

# “Individual Preferences for International Environmental Cooperation”

*Executive Report for the Swiss Network for International Studies*

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## Summary

Addressing the global challenges arising from climate change requires international environmental cooperation. Although in democratic systems domestic support for international cooperation eventually determines its long-term prospects, we know very little about how the design of international agreements affects individual support for establishing and joining such institutions. Our comparative research project contributes to answering these questions. We explore how the three key dimensions of international environmental cooperation — participation, the distribution of costs arising from climate change mitigation efforts, and enforcement mechanisms — affect mass support for these institutions among publics in France, Germany, the United Kingdom, and the United States. We embedded an experimental conjoint analysis in large-scale, representative surveys in these four countries. We find that costs and distribution, participation, and enforcement affect individuals’ willingness to support these international efforts. Our results suggest that support is higher for global climate agreements that involve lower costs, distribute costs according to prominent fairness principles, encompass more countries, and include a small sanction if a country fails to meet its emissions reduction targets. Moreover, the features of climate agreements have very similar effects on public support across countries. The effects of design features may mirror underlying norms of reciprocity and individual expectations about the probability of realizing an effective agreement. These results provide policymakers with novel, important and detailed knowledge about which types of international environmental cooperation are likely to have long-term prospects in democracies and which will not.

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# 1 Introduction

Many citizens, experts, and an increasing number of policymakers around the globe perceive global warming as a particularly important challenge that necessitates global cooperation to be addressed successfully (Stern 2007; Bank 2010; Worldpublicopinion.org 2009). While the scientific community emphasizes that industrialized countries, like Germany, France, the United States, or the United Kingdom, will have to play a key role in building a global climate policy architecture (Olmstead and Stavins 2010; Bosetti and Frankel 2009; Frankel 2008; Bodansky, Chou and Jorge-Tresolini 2004), we know virtually nothing about which types of international climate policies citizens support in these democratic systems. Improving our knowledge about which types of international agreements individuals prefer over others and why appears crucial since all global efforts aimed at curbing greenhouse gas emissions ultimately rely on individuals changing their consumption patterns and supporting policymakers' international climate policy choices electorally. Therefore, the effectiveness and sustainability of any international climate policy ultimately depends on individual support. Despite informative survey evidence on individuals' general environmental attitudes and beliefs (Daniels, Krosnick, Tichy and Tompson 2012; Tingley and Tomz 2012; Diekmann and Franzen 1999; Czap and Czap 2010; Yeager, Larson, Krosnick and Tompson 2011), our project provides novel and policy-relevant insights as it focuses on how and why the most salient features of global environmental agreements influence public support for these cooperative efforts.

This executive report provides an overview of the research for this project that we have completed to date and that has in part been published in *Proceedings of the National Academy of Sciences* (Bechtel and Scheve 2013). We have made considerable progress on several fronts and are pleased to report significant final results and outline subsequent research that will build on the research carried out as part of this project.

## 2 A Theory of Climate Policy Design and Public Support

We are interested in how public support for international environmental cooperation depends on the specific features of the policy in question. To this end, we develop three theoretical accounts of the effects of climate agreement features on individual preferences. Although this question has not yet been addressed by previous research, our theory can draw on the available literature in international political economy (Keohane and Victor 2011; Thompson 2009; Bechtel and Tosun 2009; Victor 2006; Finus and Tjøtta 2003; Mitchell and Keilbach 2001; Downs 2000; Barrett 1997), and climate policy research (Victor 2011; Olmstead and Stavins 2010; Bosetti and Frankel 2009; Frankel 2008). We focus on three core dimensions of international environmental cooperation: Costs and distribution, participation, and enforcement.

