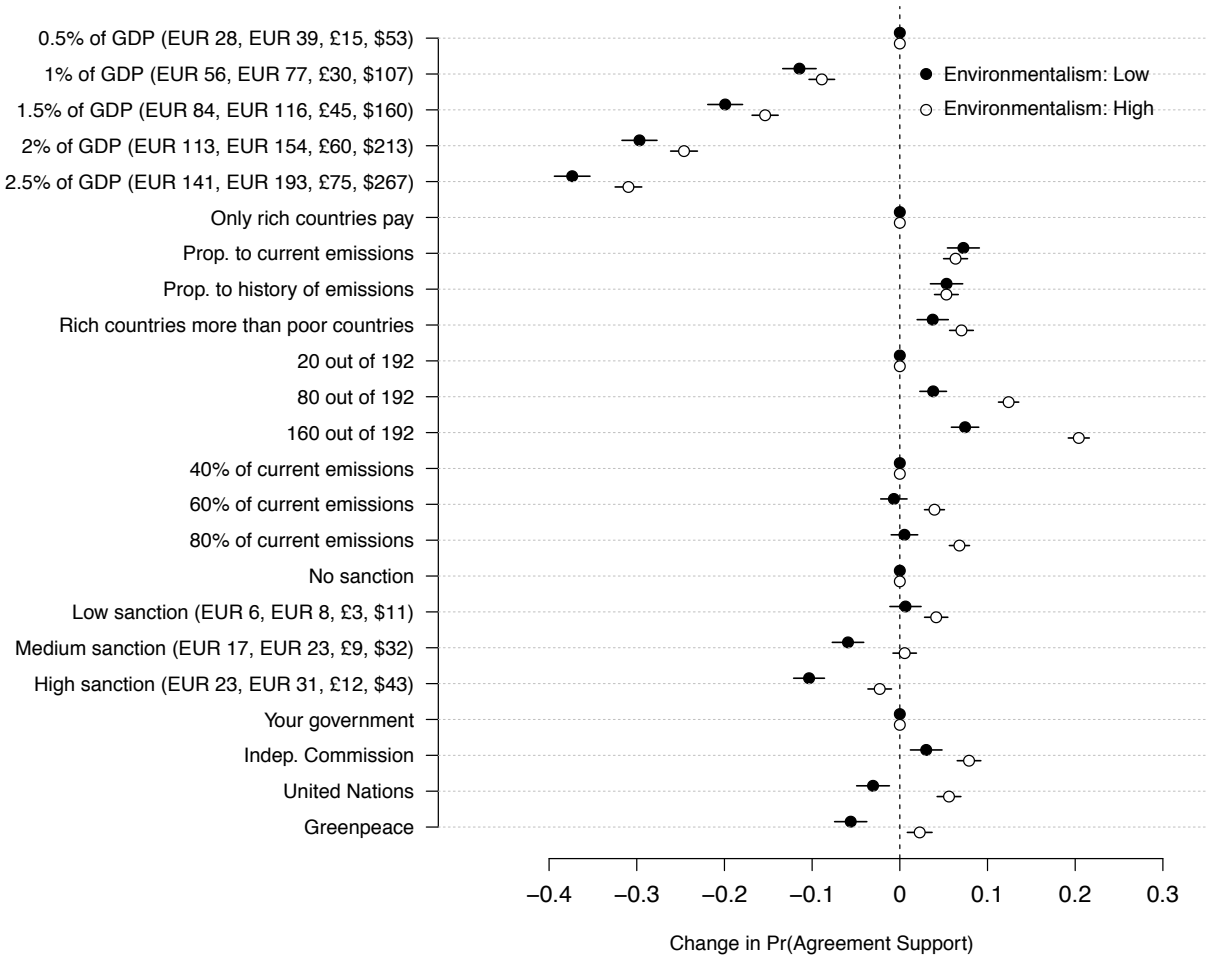

Figure 2: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States by Level of Environmentalism.* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate that that value is the reference category for a given agreement dimension. Environmentalism is measured by asking individuals about how much they support or oppose international climate change cooperation in general (pretreatment). The wording was: "As you probably know, many experts say that countries have to reduce their greenhouse gas emissions to address global warming. Generally speaking, how strongly do you support or oppose international cooperation to reduce greenhouse gas emissions even if this involves significant costs?" Answers on a five-point scale were converted into an indicator variable that equals one for those who support or strongly support international climate cooperation and is zero otherwise.

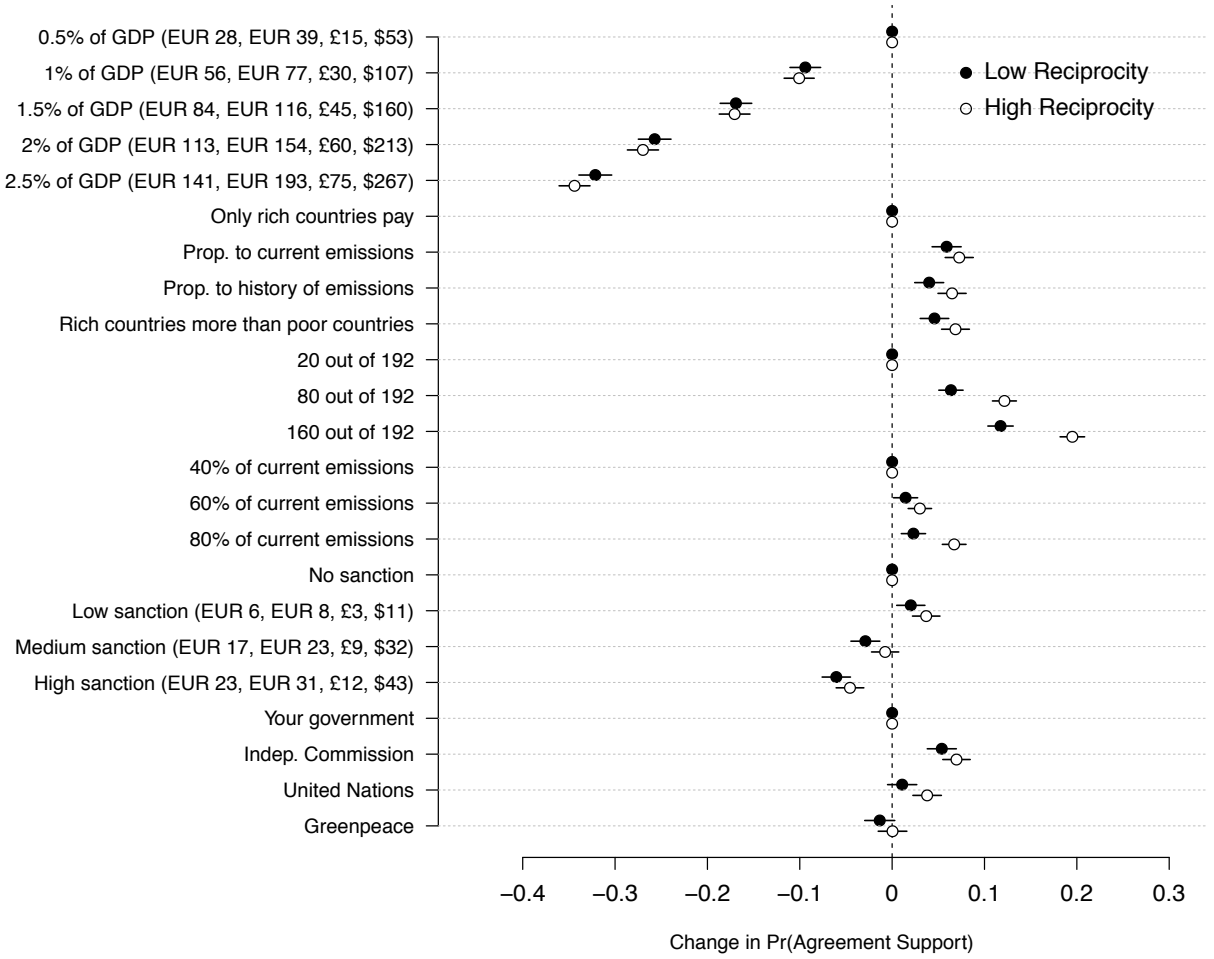

Figure 3: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States by Individuals' Levels of Reciprocity.* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate that that value is the reference category for a given agreement dimension. Reciprocity is measured using the strategy method, see text for details.

