

Fairness or Finance:
Popular Support for Global Environmental Cooperation

Bronwyn Lewis Friscia
Robert F. Trager

UCLA Department of Political Science

Abstract

Global environmental agreements founder on disagreements over burden sharing between the developed and developing worlds. Past research has argued that the perception of personal costs is a major driver of the political viability of such agreements in the United States and in other developed countries. We show, however, that the framing of an agreement influences whether it is perceived as fair and that this has a far larger impact on approval. We observe the greatest increases in approval when the agreement is framed as a response to the role of developed world consumption habits in driving emissions, far more than when it is framed as a response to current or historical emissions production, and these effects are particularly large among potential swing voters. We also find that approval is increased by bipartisan support and information on the future financial cost of allowing climate change to proceed unchecked.

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Every year, the vast majority of the world's countries meet to negotiate next steps at the annual Conference of the Parties (COP) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC). Every year, the sense of urgency at these negotiations grows, as the worldwide scientific consensus solidifies that the risks of unabated global warming will be devastating and substantial reductions in greenhouse gas (GHG) emissions are required immediately worldwide if the worst outcomes are to be averted. Every year, global emissions continue to grow despite these efforts at international cooperation (IPCC, 2014). And every year for many years now, the same political cleavage has plagued the best diplomatic efforts at striking a deal that is both broadly acceptable and sufficiently powerful: a persistent disagreement between the developed and developing countries over how to fairly distribute the global financial burden of climate change mitigation and adaptation.

This point of disagreement has historically caused conflicts between developed and developing countries during climate negotiations. For example, at the 2009 United Nations Climate Change Conference in Copenhagen (also known as COP15), Chinese Vice Foreign Minister He Yafei and U.S. climate negotiator Todd Stern clashed over Stern's position that the U.S. was not in the world's debt for its historical production of emissions and would not consider China a likely candidate for climate aid from the U.S. to help defray the costs of Chinese contributions to the mitigation and adaptation effort. At a press conference following these remarks, He called Stern "extremely irresponsible"¹ and likened the U.S.'s expectations to asking China to pay a restaurant tab right after sitting down to the table. "Suppose there is a restaurant where the people from the developed countries have been eating for a long time," He said. "Just as the people from the developing countries sit down, the developed countries want them to share the restaurant bill. Is it really fair?"²

¹Karl Ritter, "Chinese Official Calls U.S. Negotiator Irresponsible," *U.S. News and World Report*, 11 December 2009.

²Zhou Kai, "He Yafei cleverly asks the developed countries why we should pay the bill when we just sat down to eat," *Beijing Evening News*, 12 December 2009.

The 2009 Copenhagen talks concluded with a promise of climate aid in the form of the Green Climate Fund, but the issue remained a political sticking point when the promised finance did not materialize. Four years later at COP19 in Warsaw, delegates from no fewer than 77 developing countries staged a symbolic walkout from the proceedings in protest of these missing funds. *The New York Times* reported that the talks were “bogging down over the old divide between rich and poor nations,” with developing countries “in protest at what they consider inadequate financial support from wealthy countries.”³

The question of climate finance continued to be salient in the most recent climate talks. In a statement ahead of the ministerial segment of COP21 in Paris in 2015, Indian Environment Minister Prakash Javadekar staked a place for India as a watchdog on this issue, saying that “India is here to ensure that rich countries pay back their debt for overdraft that they have drawn on the carbon space.”⁴ While Javadekar ultimately praised and agreed to sign the voluntary pledge-and-review-based agreement adopted at Paris, he gave an interview only a few months later lamenting the ongoing disappointment of the Green Climate Fund. Far from the \$100 billion per year goal that the developed countries have repeatedly promised to mobilize by 2020, Javadekar noted that, “[t]oday only \$10 billion is available on the table. Even a country like America is promising only \$3 billion.”⁵

Most ominously, the COP22 talks in Marrakesh in late 2016 were overshadowed by the election to the U.S. presidency of Donald J. Trump, who had promised on the campaign trail to pull the U.S. out of the Paris agreement if elected and made good on that promise on June 1, 2017. Prior to the exit, President Trump signed an executive order dismantling Obama-era measures like the Clean Power Plan that would have enabled the U.S. to meet

³David Jolly, “Developing Nations Stage Protest at Climate Talks,” *The New York Times*, 20 November 2013.

⁴Amitabh Sinha, “Will ensure rich countries pay back: Prakash Javadekar” *Indian Express*, 7 December 2015.

⁵Mayank Bhardwaj, “India calls on developed world to tax coal for climate fund,” *Reuters*, 21 April 2016.

its Paris commitments. The administration’s justification for these moves again speaks to the question of fairness in how developed versus developing countries share responsibility for mitigation and adaptation. President Trump’s appointment to head the Environmental Protection Agency, Scott Pruitt, has commented that the Paris agreement was a “bad deal” since China and India “got away scot free” by not pledging to hit any reduction milestones until 2030 while we in the U.S. “penalized ourselves through lost jobs.”⁶

This disagreement regarding burden sharing can be attributed to the two very different interpretations of the same fairness principle at work in the arguments of the developed and developing world leaders quoted here (Ringius, Torvanger, and Underdal, 2002). Ultimately, all sides agree with the “polluter pays” fairness principle that costs should be distributed according to responsibility for emissions, but they disagree about whether “the polluters” should be defined in historical or current terms. Are the real “polluters” the advanced industrial countries who historically created this problem, or the countries who currently help perpetuate it as they now industrialize?

Recent work on the determinants of mass support for global climate agreements suggests that the “polluter pays” fairness principle is popular among the voters of the developed world, not just their elites. Both the historical and current interpretations of “polluter pays” cost-sharing tend to increase approval of an agreement relative to one in which only the rich countries foot the cost of mitigation and adaptation (Bechtel and Scheve, 2013). However, these positive effects are small compared to the negative effects of the cost of the agreement to households, a result that complements public opinion work on American sensitivity to cost when considering actions that could help the environment. In their 2014 book *Cheap and Clean*, for example, Ansolabehere and Konisky (2014, 164) write that “most Americans are ... unwilling to spend more than a few dollars more on each month’s electricity bill

⁶Pilita Clark, “Trump’s blow to Paris climate deal is not a knockout,” *Financial Times*, 28 March 2017.

even “if it solved global warming.” Yet, other studies suggest that the framing of the issue can increase individual support for even personally costly pro-climate action (Obradovich and Guenther, 2016; Albertson and Busby, 2015; Bain, Hornsey, Bongiorno et al., 2012), and there is evidence from other corners of the international relations literature that both elite cues and the moral framing of a policy are greater influences on individual support for foreign policies than simple costs.

This article is the first to examine the relative power of all three of these factors in determining popular support for a global climate agreement: its cost, its political context, and its framing of burden sharing responsibility through the “polluter pays” fairness principle. In particular, we explore the impact on popular approval of a third possible framing of who the “polluters” are: that of “polluters-as-consumers,” which highlights how developed world consumption habits outpace those of the developing world in driving the production of emissions worldwide despite a vast disparity in population (Peters, Mix, Weber et al., 2011). We also consider the impact of the political party or parties endorsing the agreement on its popular support. We develop a series of hypotheses regarding these effects in the section that follows and then report the results of a large-scale survey experiment that we conducted to test them on a representative sample of the U.S. voting-age population.

We make several contributions. First, our results strongly challenge the existing finding that the personal financial cost of implementing an agreement is a central driver of popular support. However, we find that informing citizens of the *future* financial costs of allowing climate change to proceed unchecked increases approval substantially. Second, we find that *bipartisan* support significantly increases the popular approval of an international climate agreement, which we interpret as a sign that having both parties’ support is viewed by voters as an elite cue regarding the agreement’s general merit. Third, approval levels in the United States are strongly influenced by certain fairness primes about which countries are most responsible for climate change. Information about how the developed world’s historical production of emis-

sions created the global warming problem does not influence popular approval. In contrast, approval rises considerably when respondents are also provided with information about how much more the *consumption* habits in the developed world drive *current* global emissions compared to those in the developing world. Talking about responsibility for emissions in consumption rather than production terms could play a role in more effectively building long-term popular support for American leadership in international climate policy.