### Costs and Distribution

The costs arising from international climate policy and their distribution plays a key role in the public debate and continues to figure prominently in international negotiations about a global climate policy architecture (Keohane and Victor 2011; Thompson 2009; Mitchell and Keilbach 2001). Some even argue that the questions of distributive justice will eventually determine success or failure of international climate policy efforts (Bodansky et al. 2004; Frankel 2008). International climate policy efforts immediately 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 (Page 2007; Ringius, Torvanger and Underdal 2002). Therefore, as regards the role of costs and distribution, our research project asks two key questions: First, to what extent are individuals willing to accept costs arising from

international climate policies? Second, do citizens prefer a certain type of allocation principle that should guide the distribution of costs between countries?

Although some suggest that the costs of environmental protection do not play a significant role for support for environmental policy (Daniels et al. 2012), theories of economic voting predict that individuals generally prefer policies that, all else equal, provide them with the largest benefits or, in the case of costly regulatory choices, the policy that is associated with the lowest costs. This suggests that individuals' willingness to support international climate policy depends negatively on the specific costs arising from global climate cooperation. Thus, we expect that support for a climate agreement decreases as the expected costs of the policy increase.

There exists a surprisingly widespread consensus among individuals on fairness norms like the "polluter pays" principle and the "ability to pay" principle (Ringius et al. 2002). Each of these principles suggest a specific distribution of costs that mirrors prominent conceptions of fairness. According to the "polluter pays" principle, a fair distribution of the costs arising from climate policy should be proportional to the distribution of greenhouse gas emissions. Given the current distribution of emissions and the stock of historical emissions, the "polluter pays" principle requires that industrialized countries carry almost all of the costs associated with the mitigation efforts agreed upon in a global climate agreement. Given the well-documented importance of fairness preferences, we expect that a distribution proportional to emissions increases support for a climate agreement as compared to an agreement that does not include such a norm of distributive fairness.

A second prominent fairness norm is the ability to pay principle. This norm, also known as the "stronger shoulders bear the greater burden" principle, requires that the costs of a policy should be proportional to the ability to pay. In the case of global climate policy that aims at reducing global CO<sub>2</sub> emissions, the "ability to pay" principle requires that rich countries finance a much larger share of the costs of mitigation policies than poorer countries. Since this distributive principle resonates with a widespread fairness norm, we expect that international agreements that distribute the costs of climate protection according to the "ability to pay" principle will receive more individual support than agreements that follow other allocation schemes that appear less fair.

## **Participation**

The level of participation in international institutions is a key aspect of international cooperation as it has important consequences for an institution's decision-making capacity, evaluations of the fairness and legitimacy of the institution, and ultimately its success in reaching its objective (Keohane and Victor 2011; Thompson 2009; Bechtel and Tosun 2009; Mitchell and Keilbach 2001; Downs 2000; Barrett 1997). In the context of global climate policy, we distinguish two ways of conceptualizing the level of participation in international cooperation. First, we can think of participation 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 and relevant in the context of climate change, as climate agreements that represent a larger share of emissions may potentially be more effective than an agreement that represents only a very 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 hypothesize that individuals have a preference for more encompassing agreements both because such agreements are more effective and because they are perceived to be more fair.

## Enforcement

International climate policy ultimately aims at reducing CO<sub>2</sub> 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 1988; Abbott and Snidal 1998) has highlighted that the effectiveness of international institutions crucially 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). More specifically, we expect that individuals that have a stronger preference for environmental protection in general will be more supportive of agreements that include a sanction than individuals that are less concerned about the environment.

## 3 Research Design: Questionnaire, Experimental Conjoint Analysis, and Sample Size

To evaluate these hypotheses we developed a comprehensive questionnaire that includes quasi-behavioral measures of social norms, such as, reciprocity. Second, we have designed a unique conjoint experiment to explore how different features of international environmental agreements affect individual support for these policies. Using an experimental conjoint approach has significant efficiency advantages over traditional experimental items in surveys, as it allows us to explicitly compare the effects of specific features and the trade-offs individuals make between them (Hainmueller, Hopkins and Yamamoto 2012; Bechtel, Hainmueller and Margalit 2012; Hainmueller and Hopkins 2012). We embedded the conjoint experiment in the survey conducted on representative samples of the adult populations in France, Germany, the United Kingdom, and the United States.<sup>1</sup>

The core of our study is an experimental conjoint analysis that allows us to estimate how citizens' support for an international climate agreement varies as a function of its specific design features (participation, costs and distribution, and enforcement). In each conjoint, we showed a respondent two international agreements in comparison and ask them to rank and rate them. Each respondent was shown four such binary comparisons. In addition to asking respondents which of the two agreements they prefer, we asked: "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)."