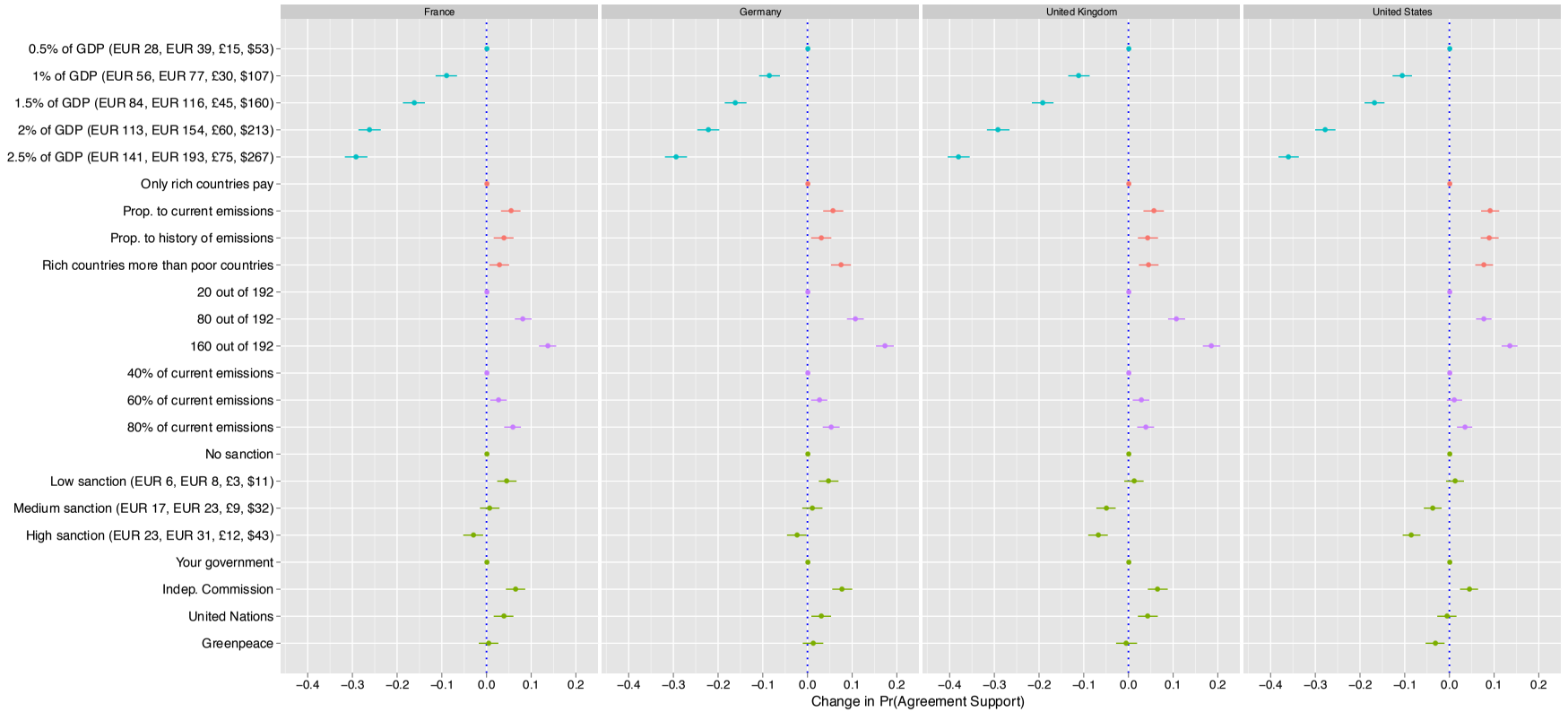

Figure 4: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States.* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate that that value is the reference category for a given agreement dimension.

A Appendix: Conjoint Instructions

The directions for the conjoint experiment appeared on two pages before the respondent began choosing between agreements. First respondents were given the following instructions:

> Most countries around the world are currently discussing the possibility of agreeing to new policies that would address the problem of global warming. We are interested in what you think about these international efforts and the United States's possible participation in such an agreement.
>
> We will now provide you with several examples of what agreements between countries to address climate change could look like. We will always show you two possible agreements in comparison. For each comparison we would like to know which of the two agreements you prefer. You may like both alternatives similarly or may not like either of them at all. Regardless of your overall evaluation, please indicate which alternative you prefer over the other.
>
> In total, we will show you four comparisons. People have different opinions about this issue and there are no right or wrong answers. Please take your time when reading the potential agreements. In addition to deciding which climate agreement you would prefer, we also ask you how likely you would be to vote for or against the United States joining each agreement in a referendum.

Second respondents were shown the following example with further instructions:

> The figure below shows the features of the two possible agreements that you will be choosing between. Note that the order of the features may vary.

