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**Dustin Tingley¹ and
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Abstract

It is widely believed that international cooperation can arise through strategies of reciprocity. In this paper, we investigate whether citizens in the United States and 25 other countries support reciprocity to deal with climate change. We find little public enthusiasm for intrinsic reciprocity, in which countries restrain their consumption of fossil fuels if and only if other countries do the same. In contrast, we find significant support for extrinsic reciprocity, in which countries enforce cooperation by linking issues. Citizens support economic sanctions against polluters and are willing to shame them in international forums, especially when the polluters are violating a treaty. Cooperation could, therefore, emerge from efforts to link climate with other issues and to embed climate commitments in international law.

Keywords

global warming, public opinion, reciprocity, treaty, international law

Introduction

How can countries cooperate in the absence of a central authority? The seminal work of Axelrod (1984) and Keohane (1984) argued that countries can sustain cooperation by employing strategies of reciprocity, in which each country restrains its pursuit of self-interest if other countries do the same. We

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extend this line of research by investigating whether ordinary citizens support strategies of reciprocity.

We examine this topic with reference to climate change for both practical and theoretical reasons. Concerns about climate change are mounting, and many now regard it as the major challenge confronting the international community. The Intergovernmental Panel on Climate Change has concluded that the earth is warming and attributes most of the trend to human activities—especially the consumption of fossil fuels. The panel predicts that global warming will trigger widespread flooding of coastal regions, extreme weather such as droughts and hurricanes, and the disruption of food supplies. It is important to know what measures, if any, citizens would be willing to take to address this impending challenge.

We focus on public attitudes toward reciprocity because reciprocity is a central theme in international negotiations about climate change. Leaders understand that any solution will require international cooperation. To stabilize the level of carbon in the atmosphere, countries around the world will need to curtail their consumption of fossil fuels. Leaders also recognize that transitioning from fossil fuels will require major sacrifices. Many have, therefore, insisted on burden sharing. In a series of talks sponsored by the United Nations, the major emitters of carbon—the United States, the European Union, Japan, China, India, and others—have offered to reduce their emissions substantially if and only if other nations take commensurate action. Our study reveals whether citizens insist on the kinds of reciprocal commitments that leaders have been demanding in international forums.

Our research also speaks to a scholarly debate about whether strategies of reciprocity are appropriate and credible ways to address environmental problems. We distinguish two forms of reciprocity that countries could employ to enforce cooperation on climate change. The first, *intrinsic reciprocity*, involves adjusting one's effort to reflect the efforts of others (Lipson, 1981). Countries that use this strategy will restrain their emissions insofar as other nations show similar restraint but will not make sacrifices if other nations prove unwilling to do their part. The second strategy, *extrinsic reciprocity*, involves linking cooperation in one domain of international relations to cooperation on others (Lohmann, 1997). Countries that use this strategy might offer carrots such as trade and aid to nations that reduce greenhouse emissions, while slapping sanctions on nations that refuse to help.

Both forms of reciprocity are vulnerable to problems of credibility. A strategy is credible if self-interested players would carry it out, but it is not clear whether countries would actually punish other nations for polluting. Suppose, for example, that many nations agreed to reduce their consumption of fossil fuels but then some cheated on the agreement. The remaining parties to the

agreement could respond by reducing their own abatement efforts and/or imposing extrinsic sanctions on the cheaters. As Barrett (2012) and others have emphasized, though, countries might not be willing to carry out these punitive steps. In democracies, the credibility of punishments depends not only on the preferences of leaders but also on the views of their constituents. We shed light on this issue of credibility by investigating how citizens react when other countries shirk.

Our paper systematically analyzes public support for reciprocity on climate change. Data from 26 countries reveal little enthusiasm for intrinsic reciprocity. Most citizens believe that the amount of effort they exert at home should not depend on levels of environmentalism abroad. This fact undermines the credibility of strategies in which each country restrains its emissions only so long as other countries restrain theirs. However, we find substantial support for extrinsic reciprocity. Many citizens are willing to apply economic sanctions against polluters and shame them in international forums, especially when the polluter is violating a treaty. Cooperation could, therefore, emerge from efforts to link climate policy with other issues—for instance, trade—and embed states' commitments in international law.