We carefully instructed respondents to ensure that they understood the comparisons and the dimensions used in the conjoint. Figure 1 shows a screenshot of the example comparison we used to instruct respondents (we also provided additional verbal instructions not shown in Figure 1). To avoid confusing our respondents, we kept the order of the dimensions fixed.

Table 1 shows the dimensions and values used in the conjoint. 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 CO<sub>2</sub> concentration at 550 particles per million (ppm) will require abatement costs in the order of 2 percent of GDP in industrialized countries.

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<sup>1</sup>As indicated in the budget, Yale University has financed various preliminary aspects of the work including the pilot study (\$20'000) in the United States.

Figure 1: Screenshot of the Conjoint Part of the Survey

Comparison 1: Which agreement do you prefer?

Features	Agreement 1	Agreement 2
Number of participating countries	<i>This says how many countries participate in the agreement</i>	
Costs to average household per month	<i>This says how much the implementation of the agreement will cost a household per month</i>	
Share of emissions represented by participating countries	<i>This says for how much emissions the participating countries are responsible</i>	
Distribution of costs from implementing the agreement	<i>This says how the costs of the agreements are distributed between countries</i>	
Sanctions for missing emission reduction targets	<i>This says whether and how missing emission reduction targets will be sanctioned</i>	
Monitoring: Emission reductions will be monitored by	<i>This says how emission reduction efforts will be monitored</i>	
<b>Which agreement do you prefer?</b>	<input type="radio"/>	<input type="radio"/>

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).

	Vote definitely against 1	2	3	4	5	6	7	8	9	Vote definitely in favor 10
Agreement 1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agreement 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Nordhaus (2007), however, has argued that the discount rates used by Stern (2007) are too low since they are inconsistent with the existing market returns on capital investment. From this perspective, the immediate costs of climate mitigation required to stabilize greenhouse gas concentrations at around 550ppm will be lower than those reported by Stern (2007). To account for these different cost scenarios, 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). We used a similar approach to choose the size of sanctions to households for a country missing its emission reduction targets, distinguishing between no sanction and a small (\$ 11), medium (\$ 32), and high (\$ 43) sanction.

Our choice of allocation principles to distribute the costs of climate policy mirrors the debate and includes variants of the polluters principle (proportional to current emissions and proportional to history of emissions), as well as the “ability to pay” or “stronger shoulders bear the greater burden” principle (only rich countries pay and rich countries pay more than poor countries).

The sample size for the United States was 2,500 and the sample size for France, Germany, and the United Kingdom was 2,000 each. Thus, the total sample size was 8,500. As each respondent rated 8 climate agreements, the total number of rated climate agreements that we can use to estimate the effects of institutional design features is 68,000.

## 4 Findings

Since 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.

Table 1: Policy Dimensions and Values for the Global Climate Agreement Experiment.