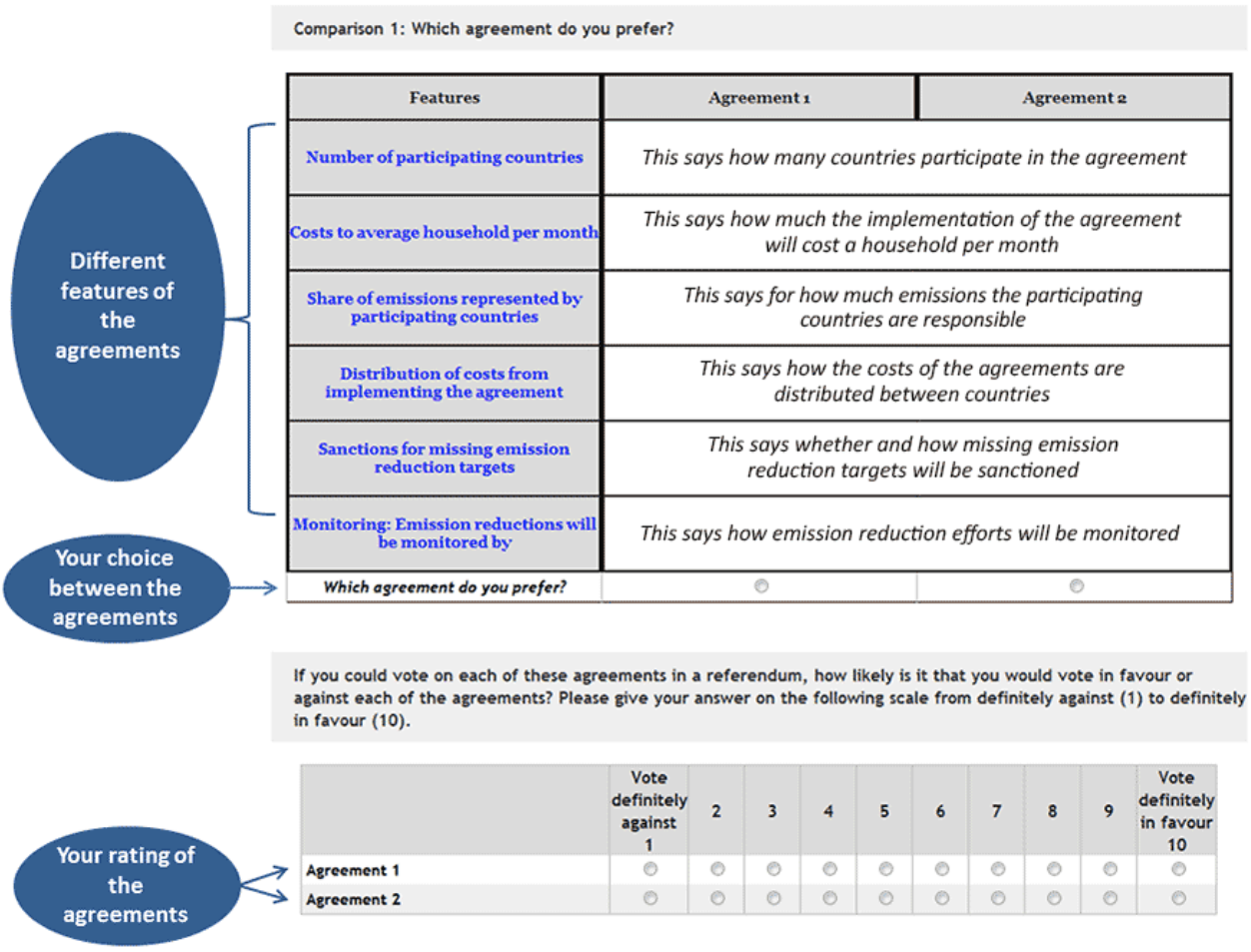

Figure A-1: *Conjoint Experimental Instructions*

A.1 Rating Results

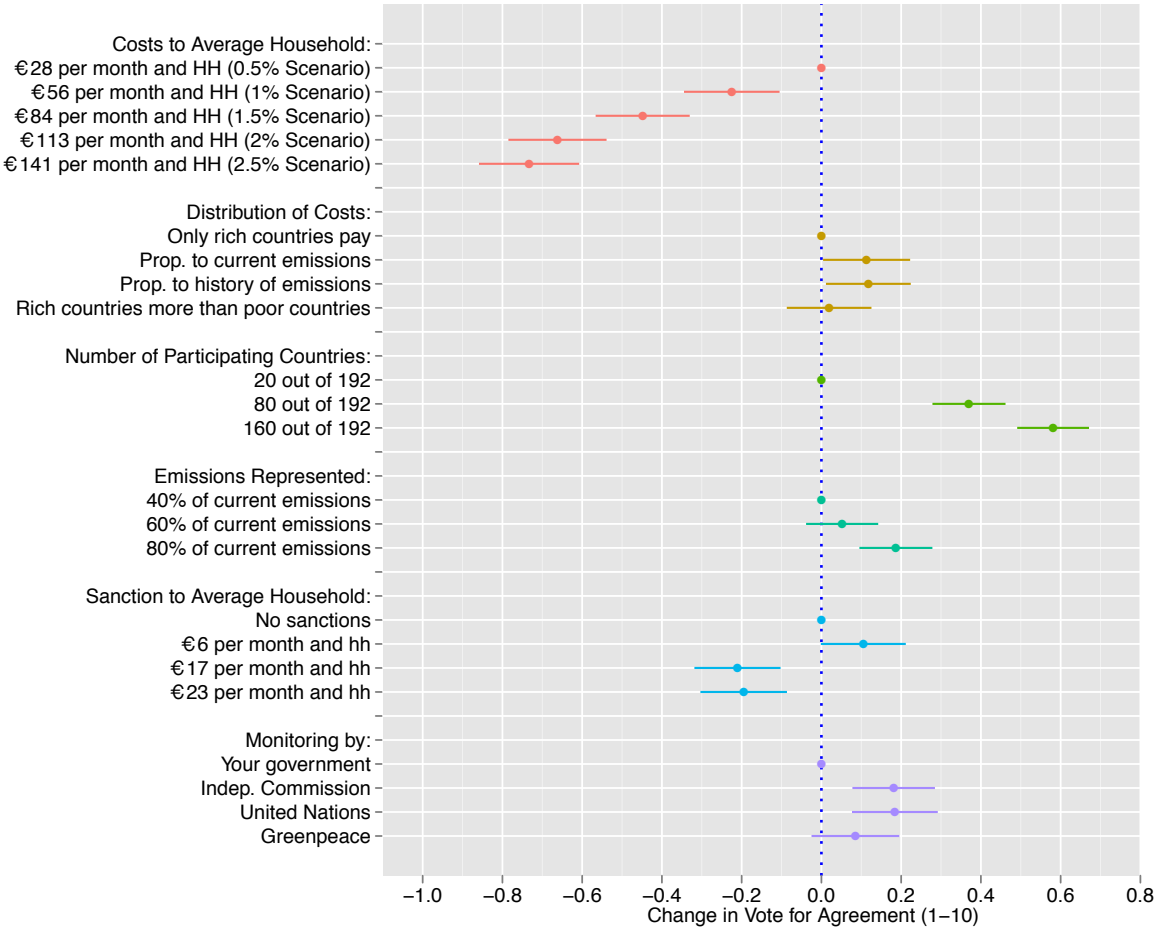

Figure A-2: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation, Vote for Agreement Measure—France.* This plot shows estimates of the effect of randomly assigned agreement features on the stated propensity of respondents to vote for an agreement in a referendum. Estimates are based on the regression of *Vote for Agreement* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension.