Support for Costly Action on Climate Change: Economics or Politics

This study was motivated by several gaps in our knowledge about the drivers of popular support for U.S. participation in a costly international climate agreement. While several studies have found that an agreement’s cost to U.S. households is a central determinant of approval, insights from other corners of the literature on public opinion and foreign policy suggest that opinion formation is shaped by elite cues and normative notions of fairness.

We analyze three aspects of the determinants of popular support for action to arrest climate change: the costs of action, the political context, and the moral framing of burden sharing responsibility. The strongest results in the literature relate to the first of these. Bechtel and Scheve (2013, 13764) find that “costs are the major drivers of support for global climate agreements.” We therefore replicate the treatment from their study, which describes the cost of an agreement in terms of the size of the reduction in average monthly household income. We refer to this as the *Household Income Cost Hypothesis*.

Household Income Cost Hypothesis: Approval of a climate agreement is higher when the expected household costs are lower.

While this hypothesis is intuitive, and receives some support in the literature, we expected the effect of household costs to be moderate, relative to the effects of other determinants of approval. A primary reason for this expectation is that the magnitude of costs is not straightforwardly associated with approval of international action in other contexts. The cost in human life of armed conflict is not the primary predictor of support for war, for instance. The percentage of Americans who approved of U.S. efforts in the Second World War reached 90% even after U.S. battle deaths were in the hundreds of thousands; the U.S. intervention in Somalia, by contrast, dipped down to 30% approval even though U.S. battle deaths never reached one hundred (Larson, 1996). Although casualties are one factor in approval, they are interpreted in the light of others, such as the conflict's importance to national security and U.S. standing in the world as well as the military campaign's likelihood of success (Gartner and Segura, 1998; Eichenberg, 2005; Gelpi, Feaver, and Reifer, 2009; Hanania and Trager, 2017). We therefore expected similar findings on approval of international environmental policies; the political and social framing of moral factors and the perceived importance of the agreement are likely to be more significant drivers of popular approval.

The conjoint design of the Bechtel and Scheve experiment also has implications for how to interpret the findings from that study. In explicitly requiring respondents to compare one agreement to another, the design reveals the treatments to the survey participants. Informed respondents may be more comfortable basing their approval on a comparison of costs rather than on whether a plan is presented by a Democratic or a Republican president even though the latter may be a salient factor in a real-world context. We also suspected that the large effect of personal cost that Bechtel and Scheve find was in part driven by the small effects of the other treatments. The paper analyzes which of two agreements participants ranked higher; in the absence of other bases for selection, cost would drive the preference ordering

of the two agreements without indicating the level of support for any agreement.

Just as the meaning of military action determines the human cost that societies are willing to bear, we hypothesize that the cost of action on climate change would be weighed against the costs of inaction. Surveys and survey experiments on this issue tend to present taking action on climate change as costly without also quantifying the cost of *inaction* – that is, the estimated financial cost to individuals of allowing climate change to proceed unchecked at current rates. Respondents were being asked to choose between a certain loss or no loss rather than weigh a trade-off between a smaller loss now or a greater loss later.⁷ We hypothesized that being told about both sides of this trade-off in this way, so that the cost of action could be directly evaluated against the cost of inaction, would have a substantial effect on approval. We refer to this as the *Consequences of Inaction Cost Hypothesis*.

Consequences of Inaction Cost Hypothesis: Approval is higher when respondents can compare the costs of action to the costs of inaction.

Next, we investigate how the political context influences popular approval of a climate agreement. Following prominent political science literatures, we hypothesize that the signals sent by political elites will have substantial effects on popular preferences. When elites agree, approval is often higher across the political spectrum (Zaller, 1992). Thus, we expect approval to be higher when Democrats and Republicans both support an agreement, which we call the *Bipartisanship Hypothesis*. Further, in line with the political proverb that “it takes a Nixon to go to China,” we expect that an agreement will be more popular when it is championed by the side that is viewed as most skeptical of the benefits of an agreement. When a Republican president behaves “against type” by supporting an agreement, this should convey more information to voters than when a Democratic president takes the

⁷For related experiments, see Kahneman and Tversky (1979).

same action. Thus, a Republican president may be able to achieve higher levels of support for the same agreement. We refer to this as the *Against Type Hypothesis*.

Bipartisanship Hypothesis: An agreement with bipartisan support will have higher approval levels.

Against Type Hypothesis: Approval will be higher when the agreement is championed by Republicans.

Finally, we investigate how the moral framing of the agreement influences approval. In particular, we evaluate whether information about responsibility for the creation of the global warming problem influences approval by influencing what respondents perceive to be fair. As we noted in the introduction, the argument that the *historical* responsibility for the problem lies in the developed world appears to be a highly salient political argument in the developing world. Would developed world citizens in the U.S. respond the same way? The issue involves some complicated moral questions because individuals today might believe they are not responsible for what was done in the same *place* in the past. Few white Americans support reparations for slavery, for instance (Brooks 1999, 341-44, Cose 2005, 171). As in that case, differing responses to the moral argument may drive strongly divergent preferences in the developing and developed worlds. We therefore examine whether information about the developed world's historical responsibility for the global warming crisis will increase approval of an agreement that involves costly concessions to developing world nations. We call this the *Historical Responsibility Hypothesis*.

Historical Responsibility Hypothesis: Information about the developed world's historical responsibility for the global warming crisis will increase approval of an agreement involving costly concessions to developing world nations.

We next examine whether information about *current* responsibility for global emissions influences approval of an agreement. Previous research has suggested that agreements in which “the polluter pays” tend to be viewed as fairer than agreements in which the rich countries are expected to foot the bill (Bechtel and Scheve, 2013). However, research from the ecology, earth systems, and climate policy fields on consumption-based emissions accounting has suggested that existing notions of how to understand who the “polluters” are should be reevaluated. Consumption-based emissions accounting refers to a system of assigning country-level responsibility for emissions not by within whose borders the emissions are produced but rather within whose borders the product being manufactured is ultimately consumed (Davis and Caldeira, 2010). As an illustrative example, consider a chair that is manufactured in a Chinese factory and then exported to the United States and bought by an American customer living in California. The standard production-based accounting method would count the emissions produced while manufacturing the chair as “Chinese emissions,” while the consumption-based method would count them as “U.S. emissions” since American consumer demand drove their creation.

While many developed countries have achieved reductions in their production-based emissions during and since the Kyoto era, proponents of consumption-based emissions accounting have shown that these countries have continued *consuming* emissions in high volumes, effectively driving demand for emissions production in the manufacturing centers of the developing world (Peters, Mix, Weber et al., 2011; Wiebe and Yamano, 2016). This concept is often called carbon leakage, which refers to the phenomenon whereby environmental regulation in one country can reduce emissions at home but contribute to the creation of new emissions in other countries with laxer regulations (IPCC, 2014). Recent work in political science has shown that as countries systematically consume emissions at a far higher rate per capita than they produce them as they grow richer, which suggests that climate agreements focused on regulating production should not be expected to make large impacts on global emissions if consumption is left unchecked (Friscia, 2017).

This issue has been largely ignored in international climate negotiations, with a few noteworthy exceptions.⁸ However, its potential implications for shifting how voters view the fairness of an agreement in which “the polluter pays” are substantial and have never been estimated. Descriptions of agreements in which “the polluter pays” typically place a strong burden on the manufacturing centers of the developing world as some of the world’s greatest producers of emissions. If U.S. citizens have been shown to view these agreements as fairer, might they view an agreement that will be costly to the U.S. more favorably once informed of how much the consumer habits of developed countries like the U.S. drive the production of emissions in the developing world? We hypothesized that respondents would be more likely to support a costly agreement if they were informed of the developed world’s current responsibility for global emissions via consumption channels, which we call the *Current Responsibility Hypothesis*.

Current Responsibility Hypothesis: Information about the developed world’s consumption-based responsibility for current global emissions will increase approval of an agreement involving costly concessions to developing world nations.

Experimental Design

To explore these hypotheses, we conducted a large-scale survey experiment on a representative sample of voting-age U.S. adults in July 2016. Following other studies of this kind (Tomz and Weeks 2013, Trager and Vavreck 2011), we executed the experiment online, employing the services of Survey Sampling International (SSI). Our sample size was 3,128 respondents,⁹

⁸India’s threat to push for a consumption perspective at Paris is one such exception. See, for example: Sophie Yeo, “India hints at new focus on consumption based emissions,” *Climate Change News*, 24 November 2014.