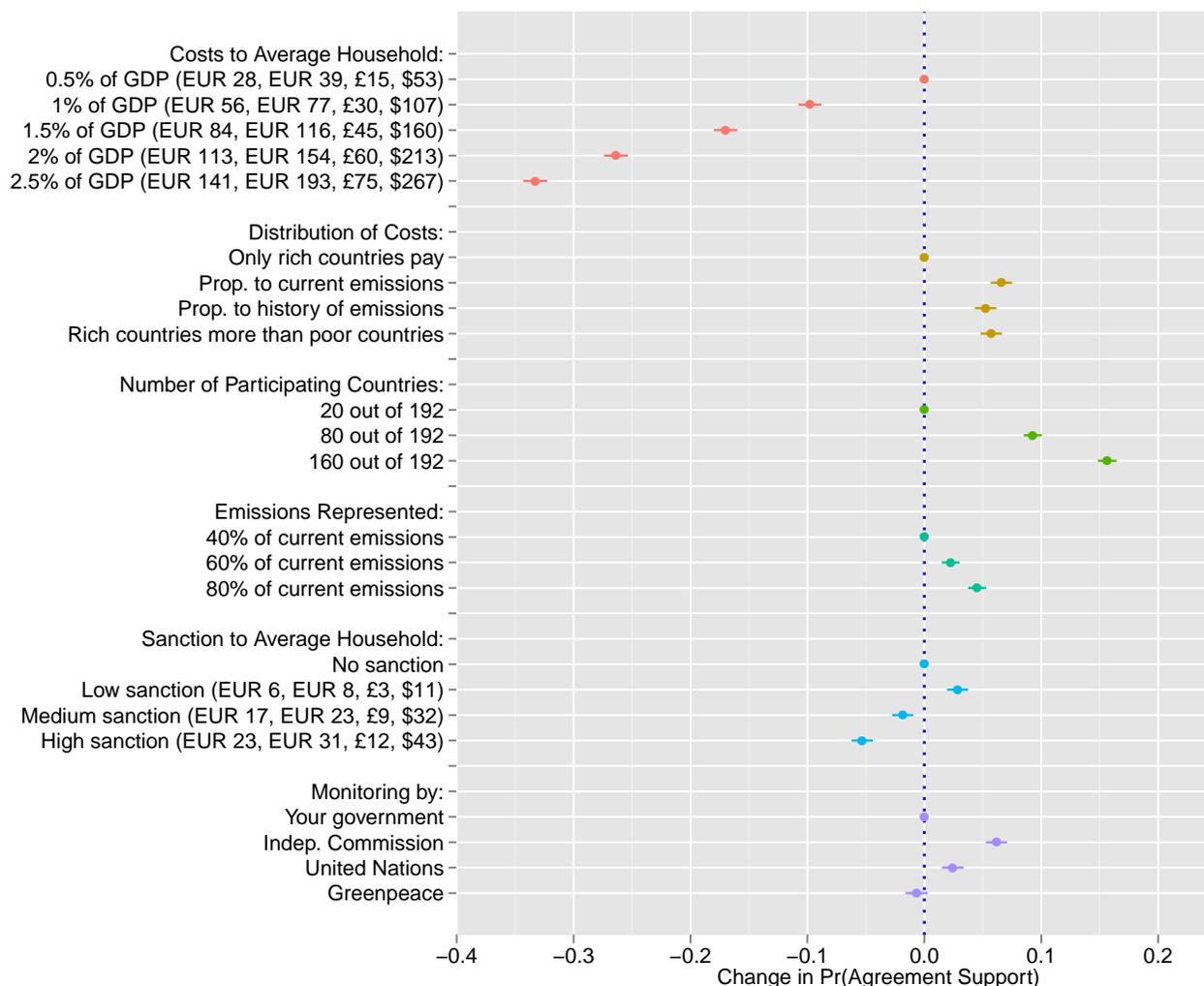
<i>Dimension</i>	<i>Values</i>
<i>Costs and Distribution</i>	
Costs to Average Household	€28, €39, £15, \$53 per month €56, €77, £30, \$107 per month €84, €116, £45, \$160 per month €113, €154, £60, \$213 per month €141, €193, £75, \$267 per month
Distribution of Costs	Only rich countries pay Proportional to current emissions Proportional to history of emissions Rich countries pay more than poor countries
<i>Participation</i>	
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
<i>Enforcement</i>	
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

Thus, we do not rely on any assumption about the model’s functional form. Figure 2 presents our estimates of the effects of climate treaty design on public support. The point estimates without confidence intervals form the reference category. We find that the effects of international climate policy features on individual support for an agreement are statistically and substantively significant.