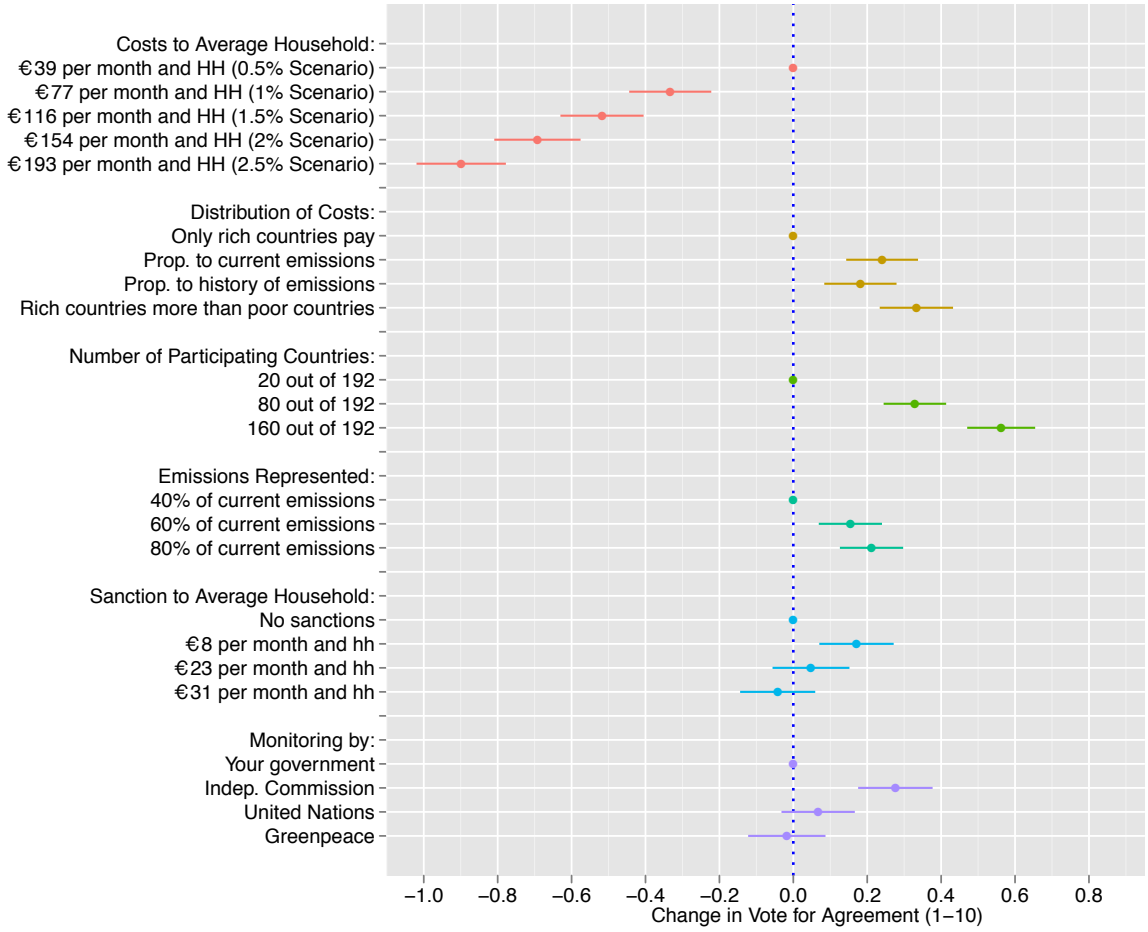

Figure A-3: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation, Vote for Agreement Measure—Germany.* This plot shows estimates of the effect of randomly assigned agreement features on the stated propensity of respondents to vote for an agreement in a referendum. Estimates are based on the regression of *Vote for Agreement* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension.

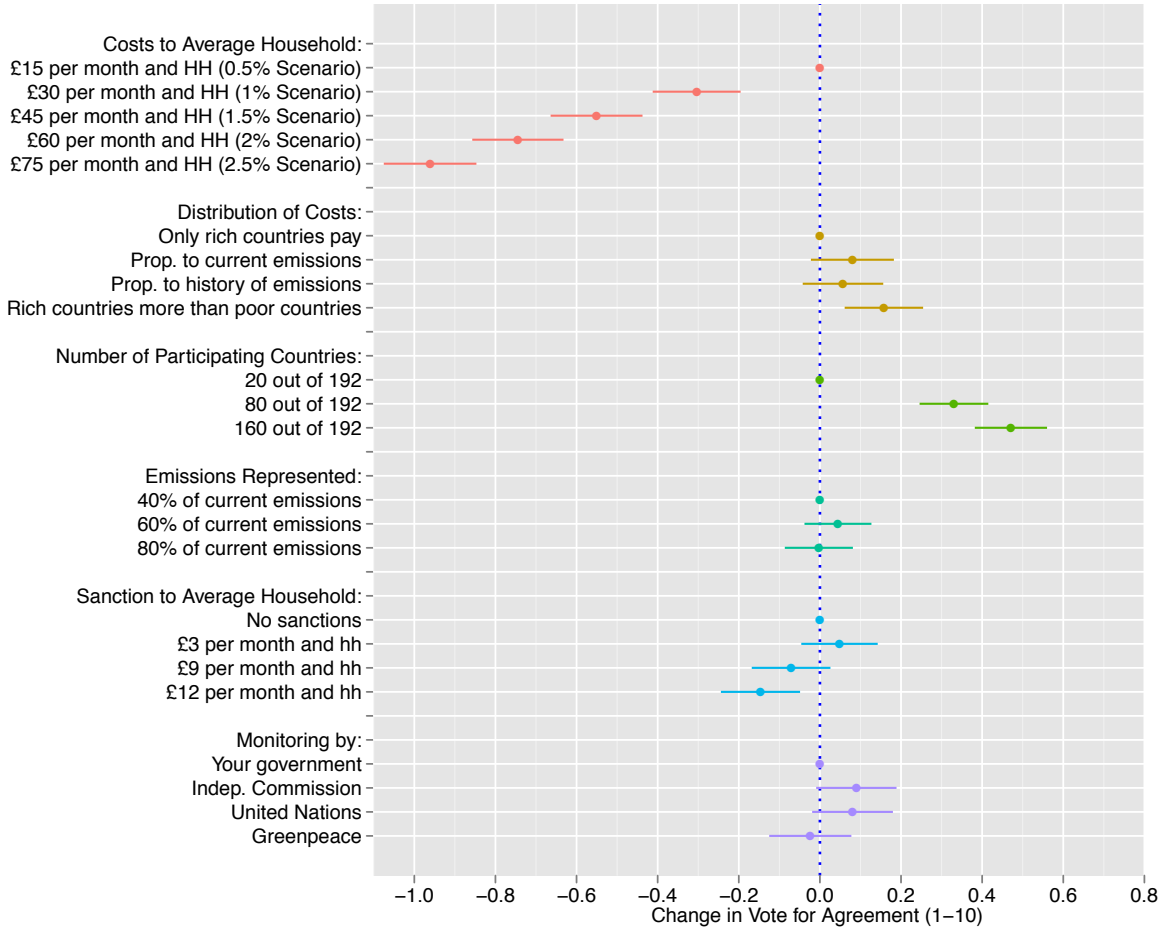

Figure A-4: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation, Vote for Agreement Measure—UK.* This plot shows estimates of the effect of randomly assigned agreement features on the stated propensity of respondents to vote for an agreement in a referendum. Estimates are based on the regression of *Vote for Agreement* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension.