⁹93.16% of respondents answered the key question about approval of the agreement that bears on most of our core results, and 86.7% of respondents finished the full survey.

and an examination of the marginal distributions of the sample’s sociodemographics reveals close comparability to recent data on the regional, racial, gender, educational, and political diversity of the U.S. population.¹⁰ Respondents were asked to read a vignette containing a proposal for an international climate agreement, consider some additional relevant information, and then answer questions about whether they would approve of U.S. participation in the agreement.

The design of the agreement described in the vignette, which can be viewed in Appendix B, had two central motivations. First, the reflects the actions needed to actually keep global emissions in the “safe zone.” We modeled the basic proposal after a recommendation made by climate scientists at Duke University (Kasibhatla and Chameides, 2007) to accomplish this goal by having top developed- and developing-world emitters agree to begin regular yearly emissions reductions equal to 2% of their current annual production levels.¹¹ Second, the agreement reflects last year’s Paris climate deal not only in including both developed and developing countries but also in asking for significant financial support from the developed world to assist developing countries with mitigation and adaptation. We therefore included in the agreement a commitment for all developed countries to commit substantial financial contributions to a \$50 billion climate fund with this mission.¹²

In these ways, the agreement was designed to provoke questions of fairness. Namely, respondents must evaluate if it is fair to ask rich countries to pay significant amounts to help

¹⁰See Appendix A for a summary of these distributions and how they compare to the U.S. population. Because we are interested in estimating treatment effects and not existing sentiments in the U.S. voting-age population, we do not apply weights to correct for the minimal imbalance present in the sample.

¹¹We updated this recommendation to reflect the most recent data available on top emitters according to the World Resources Institute, as described in detail below.

¹²We chose \$50 billion because the Green Climate Fund seeks to raise \$100 billion annually from a combination of public and private developed-world sources by 2020, and for the purposes of our vignette we assumed that half of those funds would be asked of developed-world governments. For more information on the Green Climate Fund, readers can visit its website at <http://www.greenclimate.fund/about-gcf/global-context>.

poor countries mitigate and adapt to climate change while also asking them to achieve costly emissions reductions themselves. Given the popular sensitivity to cost that previous research on mass support for international climate agreements has suggested, we should expect this economically demanding aspect of an agreement to be unpopular at face value. This was intentional, designed to stack the deck against our treatments testing for the effects of domestic political context and fairness primes on approval.

In addition to the vignette itself, respondents were also provided with a brief list of pieces of relevant information that they were told the participating countries were taking into account while negotiating the agreement.¹³ The content and order of these relevant pieces of information were randomized for each respondent, providing them with different information on the cost of the agreement, the party or parties that endorsed it, and the developed world's current and/or historical responsibility for climate change in consumption or production terms relative to the developing world. On the final pages of the survey, respondents were asked to answer a set of questions on whether they approved of U.S. participation in the agreement, how fair it was to the parties involved, and whether they believe the concerns about climate change are legitimate or overblown. Following other studies of this kind, we displayed the details of the agreement described in the vignette at the top of every page where respondents were asked to evaluate it in an effort to avoid the forgetting of key details (Tomz, 2007; Trager and Vavreck, 2011). This design allows us to make inferences about how public perception and approval of the agreement changed when respondents were exposed to different sets of relevant information.

Table 1 displays the experimental manipulations with the exact text seen by respondents who received each control or treatment condition. In the cost category, the control and

¹³All of this information appeared on the page following the vignette except the political context treatment, which was embedded in the vignette itself.

first treatment conditions are taken from Bechtel and Scheve (2013), in order to be able to compare their estimates of the effect of an agreement’s cost on approval to our own most directly. The control condition, which estimates that the agreement will cost the average U.S. household \$107 per month, reflects Bechtel and Scheve’s estimate of a plan that would cost 1% of the annual U.S. GDP; the first treatment condition doubles this figure. These quantities were chosen by Bechtel and Scheve to match the Stern Report’s estimate that keeping global emissions in the “safe zone” will cost industrialized countries a figure equal to about 2% of GDP per year. The cost estimates of inaction on climate change in the second treatment condition are taken from a study by Tufts climate scientists, which found that inaction would cost roughly 0.46% of U.S. GDP by the year 2050 and 3.61% of U.S. GDP by 2100 (Ackerman and Stanton, 2008). We put this into cost per household terms¹⁴ so that it is comparable to other treatment conditions. The treatment tests the effect of adding this information about future costs of inaction to the higher personal cost of immediate action condition (\$213 per household per month) in order to create the hardest test for the effect of information about the costs of inaction.

In the Current Responsibility category of treatments shown in Table 1, the figures provided on the production and consumption of emissions reflect the divide between the developed and developing world in the 15 economies who are negotiating the agreement described in the vignette. These countries account collectively for about 80% of carbon emissions worldwide. As noted in the vignette, these 15 economies¹⁵ negotiating the agreement include all countries considered by the UN to be developed (UN, 2016) as well as the top six GHG emitters in

¹⁴The Tufts report estimated that the equivalent of 3.61% of U.S. GDP in 2100 is roughly \$3.8 trillion in today’s dollars. To estimate cost per household in 2100, we divided this figure by the number of households projected to exist in the U.S. in the year 2100 according to a 2000 U.S. census population projection for 1999-2100. This census report can be viewed online at <http://www.census.gov/population/projections/files/natproj/summary/np-t1.pdf>.

¹⁵The agreement treats the pre-Brexit EU28 as one economy, so the nine developed economies in the agreement are Australia, Canada, EU28, Iceland, Japan, New Zealand, Norway, Switzerland, and the U.S.

Table 1: Randomly Assigned Conditions of the Survey Experiment

Category	Conditions
Cost	<p>(Control) It is estimated that the plan would reduce the monthly income of the average U.S. household by \$107.</p> <p>(1) It is estimated that the plan would reduce the monthly income of the average U.S. household by \$213.</p> <p>(2) It is estimated that the plan would reduce the monthly income of the average U.S. household by \$213. On the other hand, it is estimated that the cost of allowing climate change to proceed unchecked will itself reduce the monthly income of the average U.S. household by \$248 by 2050 and \$1,318 by 2100.</p>
Political Context	<p>(Control) The Democratic U.S. president endorsed the proposal, but leaders of the Republican party in Congress were sharply critical of the proposed plan.</p> <p>(1) The Republican U.S. president endorsed the proposal, but leaders of the Democratic party in Congress were sharply critical of the proposed plan.</p> <p>(2) The Republican U.S. president endorsed the proposal, and leaders of the Democratic party in Congress were also supportive.</p>
Current Responsibility	<p>(Control) No information provided.</p> <p>(1) The developed countries produce carbon emissions that are 13% lower than what is produced in developing countries. In other words, the developing world contains many more people and produces more emissions.</p> <p>(2) The developed countries consume carbon emissions in energy and goods that are 13% higher than what is consumed in developing countries. In other words, the developing world contains many more people and still consumes fewer emissions.</p> <p>(3) The developed countries consume carbon emissions in energy and goods at a rate per person that is over 2.5 times greater than the rate in the developing countries. In other words, the average person in the developed world consumes far more emissions than the average person in the developing world.</p>
Historical Responsibility	<p>(Control) No information provided.</p> <p>(1) The total production of carbon emissions from 1850-present per person in the developed world is over 8 times greater than the total in the developing world. In other words, most of the climate change problem was created by emissions from the developed world.</p>

the developing world according to the World Resources Institute.¹⁶ To calculate the figures themselves, we use OECD data (Wiebe and Yamano, 2016) on the annual country-level production and consumption of emissions.¹⁷

In the first treatment condition in the Current Responsibility category, respondents were told that the developed countries produce carbon emissions that are “13% percent lower than what is produced in the developing countries,” emphasizing the fact that the developing world contains many more people and produces more emissions. In the second treatment condition, respondents were given information in consumption terms instead. They were told that the developed countries “consume carbon emissions in energy and good that are 13% higher than what is consumed in developing countries,” emphasizing that the developing world contains many more people yet still consumes fewer emissions. In the third treatment condition, respondents were again given information in consumption terms, but this time at the per capita level. They were told that the developed countries consume carbon emissions at a rate per person that is “over 2.5 times greater than the rate in the developing countries,” emphasizing that the average person in the developed world consumes far more emissions than the average person in the developing world. In the control, respondents were given no information on the current distribution of responsibility for emissions in either production or consumption terms.