Costs are a main driver of support for climate cooperation. An increase of average household costs from 0.5% to 1% of gross domestic product decreases public support for an agreement by 10 percentage points. An agreement that is expected to cost 2% of GDP, which corresponds to €113 in France, €154 in Germany, £60 in the United Kingdom, and \$213 in the United States per household and month, decreases support among citizens by 25 percentage points on average if compared to an agreement that costs only 0.5% of GDP. The strong sensitivity to costs is consistent with the view that manageable greenhouse gases are a global public good which individuals would like to consume but their demand for it is sensitive to its price. This finding sets a noteworthy qualification on previous survey work that has documented largely stable levels of support for environmental protection even if the survey question used to measure attitudes mentions that the policy will be associated with costs (Krosnick and MacInnis 2012; Krosnick, Holbrook, Lowe and Visser 2006). While we also find broad support for climate change cooperation, that support depends substantially on its expected costs.

Although costs are important, fairness considerations matter as well. One way in which the importance of fairness norms is evident is in the sensitivity of opinion to the principles of the distribution of costs across countries. Distributing the costs of emissions reductions “proportional to current emissions” increases support by about 6 percentage points when compared to an agreement in which “only rich countries

Figure 2: The Effect of International Climate Policy Features on Public Support



*Note:* Effects of international climate policy features on the probability of supporting the agreement. Horizontal lines indicate 95% robust (clustered by respondent) confidence intervals; points without lines indicate the reference categories for the effects of the features.  $N = 68,000$  ranked climate agreements from conjoint experiment.

pay.” This effect may suggest that perceptions of agreement fairness are most powerfully determined by a “polluter-pays” principle as opposed to a strong version of the “ability-to-pay” principle.<sup>2</sup>

The results also suggest that publics are more willing to support global climate cooperation if it involves more countries. When we increase the number of countries that participate in a hypothetical agreement from “20 out of 192” to “80 out of 192” this raises public support by 15 percentage points. We also find that enforcement features matter: Individuals prefer an agreement that includes a small sanction over agreements that do not sanction countries that did not meet their emission reduction obligations. However, medium or high sanctions make a treaty less attractive than an agreement without sanctions.

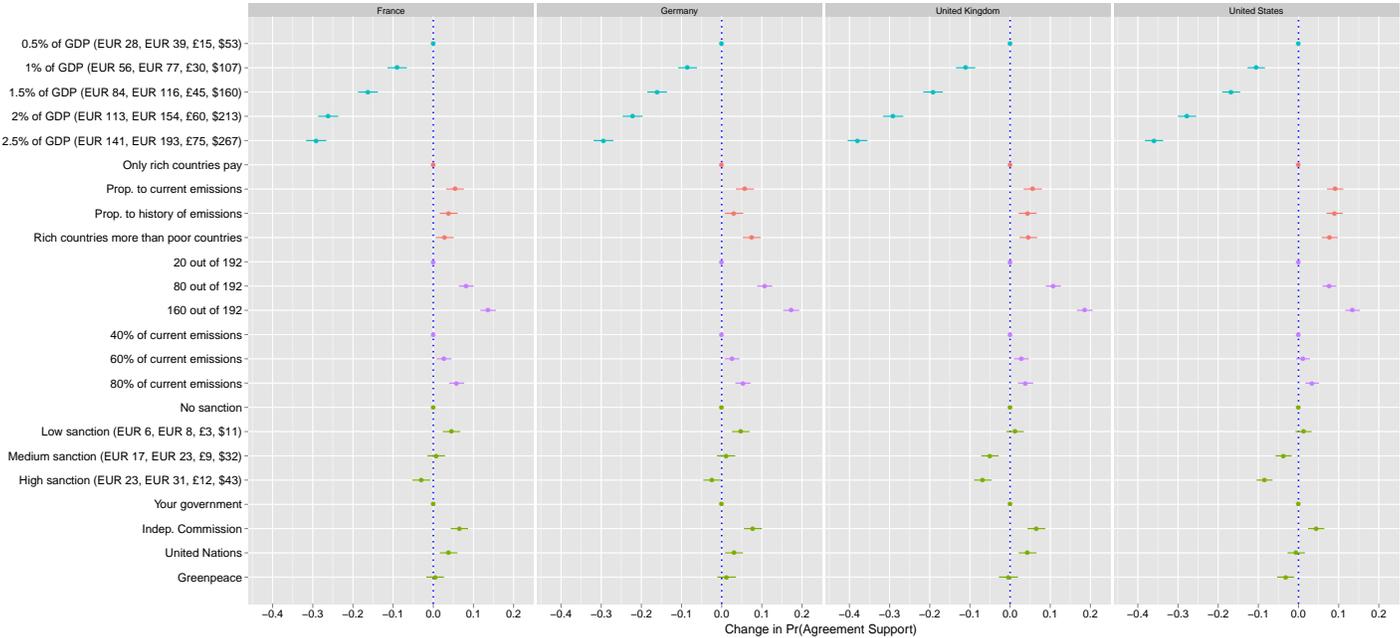
We also explore the potential mechanisms that drive the sensitivities to climate treaty design features. Our results are consistent with the interpretation that the effects of agreement features are partly due to effectiveness concerns and a reciprocity norm (see Bechtel and Scheve (2013) and the corresponding Supporting Information Appendix for the detailed results.)