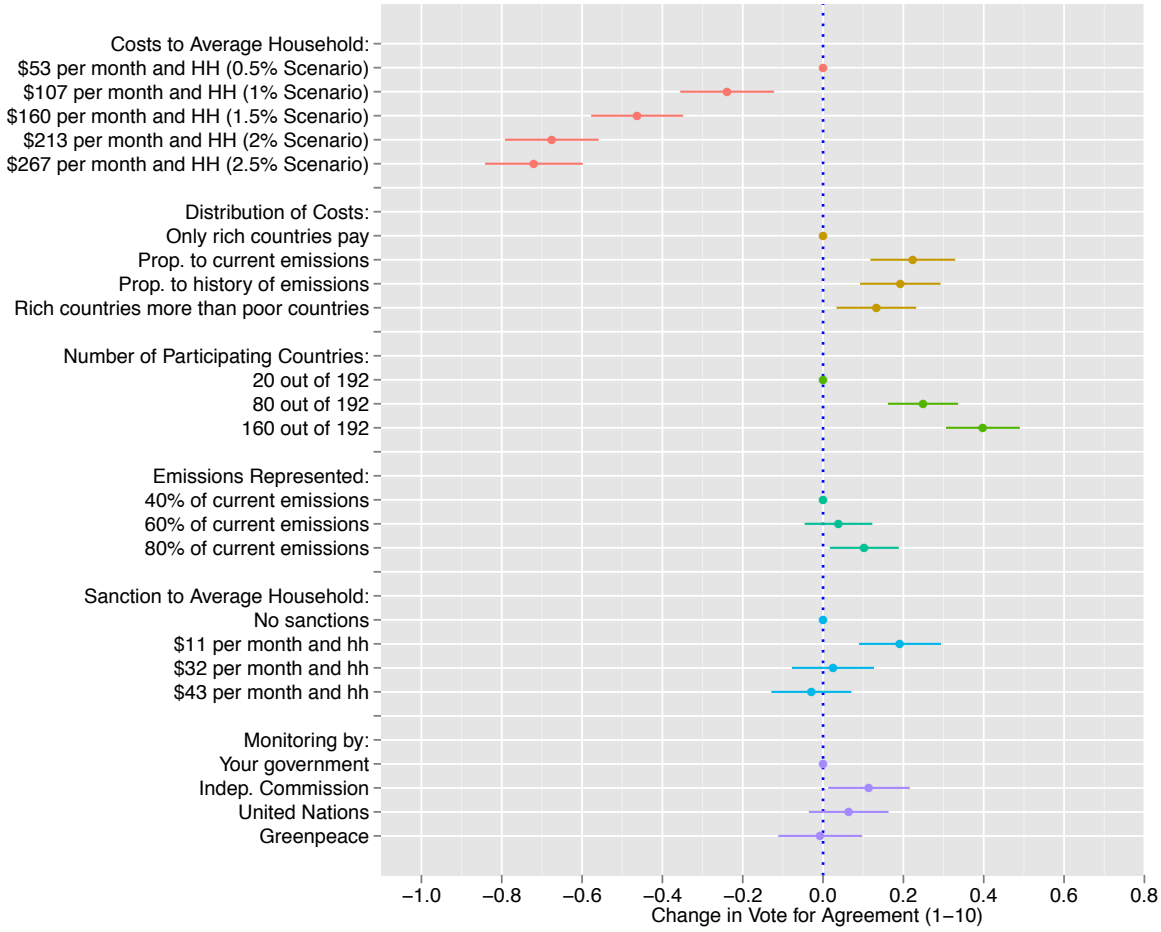

Figure A-5: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation, Vote for Agreement Measure—United States.* This plot shows estimates of the effect of randomly assigned agreement features on the stated propensity of respondents to vote for an agreement in a referendum. Estimates are based on the regression of *Vote for Agreement* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension.

A.2 Results for Alternative Measures of Environmentalism

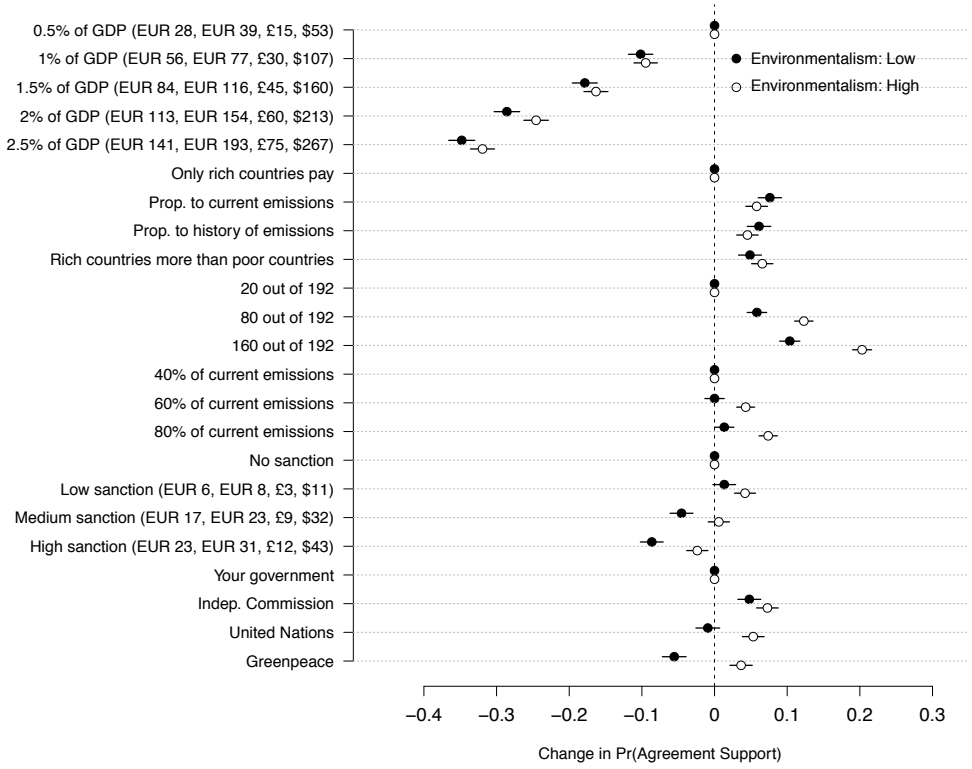

Figure A-6: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States by Level of Environmentalism (Reductions Important).* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension. Environmentalism is measured using the following question: "How important do you think it is for [France, Germany, the United Kingdom, the United States] to reduce greenhouse gas emissions?" Answers on a ten-point scale from 1 "not at all important" to 10 "extremely important" were converted into an indicator variable that equals one for those who indicated a level of importance exceeding the average response (which was 6.6) and is zero otherwise.

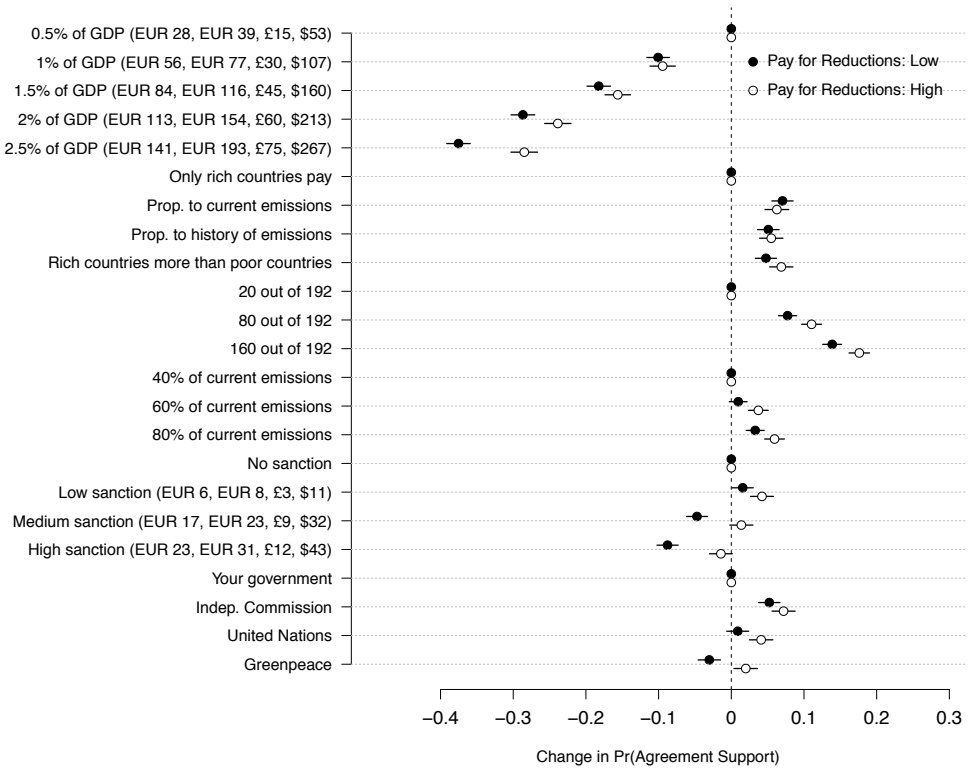

Figure A-7: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States by Level of Environmentalism (Willingness to Pay).* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension. Environmentalism is measured using the following question: "If you consider your monthly income: How much of it would you be willing to invest into reducing greenhouse gas emissions (for example, buying energy efficient electric appliances, installing heat insulation in your home, buying electric power produced from renewable energy sources, buying locally produced food)? Please indicate the amount on a scale from 0 to 100, with 0 meaning 'nothing at all' and 100 meaning 'my whole income'." Answers were converted into a binary indicator variable that equals one for those who indicated an amount higher than the median response (which was 18%) and is zero otherwise.