Climate Change and Public Opinion

The Nature of the Problem

International cooperation on climate change has been difficult because climate change is “the ultimate global commons problem” (Stavins, 2011b). To reduce greenhouse gas emissions, countries will need to make substantial sacrifices. Their residents will need to drive smaller cars, adjust their thermostats, take shorter showers, and carpool or rely on public transportation. Countries will also need to make large investments in alternative energy technologies such as solar panels, wind farms, and nuclear plants. Each of these actions entails high costs, but the benefits of acting are nonexcludable: Countries that refuse to make sacrifices will nonetheless benefit from the efforts of others. Robert Stavins (2011a, p. 49) estimates that, “For virtually any jurisdiction, the benefits it reaps from its climate-policy actions will be less than the costs it incurs.” Hence, each country has strong incentives to free ride on the sacrifices of others.

Given the temptation to free ride, how can cooperation be achieved without a centralized enforcement authority? Many analysts argue that countries can enforce cooperation by using conditional strategies that reward good behavior and penalize bad behavior. If the rewards and punishments are substantial enough, conditional strategies could incentivize all countries to

contribute to the common good. Charles Lipson (1981) usefully distinguished between two types of conditional strategies: intrinsic strategies, in which actions and reactions occur within a single policy realm; and extrinsic strategies, in which behavior on one issue prompts responses on others (see also Keohane, 1986). Both types could promote cooperation, but it is not obvious whether citizens would support them.

Intrinsic Reciprocity and the Mass Public

Many authors have argued that intrinsic strategies can sustain international cooperation (Axelrod, 1984; Barrett, 1990; Grundig, 2006; Jørgensen, Martín-Herrán, & Zaccour, 2010; Keohane, 1984). The most familiar intrinsic strategy, tit for tat, requires each player to imitate opponents by matching cooperation with equivalent cooperation and countering defection with equivalent defection. Although intrinsic strategies such as tit for tat are employed most often in bilateral relations, they can be adapted to deal with multilateral problems. On the issue of climate policy, for example, countries could agree to restrain their emissions if and only if other countries do the same.

As Hugh Ward (1996) explains,

The key to stable, cooperative collective action when binding agreements are impossible is typically that players' cooperation is conditional on the past cooperation of others. If one side fails to cooperate, this triggers retaliation in the form of refusal to continue to cooperate. For instance the European Union (EU) might press ahead with making cuts to its emissions so long as the other major northern economies were doing the same; but if they failed to cooperate in this way, the EU could switch strategy, scrapping its plans to make further cuts or even allowing emissions to increase. (p. 856)

Provided that players have sufficiently long time horizons, international cooperation could be sustained by the fear that defection by some countries would trigger defection by others, leading to the destruction of the global commons.

The negative reaction could take various forms. Governments could, for example, respond to foreign pollution by relaxing domestic regulations on individuals and businesses, by cutting subsidies for green consumption and production, or by refraining from new investments in alternative sources of energy. Citizens could respond, as well, by reducing their personal efforts to combat global warming. They might reset their thermostats to more comfortable levels, drive to work instead of taking public transportation, and avoid

paying for green technologies that are good for the environment but bad for the pocketbook.

Admittedly, countries may not have complete flexibility to retaliate against foreign pollution. Past policies could create inertia. Suppose, for example, that the United States reduces its emissions by switching from coal to solar power. If foreigners continued to burn fossil fuel, it seems unlikely that the United States would dismantle its solar grid and revert to coal. The U.S. government could, however, decide to meet future electrical demand by bringing coal plants back online or by directing future investments toward coal instead of solar. Moreover, even if the United States committed irrevocably to solar, it could still respond to foreign pollution by allowing higher emissions in other parts of the U.S. economy. Because “virtually every human activity directly or indirectly involves the combustion of fossil fuels” (Nordhaus, 2011, p. 10), countries have many opportunities to adjust domestic emissions in response to foreign ones.¹