<sup>2</sup>Bechtel and Scheve (2013) provide more details.

Our main results are based on the pooled data from all four countries. We also explore the potential heterogeneity of our findings across countries. Figure 3 shows the results. We find that publics in France, Germany, the United Kingdom, and the United States respond very similarly to changes in climate agreement features. This means that policymakers face similar domestic constraints on their international climate policy choices. Thus, in all four countries, citizens prefer a less costly treaty that includes as many countries as possible and has an independent institution monitor member countries' mitigation efforts. Notably, including a low sanction only increases support in France and Germany, but not in the United Kingdom and the United States.

Despite the similarity in how public demand responds to climate policy features, differences between these countries remain in terms of the level of support for climate policy and the possibility of of agreement features to bring about a decisive shift in support for global climate policy. In other words, whether treaty design choices can turn a climate treaty that the majority of citizens opposes into one that receives support by a majority also depends on the level of support. To explore whether agreement features can induce decisive shifts in public support, we compute predicted levels of support for hypothetical agreements. The SI Appendix for Bechtel and Scheve (2013) provides details about the algorithm for these simulations.<sup>3</sup> The main finding is that the most popular agreement brings about such a decisive shift in France, Germany, and the United Kingdom. In the United States, the most desirable climate treaty design features shifts support from 29 percent to 47. Thus, even in the United States, for which the relatively low levels of support for environmental policy are well documented, the right combination of climate agreement features can bring up support for climate policy close to the 50%.

Figure 3: The Effect of International Climate Policy Features on Public Support in France, Germany, the United Kingdom, and the United States



Note: Effects of international climate policy features on the probability of supporting the agreement. Horizontal lines indicate 95% robust (clustered by respondent) confidence intervals; points without lines indicate the reference categories for the effects of the features.

<sup>3</sup>The SI appendix is available at <http://www.pnas.org/content/110/34/13763/suppl/DCSupplemental>.