A.3 Results by Educational Attainment

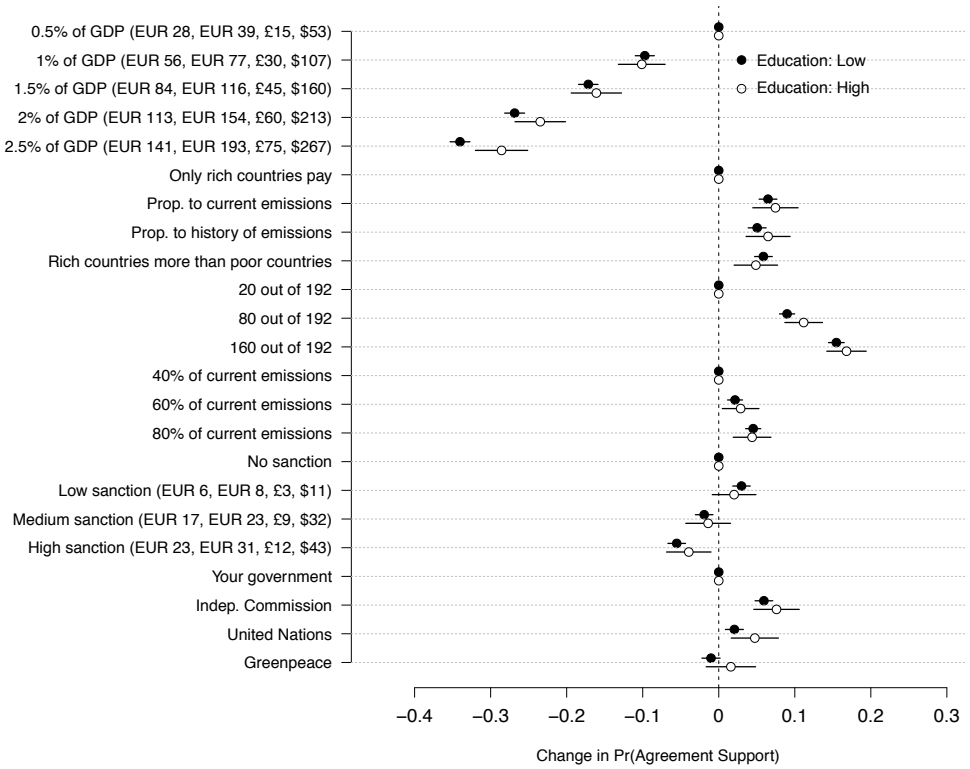

Figure A-8: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States by Level of Educational Attainment.* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension. High educational attainment is based on the following coding scheme: France: "BAC to BAC+" or "BAC+3 or more" or higher; Germany: "Realschule" or higher; United Kingdom: "GCE A Level or Higher Certificate" or higher; United States: "Some college" or higher.

A.4 Results by Attention to Survey

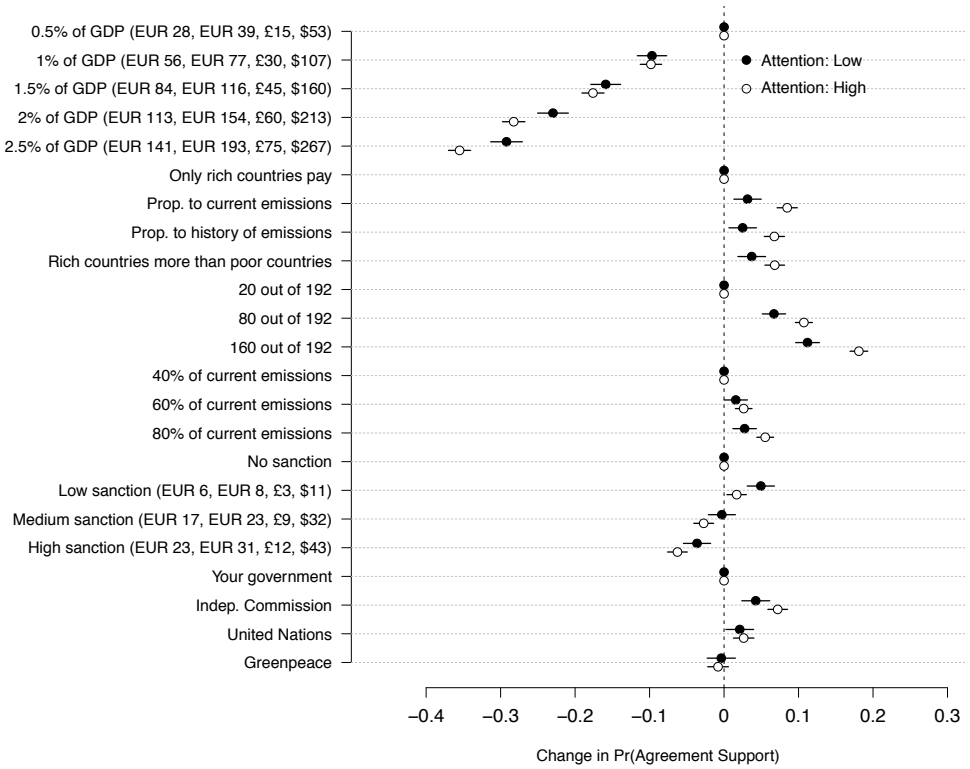

Figure A-9: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States by Level of Attention.* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension. We measured attention by asking individuals the following question after they had completed about 70 percent of the survey: "We are interested in learning about your preferences on a variety of topics, including colors. To demonstrate that you've read this much, just go ahead and select both red and green among the alternatives below, no matter what your favorite color is. Yes, ignore the question below and select both of those options. What is your favorite color?" Correct answers were coded as one and incorrect answers as zero.