In the Historical Responsibility category of treatments shown in Table 1, the treatment

¹⁶These six developing-world emitters are China, India, Russian Federation, Indonesia, Brazil, and Mexico, according to Johannes Friedrich and Thomas Damassa’s “The History of Carbon Dioxide Emissions,” published on the World Resources Institute website on May 21, 2014 (available at <http://www.wri.org/blog/2014/05/history-carbon-dioxide-emissions>). The most recent data available from this source at the time of this study was for 2011, and we used the top GHG emitters rather than the top carbon emitters due to data availability in the OECD data set that we relied upon for our country-level estimates of production-based and consumption-based emissions.

¹⁷This data set’s documentation is cited above, and it is freely available online at <http://www.oecd.org/sti/ind/carbondioxideemissionsembodiedininternationaltrade.htm>. We use the most recent year in the data set, 2011, for the figures reported.

condition compares the cumulative volume of carbon emissions produced in the countries of the developed world from 1850 to the present divided by the total number of people currently living in those countries to the same figure for the rest of the countries of the world. Respondents were told that the “total production of carbon emissions from 1850-present per person in the developed world is over 8 times greater than the total in the developed world,” emphasizing that most of the climate change problem was created by emissions from the developed world. In the control condition, no information about historical emissions was provided. The cumulative historical emissions data was calculated from the World Resource Institute’s CAIT Historical Emissions tool (CAIT, 2014) and standard population figures for each country.¹⁸

Results

Overall treatment effects

The results for the overall effects of each experimental condition on approval are summarized in Figure 1, which displays the percentage of respondents who received each experimental condition that subsequently expressed approval for U.S. participation in the proposed international climate agreement. The treatment conditions associated with approval levels that are strongly statistically distinguishable from those of their respective control conditions are darkened for reference. The bars indicate the 95% confidence interval for each approval level as determined by a one-sample t-test.

¹⁸The CAIT Climate Data Explorer’s Historical Emissions tool provides access to data on cumulative carbon emissions from 1850-2012 by country (not accounting for land use change and forestry, which the OECD data used in the Current Responsibility category also excludes). Population figures for 2012 were used to match the most recent year in the cumulative calculation. CAIT’s Historical Emissions tool can be accessed at <http://cait.wri.org/>.

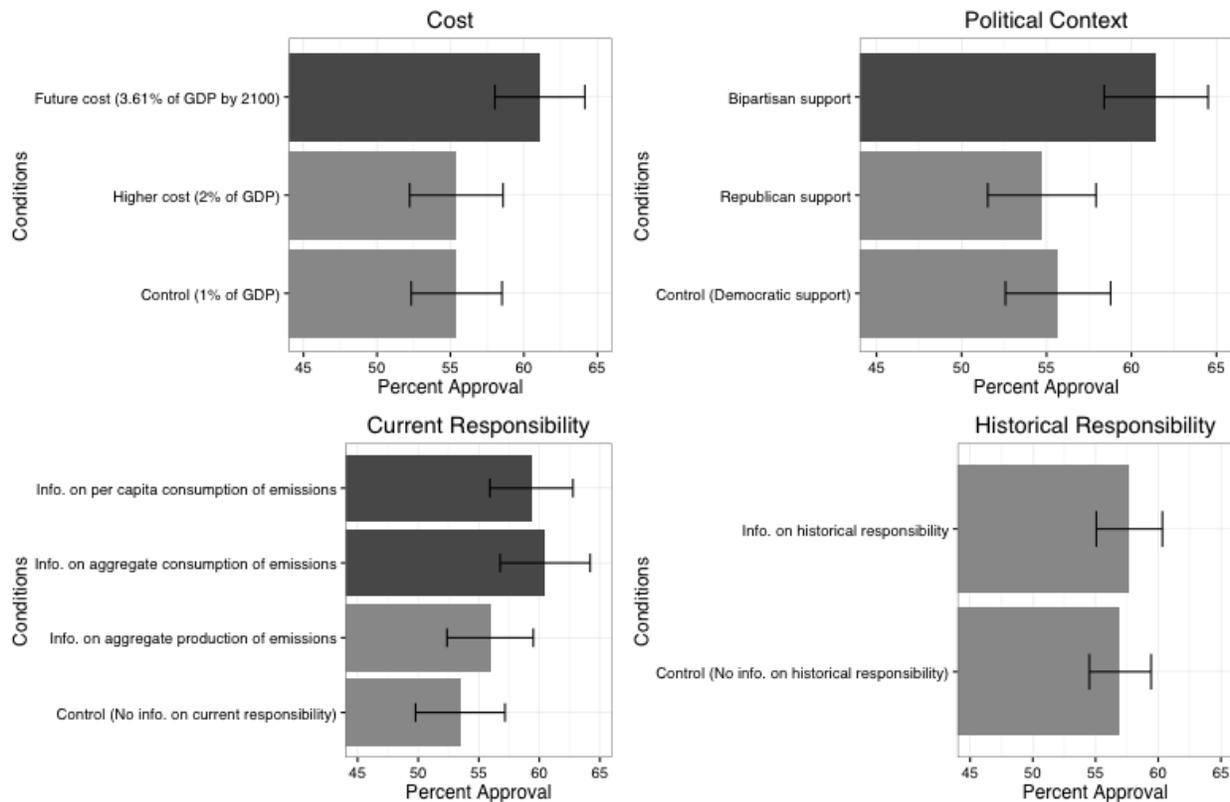


Figure 1: Experimental Results in the Pooled Data. The display shows the percentage of agreement approval associated with each control and treatment condition in the pooled data. The control for each category is always shown at the bottom of the plot for visual reference. The darkened bars signify those treatment conditions with approval levels that were statistically distinguishable from those of their respective control conditions at a highly significant ($p=0.02$ or less) level in a two-sample difference in means t-test with Welch's adjustment for unequal variances. The error bars indicate the 95% confidence interval for each approval level as determined by a one-sample t-test.

The results do not confirm the finding from previous studies that cost is a major determinant of popular support for global climate agreements. We find no support for the *Household Income Cost Hypothesis* that respondents would show greater approval when told the agreement costs less; respondents were equally likely to support U.S. involvement in the agreement when told that it will cost their households the Stern Report's estimate of \$213 per month or just half that amount. We can reject even an α effect of household cost on approval at the β significance level. Consistent with the expectations of *Consequences of Inaction*

Cost Hypothesis, however, approval levels were 6 percentage points higher relative to the control (rising from 55.4% approval to 61.1%) when respondents were told both the higher personal cost of action and the projected cost of inaction on climate change.¹⁹ This is a stark departure from the conventional wisdom that Americans largely cannot be convinced to pay for costly action on climate change and will strongly discount the importance of preventing the incursion of future costs.

We find evidence that the domestic political context of a costly climate agreement does have an effect on approval, although not entirely as expected. First, the expectations of our *Against Type Hypothesis* that respondents would be more likely to approve if told that the president endorsing the agreement were a Republican were not borne out; approval levels were similar among respondents who were told that the supporting president was Democratic and those who were told the supporting president was Republican. We therefore find no evidence of the “it takes a Nixon to go to China” phenomenon in which hardliners are more trusted with uncharacteristic foreign policy decisions at work here at least if the Democratic Party opposes the Republican president.²⁰ However, approval was 6 percentage points higher relative to the control condition among respondents who were told that the agreement had bipartisan support (rising from 55.7% approval to 61.5%), as the *Bipartisanship Hypothesis* predicts.²¹

We also find evidence that fairness primes about “who pollutes” can have an effect on approval of U.S. participation in a costly climate agreement. Consistent with the expectations

¹⁹This difference is statistically significant. The two approval levels are distinguishable at a 2% error level in a two-sample difference in means t-test with Welch’s adjustment for unequal variances. All references to the error level at which two approval rates are statistically distinguishable from one another are with reference to this kind of difference in means test unless otherwise noted.

²⁰As we discuss below, there is some evidence of an interaction effect of the Political Context and Current Responsibility treatments. Even taking this into account in a variety of ways, however, the *Against Type Hypothesis* does not receive statistically significant support.