## 5 Subsequent and Ongoing Research

This project has generated new research questions that we aim to pursue. Since reciprocity seems to be an important mechanism that may help explain why individuals find more encompassing treaties more desirable, we have begun to work on cooperation and reciprocity in mass populations. The representative surveys we fielded in France, Germany, the United Kingdom, and the United States included a public goods game that provides us with behavioral measures of cooperation (Fischbacher, Gächter and Fehr 2001). We find that socio-demographic factors, such as age, income, or education, largely fail to predict individual contributions but that expectations about the contributions of others are strong predictors of one's own contribution. We provide experimental evidence that the relationship between the expected contribution of others and own contributions is causal. We also show that the effect of expectations crucially depends on the strategies individuals employ and that these strategy types are not uniformly distributed across socio-demographic groups. These results help explain the varying success of groups within and across societies in realizing collective action and improve our ability to design institutions for solving domestic and global cooperation problems. This manuscript has already been submitted to a high-impact journal. Overall, and in addition to our article in *PNAS* (Bechtel and Scheve 2013), we will write two more articles that either fully or in part draw on the survey funded by the Swiss Network for International Studies.

Other important research questions raised by the project will require new surveys. It would be extremely useful, for example, to replicate these studies in developing countries such as China, India, and Brazil that have recently become significant contributors to greenhouse gas emissions. The study also raises questions about other potentially important dimensions of climate agreements such as the inclusion of policy instruments like carbon trading regimes and carbon tax policies that could be implemented to meet international emission obligations.

## 6 Policy Relevance and Recommendations

Our study provides knowledge about which types of climate cooperation are likely to have long-term prospects in democracies and which will not. Thus, we believe that the results carry several important implications that appear relevant for policymakers and the interested public. First, this is the first study to estimate the cost elasticity of support for global climate cooperation. Although costs are the main driver of public support for global climate cooperation, our results suggest that policymakers can significantly increase individuals' willingness to support an agreement by choosing the right combination of features other than costs. In particular, architects of climate treaties can increase support by aiming at encompassing treaties that include many countries and that represent a large share of global emissions. Moreover, the enforcement structure matters: Including independent monitoring institutions and a small sanction for countries that fail to meet their obligations also raises public support for a treaty. This knowledge may help governments to design climate treaties that are more likely to find support by a majority of citizens and therefore, have better prospects of becoming an effective tool to address climate change.

## 7 Other Activities

### 7.1 Workshop

As part of our project we organized an interdisciplinary workshop on "Global Climate Cooperation" that we held in St.Gallen in July 2013. We hosted six leading experts on climate policy and climate cooperation. 50% of the presenters were political scientists, the other 50% were economists. Several academics

from the University of St.Gallen and the University of St.Gallen's media relations officer attended the workshop (reporting about the workshop via Twitter). Although the workshop participants came from different disciplines and used a broad range of theoretical and methodological approaches, all presentations focused on the challenges of global climate cooperation and potential solutions. Moreover, the workshop resulted in a very fruitful, interdisciplinary discussion about ways to move forward in terms of research and policymaking. We have also received very positive feedback from the participants who were impressed with both the quality of the presentations and the fruitful exchange of ideas.

## 7.2 Conference Participation, Academic Talks, Awards

The work resulting from this projects has been presented at various international academic conferences and academic institutions: Harvard University, the International Political Economy Society Annual Meeting 2012, London School of Economics and Political Science, Stanford University, University of California Los Angeles, University of California at San Diego, University of St. Gallen, University of Oxford, and University of Erlangen-Nürnberg. Moreover, Michael M. Bechtel was awarded the University of St.Gallen Latsis Prize 2013 and the award ceremony explicitly mentioned research conducted as part of this project. The prize honors international excellence in research across all disciplines by a scholar below the age of 40.

## 7.3 Media Coverage

The results from this project have been covered by the following venues: Global Environmental Society, GoLocalProv, 4-traders.com, Futurity, Stanford FSI News. Moreover, against the background of the recently concluded Warsaw Climate Change Conference 2013, we are in the process of trying to publish a comment on how countries can make progress in global climate policy in an international, high quality newspaper.

## 7.4 Short Movie

Last but not least, the SNIS funding has made it possible to produce a short movie that summarizes the main results of our first article. This movie will be made available online and promoted by our institution's public relations divisions on various media and social media platforms. We will, of course, keep the SNIS informed about the release date of the short movie and will provide it with a copy.

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