A.5 Results by General Political Knowledge

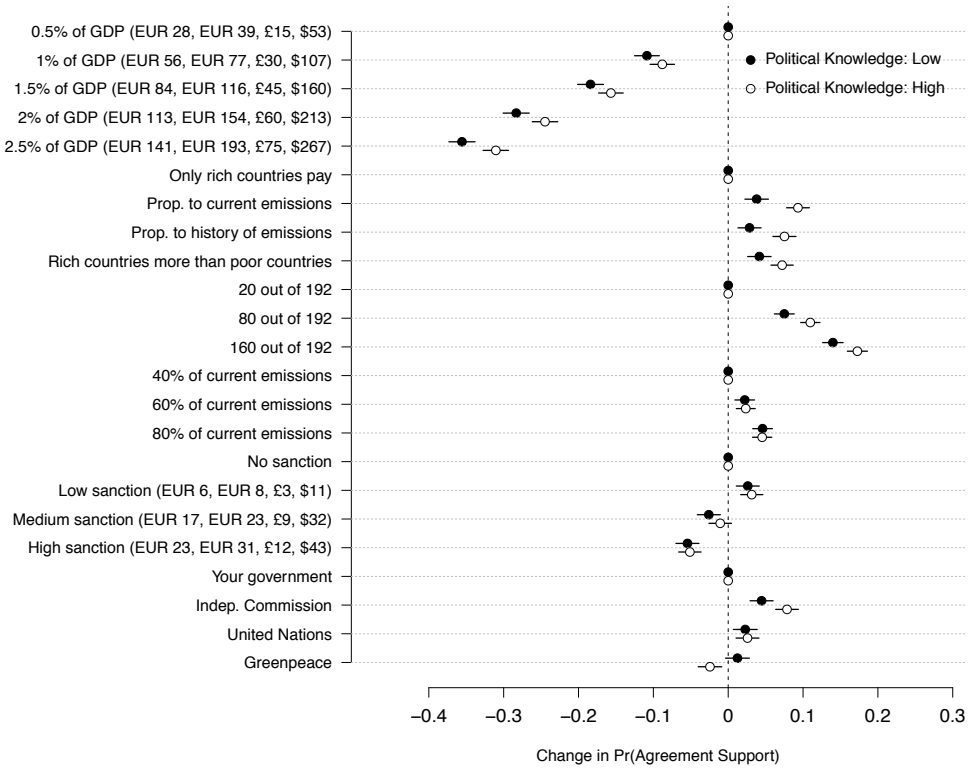

Figure A-10: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States by Level of Political Knowledge (Secretary of State).* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension. We measured political knowledge by asking individuals to select their current secretary of state/minister of defense from a list of four politicians currently holding a ministry. Correct answers were coded as one and incorrect answers as zero.

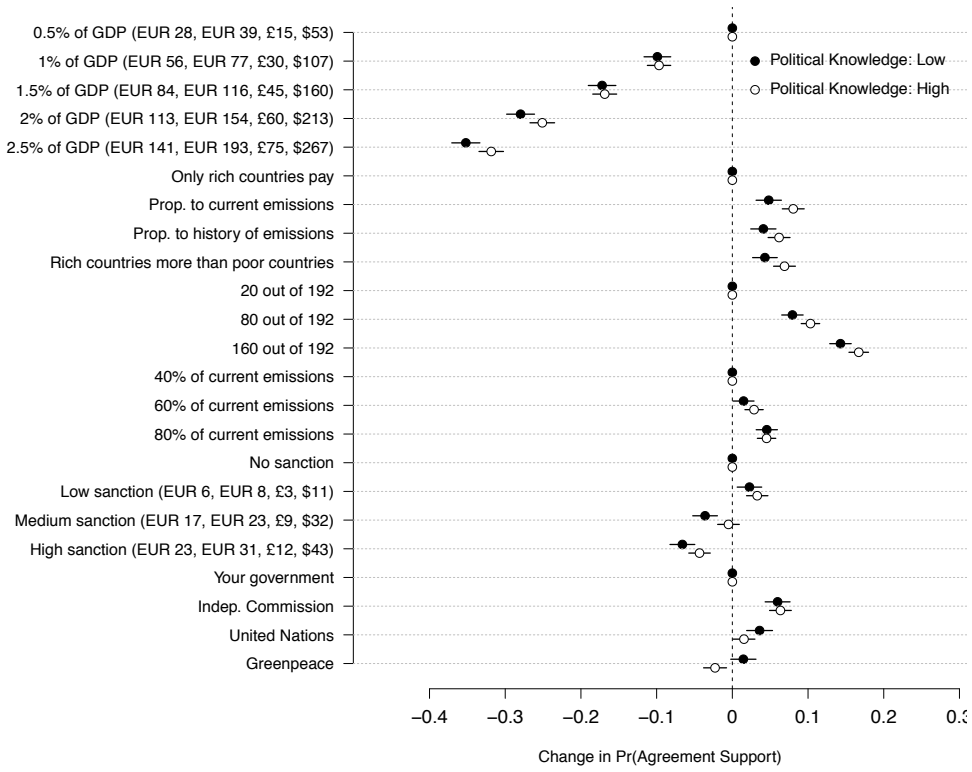

Figure A-11: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States by Level of Political Knowledge (Term Length).* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension. We measured political knowledge by asking individuals to indicate the number of years there are in one full term in office for a Senator/MP on a scale from 1 to 8 years. Correct answers were coded as one and incorrect answers as zero.

A.6 Results with Consistent Choices Only

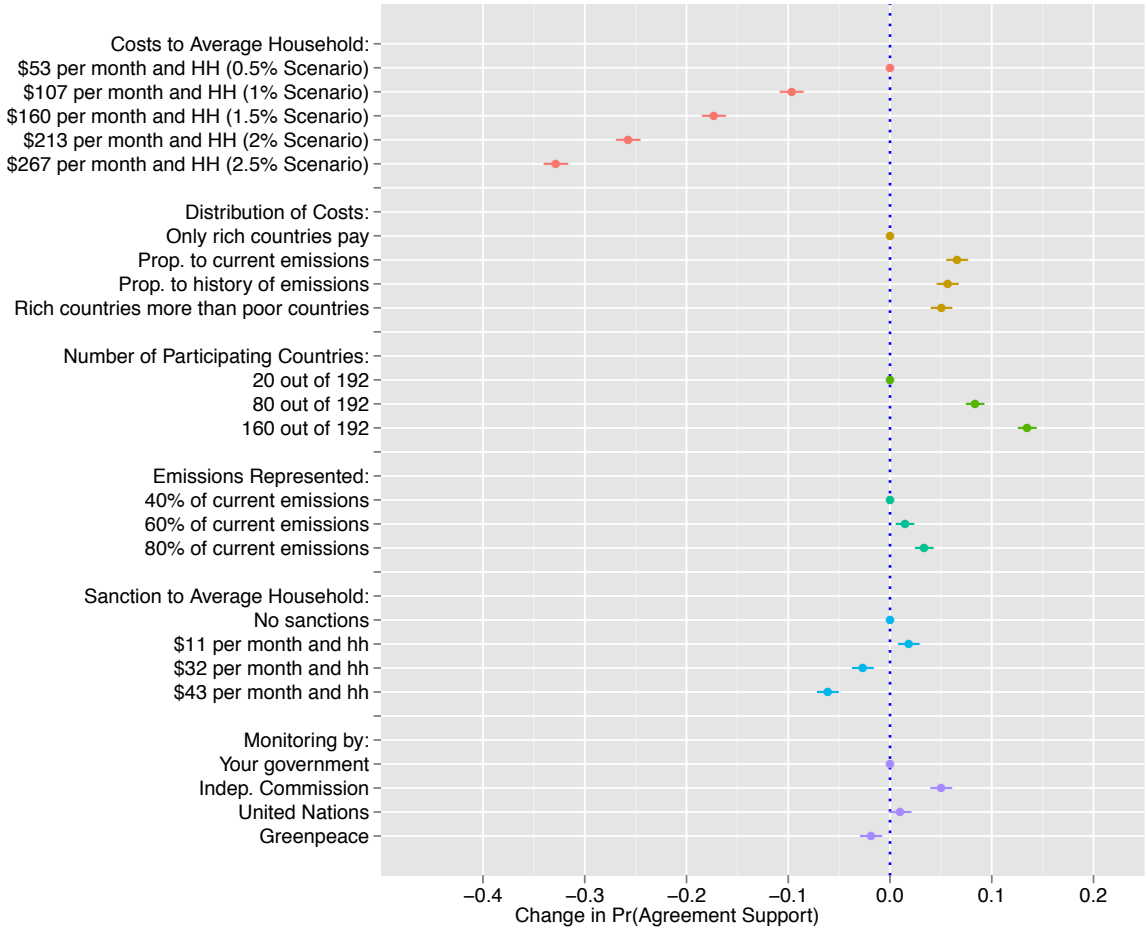

Figure A-12: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States Using Data from Consistent Choices Only.* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by respondent. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension. Choices are coded as consistent if the agreement supported in the ranking (binary choice) is also rated higher in the referendum component of the conjoint.