²¹This difference is statistically significant. The two approval levels are distinguishable at a 1% error level.

in the *Current Responsibility Hypothesis*, approval was higher among respondents who were given information on how consumption habits in the developed world contribute more to current global emissions than the consumption habits of the major emitters of the developing world, despite the vast disparity in population between these two groups of countries. However, we do not find that the distinction between presenting this information in collective (i.e. aggregate) or individual (i.e. per capita) terms makes an appreciable difference in the size of the bump in approval. Relative to approval under the control condition, approval was 7 percentage points higher among respondents who received the information in aggregate terms (rising from 53.5% approval to 60.5%) and 6 percentage points higher among those who received it in per capita terms (rising from 53.5% to 59.3%). While both of these approval levels can be distinguished from the approval level under the control condition, the difference between these two approval levels is not statistically significant.²²

The strength of the overall treatment effects for the two consumption-based fairness primes is noteworthy in light of the fact that we find no evidence of any treatment effect at all for the fairness prime containing information on the historical production of emissions. The approval level among respondents who received information about how the climate change problem was created by emissions from the developed world from 1850 to present was statistically indistinguishable from the approval level among respondents given no such information. These results do not confirm the expectation from the *Historical Responsibility Hypothesis*.

Overall, then, we find three important effects: discussing the costs of action alongside of the costs of inaction, a bipartisan political context, and framing responsibility in terms of current consumption. We examine the mechanism of each effect through analysis of five

²²The approval rates under the aggregate and per capita consumption prime conditions are distinguishable from the approval rate under the control condition at a 1% and 3% error level, respectively. The difference in the approval levels between the two consumption prime conditions is not statistically distinguishable using the same test.

mediators. The first three of these relate to the fairness of the agreement. Respondents were asked whether the burden born under the agreement was fair to the U.S., to the developed world, and to the developing world. We expected that all of the treatments would influence these mediators and particularly the perception of whether the agreement was fair to the United States, as we discussed above. Nevertheless, we asked about the fairness to one's own nation, to the group of nations of which respondent's nation is a part as well as fairness to the countries to whom the proposed transfer of resources would be made. We asked the three separate questions because research shows that individuals vary considerably on whether they show concern for self, group and other (e.g. Graham, Haidt, and Nosek 2009, McDermott 2004, Rathbun, Kertzer, Reifler et al. 2016). The next two mediators relate to respondents' views about the importance of the global warming issue and the affordability of the agreement. Respondents were asked whether concerns about global warming are overblown and whether an agreement represents too great of a financial burden. These represent other plausible logics through which the treatment effects on approval could operate. For instance, one might expect the bipartisan treatment to influence whether partisan respondents views on the importance of addressing global warming at all. Information about the costs of inaction might influence perceptions of whether the financial costs were worth paying. As we expected, each of these mediators is highly predictive of approval of the agreement in multivariate regressions with demographic controls (see Table 2).

Figure 2 illustrates the effects of the three treatments on the five mediators. Bipartisanship, consumption framing and information on the costs of inaction all show a statistically significant effect on respondents perception of the fairness of the US burden in the agreement. The effects of the other two fairness mediators are mixed. We find little effect of the treatments on perceptions that the global warming problem is overblown or on whether the agreement would be affordable. The exception is information on the costs of inaction, which causes respondents to be more likely to view the costs as a price worth paying.

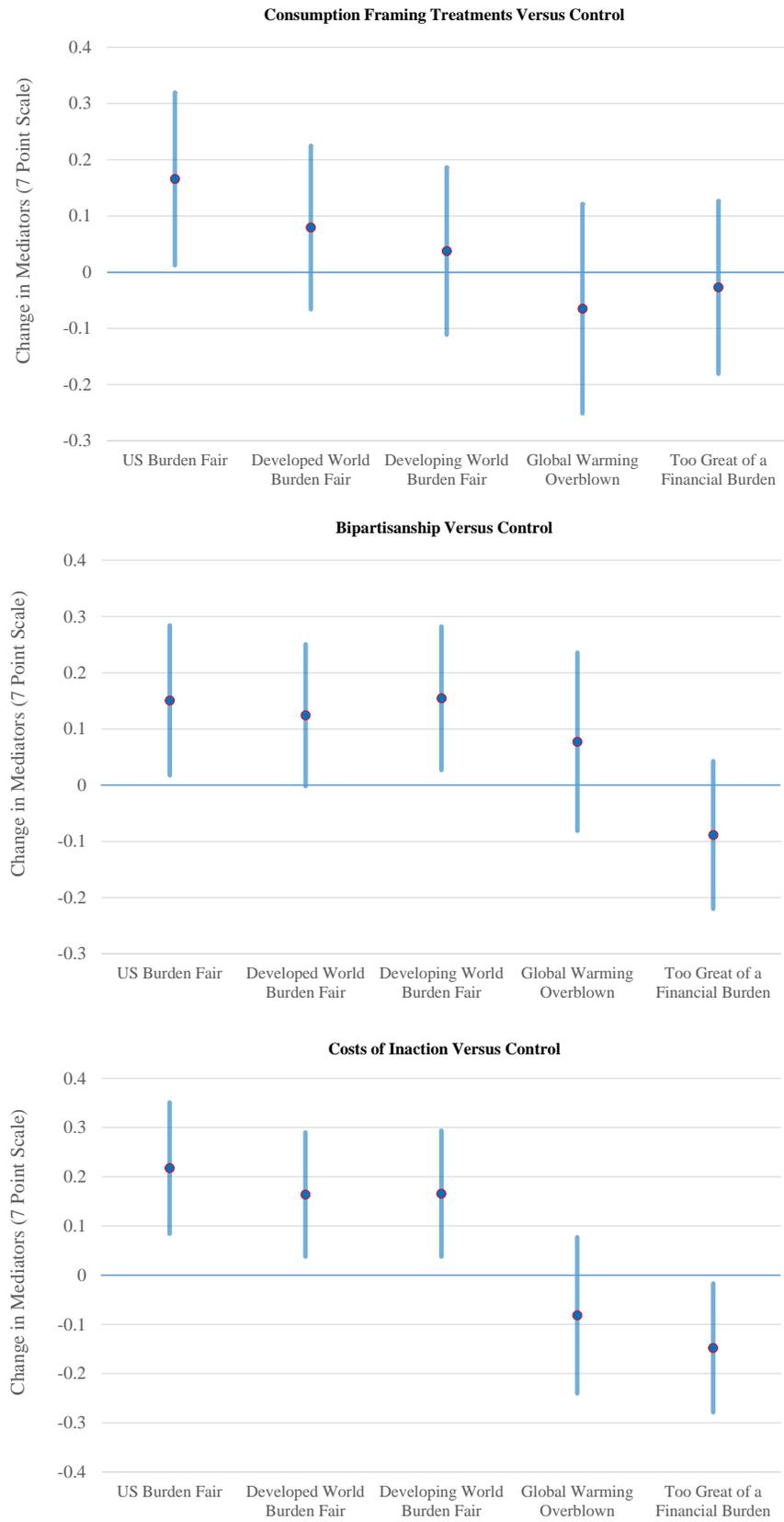


Figure 2. Effects of Treatments on Mediators

Table 2. Mediator Effects on Levels of Approval of the Agreement

Model	1	2
US Burden Fair	0.31*** (0.02)	0.35*** (0.02)
Developed World Burden Fair	0.13*** (0.02)	0.14*** (0.02)
Developing World Burden Fair	0.10*** (0.02)	0.09*** (0.02)
Global Warming is Overblown	-0.05*** (0.01)	-0.05*** (0.01)
Treaty Too Great a Financial Burden	-0.04*** (0.01)	-0.04*** (0.01)
Treatment Controls	Included	Included
Demographic Controls	Included	Excluded
Constant	0.75***	0.91***
Observations	2,582	2,725
R²	0.62	0.60

Note: *** $p < .001$

Table 2 shows the effects of the mediators on approval of the agreement. Once again, the fairness mediators play the largest role. A shift in those three mediators alone from “Disagree” to “Agree” predicts a highly significant change in approval from “Somewhat Disapprove” to “Somewhat Approve” ($p < .001$). The other two mediators are also highly significant predictors, even controlling for the effects of party ID on a seven point scale and other demographic factors, though their effects on approval are somewhat smaller.