A.7 Results With and Without Control Variables

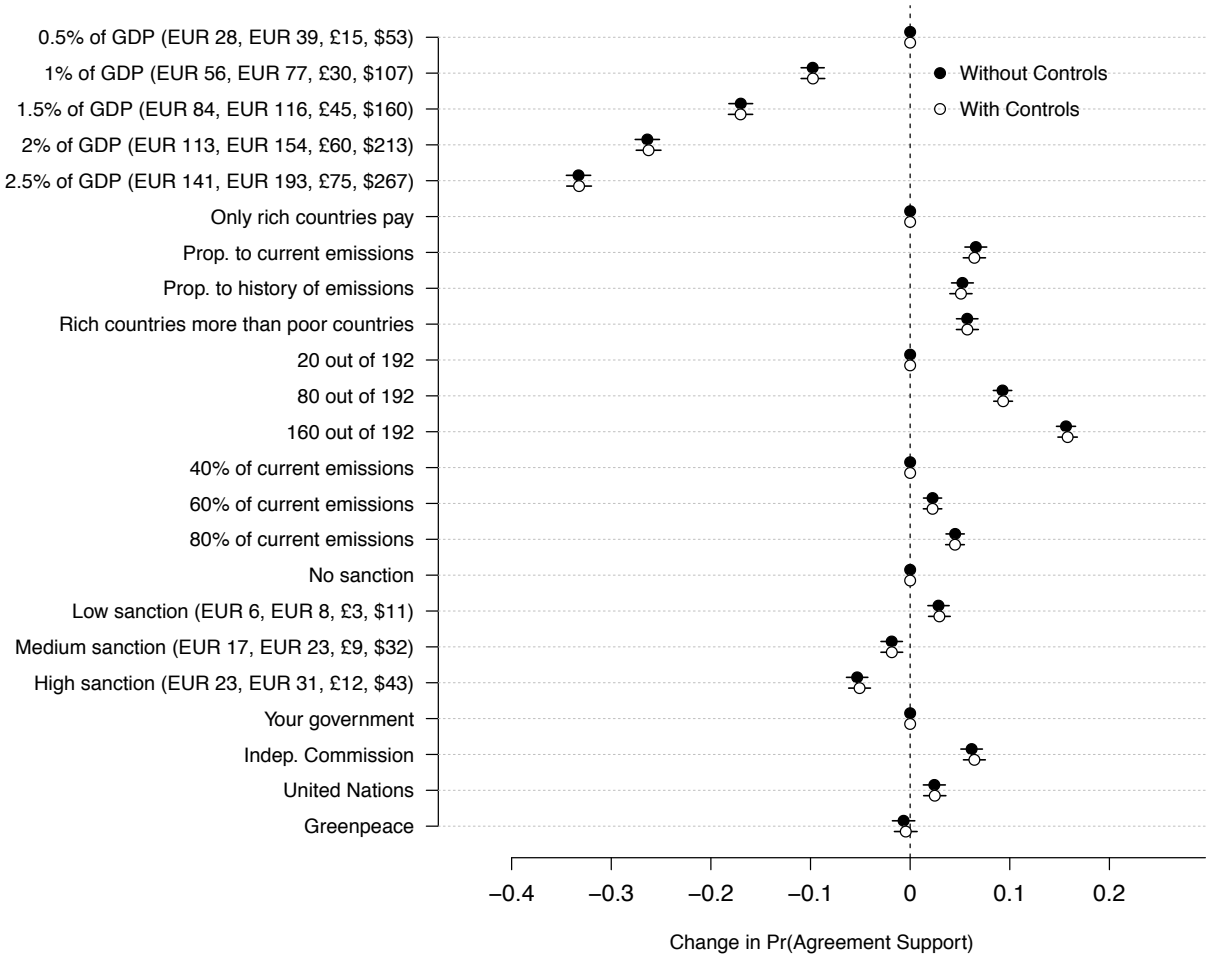

Figure A-13: *Effect of Agreement Dimensions on Public Support for Global Climate Change Cooperation in France, Germany, the United Kingdom, and the United States with and without Socio-demographic Control Variables (Pooled Data).* This plot shows estimates of the effect of randomly assigned agreement features on the probability of supporting an agreement. Estimates are based on the regression of *Agreement Support* on dummy variables for values of the agreement dimensions with standard errors clustered by conjoint. The model with control variables includes the following socio-demographic covariates (coefficients not reported): Income, Age, Gender, Education. The bars indicate 95% confidence intervals and the points without bars indicate the reference category for a given agreement dimension.

	Costs per Household					Costs: Distribution				Participation: Countries			Participation: Emissions			Enforcement: Sanctions				Enforcement: Monitoring			
	0.5% of GDP	1% of GDP	1.5% of GDP	2% of GDP	2.5% of GDP	Only rich countries pay	Prop. current emissions	Prop. emission history	Rich pay more	20 of 192	80 of 192	160 of 192	40% of emissions	60 of emissions	80 of emissions	None	0.5% of 2% GDP	1% of 2% GDP	1.5% of 2% GDP	Your government	Indep. commission	UN	Greenpeace
Income	0.002		0.002	0.001	0.009**	0.008**	0.004		0.004		0.004	0.001		0.001	0.000	-0.002	0.004		0.000	-0.001		0.001	-0.003
	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)		(0.004)		(0.003)	(0.003)		(0.003)	(0.003)	(0.004)	(0.004)		(0.004)	(0.004)		(0.004)	(0.004)
Age	-0.000		0.000	0.000	0.000	0.000	-0.001		-0.001		-0.001	0.000		-0.000	-0.001	0.001	0.000		0.001	-0.001		-0.000	0.001
	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)		(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
Female	-0.043*		-0.056**	-0.021	-0.010	-0.018	0.009		-0.020		-0.004	-0.001		0.035*	-0.005	0.003	-0.011		0.009	0.019		-0.000	0.002
	(0.025)		(0.025)	(0.025)	(0.025)	(0.022)	(0.022)		(0.022)		(0.019)	(0.019)		(0.019)	(0.019)	(0.023)	(0.022)		(0.022)	(0.022)		(0.022)	(0.022)
Education	0.003		-0.002	0.032	-0.010	0.001	-0.025		0.012		-0.032	0.006		-0.003	-0.019	0.040	0.046*		0.074***	-0.002		-0.003	0.030
	(0.027)		(0.026)	(0.027)	(0.027)	(0.024)	(0.024)		(0.024)		(0.021)	(0.021)		(0.021)	(0.020)	(0.024)	(0.024)		(0.024)	(0.024)		(0.024)	(0.024)
Constant	-0.006		-0.018	-0.040	-0.073	-0.042	0.001		-0.001		0.021	-0.025		-0.022	0.024	-0.076	-0.058		-0.080*	0.019		-0.003	-0.044
	(0.052)		(0.053)	(0.053)	(0.053)	(0.046)	(0.046)		(0.046)		(0.040)	(0.041)		(0.041)	(0.041)	(0.048)	(0.047)		(0.046)	(0.046)		(0.046)	(0.047)

Table A-1: *Balance Tests.* The table reports results from multinomial logit models in which randomly assigned agreement features were modeled as a function of socio-demographic characteristics. Coefficients shown with standard errors in parentheses. Empty columns indicate the base outcome. N=65,592 for all models. *** p<0.01, ** p<0.05, * p<0.1.