We can use the analyses from Figure 2 and Table 2 to get a sense of the relative importance of the mediators in explaining the three treatment effects.²³ As expected, the fairness of the US burden in the agreement plays a large role, explaining about a third of each treatment effect by itself. This is the only mediator that plays a statistically significant role in the effect of the consumption treatment. The three fairness mediators together account for about half

²³We employ the standard approach to analysis of mediators, which is mathematically equivalent to the approach recommended in (Imai, Keele, and Tingley, 2010) for linear models, such as those employed here.

of the total effects of bipartisanship and information on the costs of inaction. Finally, about 3% of the effect of information on the costs of inaction is explained through the financial burden mediator.²⁴ Thus, the mediation analysis further confirms the importance of fairness considerations as drivers of popular approval of a climate agreement.

One of our most intriguing findings concerns which combination of fairness-related treatment conditions had the strongest effect on approval. Relative to approval among respondents who received the control condition in both the Current Responsibility and the Historical Responsibility categories, approval was the highest among those respondents who received *both* a fairness prime regarding the current consumption of emissions in the developed world and a second fairness prime regarding the historical production of emissions in the developed world. Consistent with the overall treatment effects found for the current responsibility experimental conditions, the magnitude of the bump in approval was similar regardless of which of the two consumption-based fairness primes was paired with the history prime. The bump was substantial: relative to approval under the control condition (in which no current or historical responsibility prime was received), approval was 9.45 percentage points higher among respondents who received the aggregate consumption and history primes (rising from 53.09% approval to 62.54%), and it was 7.97 percentage points higher among respondents who received the per capita consumption and history primes (rising from 53.09% approval to 61.06%).²⁵

Perhaps counterintuitively, we find no evidence that any of the primes in the current and historical responsibility experimental conditions had any effect whatsoever on approval of U.S. participation in the agreement among respondents who identify as Democrats (that is, who describe themselves as either “moderate” or “strong” Democrats). That said, approval

²⁴Details of these analyses are available in the Online Appendix.

²⁵These approval rates are distinguishable from the approval rate under the control condition at a 2% and 3% error level, respectively.

was already extremely high within this sub-group, with approval levels ranging from 70.5% among respondents who received the current responsibility prime in production terms to 76.3% among those who received the prime in per capita consumption terms. We interpret this result as an indication that this sub-group is likely already supportive of U.S. leadership in global environmental policy for perhaps the very reasons suggested by these primes, which would render it unsurprising that this information did not further raise approval levels.

In stark contrast, however, we find evidence that these same primes had a substantial and statistically significant effect on approval among potential swing voters. If we define potential swing voters as respondents who identified as political independents, approval in this group was 12 percentage points higher relative to the control condition among respondents who received the current responsibility prime in terms of aggregate consumption (rising from 45.3% under the control condition to 57.5%). It was 8 percentage points higher among respondents who received this prime in terms of per capita consumption (rising from 45.3% under the control condition to 53.6%), although this result was significant at a lesser level.²⁶

Remarkably, these effects were even larger among respondents who identified as either “moderate” or “strong” Republicans. Approval in this group was a staggering 14 percentage points higher relative to the control condition among respondents who received the current responsibility prime in terms of per capita consumption (rising from 36.2% under the control condition to 49.7%). It was 11 percentage points higher among respondents who received this prime in terms of per capita consumption (rising from 36.2% to 47.6%).²⁷ Collectively, these results suggest that the framing effects investigated here are most powerful among those voter demographics that are least ideologically inclined to approve of this sort

²⁶Within this sub-group of respondents who identified as independents, these approval rates are distinguishable from the approval rate under the control condition at a 2% and 9% error level, respectively.

²⁷Within this sub-group of respondents who identified as moderate or strong Republicans, these approval rates are distinguishable from the approval rate under the control condition at a 2% and 4% error level, respectively.

Table 2: Levels of Approval with Fairness Primes, by Political Party of Respondent

Condition	Democrats N=883		Potential Swing Voters N=1,347		Republicans N=684	
	Approval	Net	Approval	Net	Approval	Net
Control	74.62		49.57		36.20	
Production	70.54	-4.08	54.47	4.9	40.45	4.25
Consumption	72.68	-1.94	59.20	9.63**	47.56	11.36**
Consumption (PC)	76.26	1.64	51.97	2.40	49.72	13.52**

** Indicates that the net difference in approval between the treatment and control conditions is significant at $p \leq .05$ in a two-sample difference in means t-test with Welch’s adjustment for unequal variances. The “Approval” column is the percent of respondents in that party sub-group who approved of the proposed agreement after receiving that row’s experimental condition. The “Net” column is the difference between approval under the treatment and control (relative to approval under the control).

of international environmental policy.

Roughly the same framing effects (in which the biggest bump in approval is associated with one or both of the consumption primes) are visible in every possible subset combining respondent political views (Democrat, potential swing voter, or Republican) and political context (Democratic, Republican, or bipartisan support) except for one: strong or moderate Democrats who were told the agreement was supported by a Republican president and opposed by Democrats in Congress. In this subset only, all of our current responsibility experimental conditions actually *decreased* approval of U.S. participation in the agreement. The effect was large; approval was 16 percentage points lower among respondents receiving the aggregate consumption prime relative to the control (dropping from 77.3 % approval to 60.9%).²⁸ This suggests that Democrat respondents who received the consumption prime were inclined to view the agreement as an *inadequate* response to the problem when told that had Republican but not Democratic support.

²⁸These approval rates are statistically distinguishable at a 5% error level.

In contrast, Democrat respondents who were told that the agreement had Democratic support were unmoved (in either direction) by the aggregate consumption prime but saw an increase of 9 percentage points relative to approval under the control condition when given the per capita consumption prime (rising from 72.9% approval under the control to 82.3% approval). Democrat respondents who were told the agreement had bipartisan support were only slightly moved by the per capita prime but saw an increase of 12 percentage points relative to approval under the control when given the aggregate consumption prime (rising from 73.8% approval under the control to 85.7%).

This striking interaction between the political context and fairness experimental conditions among respondents identifying as Democrats helps explain why we only observe the framing effects in the subset of respondents who were told the agreement had Democratic support. Whereas potential swing voter and Republican respondents reliably responded to the consumption primes with increased approval, Democrat respondents responded very negatively to these primes when told the agreement has Republican support but positively like the other subsets when told the agreement has either Democratic or bipartisan support. This had the effect of washing out the overall framing effects within the sub-group that was told the agreement had Republican support.

We also found that even respondents who were self-reported climate change skeptics were not immune to the framing effects investigated here. Of the 2,914 respondents who answered our question about agreement approval, 682 said that they either “agree” or “strongly agree” that “the concerns about global warming are overblown.” Within this group, we still observed a strong effect for the per capita consumption prime on approval (although we did not observe any effect at all for the aggregate consumption prime). Approval was 10 percentage points higher among skeptics who received the current responsibility prime in terms of per capita consumption relative to the control condition (rising from 51.5% to 61.6%, the difference

between a toss-up and a decided majority for agreement support among the skeptics).²⁹

Given the number of treatments administered in this survey experiment, these results could be viewed as vulnerable to inadvertent misattribution of causal effects if we did not confirm that they hold when we control for the effects of all of the treatments simultaneously. Table 3 displays the results of our logistic model of agreement approval as a function of the variants of our experimental conditions. Model 1 excludes our six demographic controls of party identification, age, gender, education, race, and region, while Model 2 includes them. In each model, the control condition has been dropped from each categorical variable to avoid multicollinearity. The full logistic regression table including demographic controls is available in the online appendix.

As is evident from a close examination of the results, the logistic regression analysis broadly confirms our findings regarding which treatment conditions have a large, positive, and statistically significant effect on approval of the proposed agreement: future cost, bipartisan support, and a consumption-based moral framing. The magnitudes of these effects are large relative to the other variants and similar across the two model specifications, with only the per capita consumption framing losing its statistical significance with the addition of the demographic controls.

To give the reader a sense of the magnitude of these effects in real terms, the average predicted probability of approval if an agreement has no moral framing, Republican support only, and the higher of the two costs (with no information on the future cost of climate change) is 0.49. This rises to 0.68 (with the aggregate framing) or 0.67 (with the per capita framing) if the agreement's fairness is framed in consumption terms, if it has bipartisan support, and if it has the higher cost but with information provided on the future cost of allowing climate

²⁹The difference in these approval levels is statistically significant at a 6% error level.

Table 3: Logistic Regression Results, With and Without Demographic Controls

	<i>Dependent variable:</i>	
	Approval	
	(1)	(2)
Higher cost	-0.013 (0.092)	0.002 (0.104)
Future cost	0.224** (0.092)	0.265** (0.104)
Republican support	-0.027 (0.092)	-0.007 (0.104)
Bipartisan support	0.243*** (0.092)	0.272*** (0.105)
Production framing	0.093 (0.106)	0.046 (0.120)
Consumption framing	0.286*** (0.110)	0.253** (0.124)
Consumption per capita framing	0.234** (0.105)	0.174 (0.120)
Historical framing	0.028 (0.076)	0.028 (0.086)
Constant	-0.012 (0.110)	1.130*** (0.433)
Observations	2,914	2,674
Demographic Controls Included?	<i>No</i>	<i>Yes</i>
Log Likelihood	-1,974.644	-1,614.582
Akaike Inf. Crit.	3,967.288	3,307.164
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

change to proceed unchecked.³⁰

Discussion

Taken together, our results suggest something optimistic: that there is a way to “sell” American citizens on the importance of U.S. participation in international climate change mitigation efforts, even when those efforts involve substantial household costs. Our findings challenge the conventional wisdom that cost is a central determinant of support for global climate policy and suggest that the most broadly effective argument in favor of U.S. leadership on this issue would include an estimate of the cost of inaction on climate change, information on how developed countries like the U.S. contribute substantially to current global emissions through our consumption habits, and ideally the latter paired with an account of how developed countries as a whole also created this problem in the first place through the rampant production of emissions since the dawn of industrialization. A broad, bipartisan political support base for the proposed international climate policy would also be likely to boost public support considerably.

It is evident that a critical part of this argument is the idea that the U.S. *currently* contributes to the global warming problem in a substantial fashion, out of proportion to its population. This is clear from the fact that the history argument on its own has no effect on approval while the arguments in terms of current consumption have substantial effects on our respondents’ willingness to support U.S. participation in a costly climate agreement. Yet the greatest gains in approval came when respondents were presented with a combined version of these two arguments: that developed countries like the U.S. not only contribute substantially to current emissions via their consumption habits, but also created this problem historically.

³⁰These marginals were calculated based on the results of Model 1. When recalculated with the results of Model 2, they remain unchanged except the lower bound is 0.52 instead of 0.49.

While the historical responsibility prime on its own is largely dismissed, it thus becomes salient when combined with the consumption-based current responsibility primes. This suggests that respondents are most likely to agree that U.S. participation in a costly climate agreement is appropriate when they are presented with a fairness argument in which the developed world is portrayed as *doubly responsible*, having both created this problem historically and continued to perpetuate it through the consumption habits of its population. It is certainly possible that political entrepreneurs will find resonant ways of expressing the historical fairness argument on its own – for example, with Chinese Vice Foreign Minister He Yafei’s memorable dinner metaphor – but framing the issue this way is likely a less than optimal approach when addressing a developed world audience, especially given the likely alternative arguments based in contemporary responsibilities that would be expressed in a real political debate.

Perhaps our most compelling finding for policymakers and environmentalists is that we find evidence that these fairness-based arguments have the greatest impacts within the very voter demographics that are least likely *ex ante* to exhibit high approval levels for costly international climate agreements: potential swing voters and Republicans. While Democrats tend to judge these arguments favorably or harshly depending on political context, swing voters and Republicans consistently find these consumption-based arguments convincing – as do Democrats as long as they are not told that a Republican leader supports the proposition while Democrats oppose it. Democrats, however, also overwhelmingly support the agreement compared to these groups in any case: while overall approval is 41.7% among moderate and strong Republicans and 53.6% among potential swing voters, it is 73.6% among moderate and strong Democrats.

To be fair, the design of any survey experiment raises legitimate questions about external validity that merit consideration here. It is possible that some respondents would react differently to the information provided in our treatment conditions when encountered in

the real world rather than in an online survey. Our primary interest, however, is in better understanding the factors that are likely to increase popular approval of a costly international climate agreement. As such, the substantial variation in approval that we observe in response to our experimental conditions provides a good indication of the circumstances under which the public will support U.S. leadership on this issue.

Our aim has been to investigate the roles of fairness, finance, and political context in determining popular support for global environmental policy, with a substantive focus on climate change. We have shown that U.S. voters care less about an agreement's cost than they do about the financial consequences of inaction on an issue, elite cues, and notions of fairness in forming their views of U.S. involvement in international climate policy. We hope that readers will take away two key theoretical contributions. First, the salience to voters of the historical fairness argument that the developed world should contribute to mitigation because it created the climate change problem in the first place is highly contingent on context. Second, our results strongly support arguments that emphasize the role of perceptions of fairness in determining support for costly action. Notably, we find that this is true even for those for whom change is a larger percentage of their monthly income. We have offered tentative explanations for the mechanisms by which these considerations shape opinion formation that we hope future research efforts will be able to explore further.

Appendix A: Sample Demographics

Demographics figure to be placed here.

Appendix B: The Vignette

Global Environmental Policy

The following questions are about U.S. participation in an international agreement on the environment. We will describe a scenario and ask if you would approve or disapprove of U.S. participation.

The Situation

U.S. delegates are meeting with the leaders of other major economies to consider a proposal for how to reduce carbon emissions worldwide.

Based on the recommendations of climate scientists, the proposal would keep global emissions in the “safe zone” through an agreement involving the 15 economies that both produce and consume roughly 80% of carbon emissions worldwide. This group includes countries considered developed by the UN plus all top greenhouse gas emitters among the developing countries.

The proposal asks the following:

- All 15 economies, including the United States, are asked to begin immediately decreasing carbon emissions by 2% each year for 40 years.
- The developed countries agree to transfer a fund of \$50 billion per year to the developing world to help them reduce emissions and adapt. The developed countries will contribute to the fund in proportion to the sizes of their economies.

[Randomized variant of the Political Context Treatment.]

The deal was negotiated between these developed and developing countries with the following in mind:

The global warming problem is costly, and it cannot be solved without the participation of

both developed and developing countries.³¹

[Randomized variant of the Economic Cost Treatment.]

[Randomized variant of the Current Emissions Treatment.]

[Randomized variant of the Historical Emissions Treatment.]

Appendix C: Political Context, Political Views, and Fairness

When we looked beyond the overall treatment effects, we found evidence that partisan cues and attitudes interacted with the effects of fairness primes in several ways worth noting. First, we were interested in whether the framing effects that we found in the pooled data held for the subsets of respondents who received each of the political context experimental conditions. We found that, of all the current and historical responsibility primes, the only ones to have a statistically significant effect within these sub-groups were again those primes given in consumption terms, and only within the sub-group of respondents who were also told that the agreement was supported by a Democratic president with Republican opposition in Congress. Among this group, approval was 10.1 percentage points higher among respondents who received the consumption prime in aggregate terms than it was among respondents who received the current responsibility control condition (rising from 49.56% approval to 59.66%), and it was 10.01 percentage points higher among those who received the consumption prime in per capita terms (rising from 49.56% approval to 59.57%).³²

In contrast, these framing effects were almost invisible among respondents told that the

³¹The visual order of the following three treatments was randomized in addition to the variants themselves.

³²Within this sub-group of respondents who were told the agreement was supported by a Democratic president, both of these approval rates are distinguishable from the approval rate under the control condition at a 3% error level, respectively.

agreement was supported by a Republican president, and they were visible but not statistically significant among respondents told the agreement had bipartisan support. It should be noted, however, that respondents who were told the agreement had bipartisan support overall approved of the agreement by a considerable margin (ranging from 57.32% under the current responsibility control condition to 64.76% under the condition with consumption information given in aggregate terms); the framing effects were simply not found to be statistically significant in further increasing approval within this sub-group.

Appendix D: Treatment Effects Across Demographics

We find some heterogeneity worth noting in the overall treatment effects within particular demographic sub-groups of our respondents. First, education level appears to interact with the strength of the effect of elite cues on approval. While we do not observe a significant departure from the overall framing effects when we disaggregate our respondents by whether or not they have a college degree, we do find that our respondents without a college degree responded more strongly to the political context conditions than did our college-educated respondents. Specifically, while respondents with a high school education or no degree had almost exactly the same approval rate when told that the agreement was supported by a Democratic president as by a Republican president, approval was 9.65 percentage points higher relative to the control within this sub-group when told that the agreement had bipartisan support instead (rising from 49.3% to 58.9%).³³

This suggests that U.S. citizens with lower levels of education might rely more on elite cues in public opinion formation on such policy matters than their college-educated counterparts. In contrast, approval was only 4 percentage points higher among college-educated respondents

³³This difference is statistically significant at a 3% error level.

when they were told the agreement had bipartisan rather than Democratic support (rising from 59.4% to 63.7%), and it was 6 percentage points higher relative to when they were told the agreement had Republican support (rising from 57.7% to 63.7%). Only the difference between the approval levels under bipartisan support and Republican support was statistically distinguishable, and even then the same approval bump among the non-college-educated respondents was over 50% higher.

When we disaggregate by age instead, we find that the most salient difference in treatment effects among age groups is sensitivity to cost. While the young appear to be most concerned by the future cost of inaction on climate change, the middle-aged seem most sensitive to doubling the cost of the proposed agreement and the elderly appear the least concerned with cost entirely. If we consider young people to be aged 18-35, this sub-group starts with extremely high approval and sees it rise 7 percentage points further relative to the control (from 70.5% to 77.8%) when informed of the financial cost of allowing climate change to proceed unchecked; however, this group is largely unmoved by the prospect of doubling the cost of the agreement. In contrast, if we consider the middle-aged to be 36-60 years old, this sub-group starts with markedly lower approval levels that drop 7 percentage points further relative to the control (from 52.6% to only 45.6%) when the cost of the agreement is doubled; this group is largely unmoved by the specter of the future cost of unchecked climate change.³⁴ These effects make sense if we assume that young people are more likely to believe that they will live to see the negative consequences of climate change left unchecked, while middle-aged people are more likely to have financial obligations (to mortgages, dependents, retirement accounts, and so on) that could cause concerns about personal financial sacrifices to outweigh concerns about future costs they may not live to see.

³⁴These differences in approval cited here within the young and middle-aged sub-groups are statistically significant at a 4% and 5% error level, respectively.

By a similar logic, then, it is perhaps unsurprising that the elderly appear to be least supportive of the climate agreement under the control condition but also the least sensitive to concerns about the agreement’s cost. If we consider the elderly to be those who are 61 or older, this sub-group exhibits the lowest overall approval levels of any age group (starting at 38.5% under the control condition), and approval rises approximately 8.5 percentage points under both conditions where the cost of the agreement is doubled, including the condition in which the future cost of inaction on the issue is also emphasized (to 47% and 47.3%, respectively).³⁵

We observe still another kind of disparity in the treatment effects when the data is broken out by gender. First, it must be noted that we saw significantly higher overall approval of the proposed agreement among the men in our sample than among the women, despite there being no large differences in either their mean or median self-ranking of their political affiliation (from 1 for “strong Democrat” to 7 for “strong Republican”): overall approval among men was 65% while it was only 52% among women. Second, we found that while neither gender sub-group’s approval moved in response to doubling the cost of the proposed agreement, women were much more responsive than men to the treatment condition emphasizing the future cost of allowing climate change to proceed unchecked. Among men, there was no statistically distinguishable difference in approval across any of the three experimental conditions in the cost category, whereas approval among women rose 9 percentage points relative to the control (from 48.5% to 57.8%) under the condition emphasizing the future cost of inaction on the issue.³⁶ In contrast, men were much more responsive than women to the fairness primes in the current responsibility category (even though, consistent with our other findings, neither gender cared about the fairness prime in the historical responsibil-

³⁵However, there is some additional uncertainty surrounding these effects as they are only significant at an 8% error level.

³⁶The difference in these approval levels is statistically significant at a 1% error level.

ity category). While there was no statistically distinguishable difference in approval among women who heard any of the fairness primes, approval among men was 8 percentage points higher relative to the control (rising from 60.6% to 68.3%) under the condition with the fairness prime in per capita consumption terms and 7 percentage points higher with it in aggregate consumption terms.³⁷

Finally, when we disaggregate the data by race, we find that different treatment conditions were most salient to different racial sub-groups. Among respondents who identified themselves as white, several treatment conditions were associated with significant increases in approval: the cost condition emphasizing the future cost of inaction on climate change (in which approval rose 7.43 percentage points relative to the control from 50.4% to 57.8%), the condition with the fairness prime given in terms of aggregate consumption (in which approval rose 9 percentage points relative to the control from 49.7% to 58.6%), and the political context condition in which the agreement has bipartisan support (in which approval rose 7 percentage points relative to the control from 50.3% to 57.2%).³⁸ White respondents were indifferent to cost, single-party support, and all of the other fairness primes. In contrast, the sub-group of respondents who identified themselves as Hispanic only saw a statistically significant bump in approval under the cost condition emphasizing the future cost of inaction on climate change, but this effect was massive: approval was fully 26 percentage points higher under this condition relative to the control (rising from 56.5% to 82.5%).³⁹ In still greater contrast, none of the experimental conditions were associated with a significant boost in approval within the sub-groups of respondents who identified as either African American or Asian. However, it should be noted that all of the non-white sub-groups exhibited much higher overall support of the agreement than their white counterparts: while overall approval

³⁷These differences in approval are significant at a 5% and 8% error level, respectively.

³⁸Each of these differences in approval under the condition listed here and its respective control are statistically significant at a 1%, 1%, and 2% error level, respectively.

³⁹This difference in approval is significant at a 1% error level.

was 52.8% among white respondents, it was 64% among African Americans, 68.2% among Hispanics, and 74.9% among Asians.

It is also worth considering that the only race-based sub-group that saw a significant increase in approval when told the agreement has bipartisan support is that of white respondents. One possible explanation for this is that members of racial minorities may not on average feel as politically represented or as trusting of political elites as their white counterparts. If true, this might dramatically reduce the extent to which they view bipartisan elite support as a signal that the climate agreement has been well-vetted and must be a good idea.

Appendix E: Full Logistic Regression Results with Demographic Controls

Table 4: Logistic Regression with Full Set of Demographic Controls

	<i>Dependent variable:</i>
	Approval
Higher cost	0.002 (0.104)
Future cost	0.265** (0.104)
Republican support	-0.007 (0.104)
Bipartisan support	0.272*** (0.105)
Production framing	0.046

	(0.120)
Consumption framing	0.253**
	(0.124)
Consumption per capita framing	0.174
	(0.120)
Historical framing	0.028
	(0.086)
Moderate Democrat	-0.335**
	(0.162)
Lean Democrat	-0.727***
	(0.172)
Independent	-1.151***
	(0.143)
Lean Republican	-1.384***
	(0.187)
Moderate Republican	-1.301***
	(0.182)
Strong Republican	-1.710***
	(0.200)
Age 26-30	-0.006
	(0.191)
Age 31-35	-0.182
	(0.185)
Age 36-40	-0.567***
	(0.181)
Age 41-45	-0.907***
	(0.187)

Age 46-50	-0.914*** (0.187)
Age 51-55	-1.066*** (0.182)
Age 56-60	-1.137*** (0.198)
Age 61-65	-0.978*** (0.199)
Age 66-70	-1.307*** (0.189)
Age 71-75	-1.085*** (0.247)
Age 76-80	-1.080*** (0.372)
Over age 80	-1.255** (0.550)
Female	-0.280*** (0.090)
High school education	0.458 (0.385)
College education	0.615 (0.381)
Post-graduate education	0.807** (0.390)
African American	-0.225 (0.141)
Native American	-0.171

	(0.346)
Hispanic	0.119
	(0.215)
Asian	0.452***
	(0.146)
Other race	-0.499*
	(0.266)
South resident	0.031
	(0.114)
Midwest resident	-0.106
	(0.124)
West resident	-0.003
	(0.129)
Constant	1.130***
	(0.433)
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Observations	2,674
Log Likelihood	-1,614.582
Akaike Inf. Crit.	3,307.164
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Note: *p<0.1; **p<0.05; ***p<0.01

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