When responding to foreign cheating, leaders may worry about the potential for collateral damage. If a country reacted by cutting its own green initiatives, this step could impose negative externalities not only on cheaters but also on cooperative countries. Retaliation could even hurt the retaliator by exacerbating global warming and polluting the local environment. These points do not, by themselves, imply that intrinsic reciprocity lacks credibility. When other countries cheat, it may be rational to follow suit instead of accepting the sucker’s payoff. Nonetheless, countries may prefer extrinsic punishments, such as diplomatic pressure and trade sanctions, which can be applied directly against cheaters while minimizing collateral damage.

In light of these arguments, how would citizens respond to the climate policies of foreign countries? We distinguish and test for three potential responses: emulation, counterbalancing, and nonreaction.

The first possibility is *emulation*, that is, controlling emissions if other countries control emissions but abandoning restraint if other countries abandon restraint. Emulation could arise from a strategic effort to enforce cooperation by employing multilateral trigger strategies. Emulation could also stem from the ethical conviction that free riding is immoral, and that it would be morally acceptable to shirk if other countries shirked. Either logic could cause public support for climate policies to rise and fall in tandem with the actions of other countries.

A second possibility is that citizens might *counterbalance*, rather than emulate. After learning about major foreign efforts to stop global warming, citizens might conclude that their own country’s contributions are no longer necessary and that their country can pollute freely without jeopardizing the global commons. Conversely, after hearing that other countries are increasing

emissions, citizens might redouble their own efforts in order to offset the destructive activities of foreigners. By this logic, foreign pollution could mobilize citizens to support environmental policies, whereas foreign environmentalism could demobilize them.

Counterbalancing could also emerge as a rational response to changes in the international economy. If some countries slashed their consumption of fossil fuels, the global price of fossil fuels would fall. Consumers in other countries might respond to lower prices by purchasing and burning more fossil fuels, thereby undermining the original coalition's efforts to combat global warming. A parallel effect could arise due to changes in international trade. "Since a carbon abatement policy by cooperating countries may shift comparative advantage in carbon-intensive goods toward noncooperating countries, production of such goods and emissions may rise outside the coalition" (Stavins, 1997, p. 318). To the extent that citizens counterbalance rather than emulate foreign countries, the prospects for international cooperation on climate change will be poor.

Finally, citizens might *not have any intrinsic (within-issue) reaction* to the policies of other countries. Some citizens might endorse national environmental legislation and make personal efforts to reduce their own emissions, even if foreigners do not contribute to the global cause. Other citizens might refuse to act, even if other countries aggressively control their own carbon emissions. We use the terms *unconditional* and *noncontingent* to describe policy preferences that do not depend on the behavior of other countries.

To summarize, international relations scholars argue that cooperation could arise via intrinsic reciprocity. By definition, this form of reciprocity requires countries to emulate each other. If, however, citizens—and the governments that serve them—have unconditional or counterbalancing preferences, reciprocity will not occur. It is, therefore, important to investigate how citizens would respond intrinsically to the climate policies of other countries. We expect that most countries have mixed populations,² in which some people want to emulate foreign behavior, others want to counterbalance foreign behavior, and still others have unconditional policy preferences. Below, we test for all three types and estimate the relative frequency of each.

Extrinsic Reciprocity and the Mass Public

A second way to enforce international cooperation is via extrinsic reciprocity. Rather than treating issues discretely, countries could make cooperation in one sphere contingent on cooperation in another (Lohmann, 1997). For instance, countries could apply trade sanctions against nations that emit high levels of carbon (Barrett, 1997, 2003; Esty, 2001; Stiglitz, 2006). They could

also invoke diplomatic sanctions, reduce foreign aid, or shame polluters in international bodies such as the United Nations. The crucial point is that extrinsic reciprocity operates across issue areas, not within them.

Linkage strategies will succeed only insofar as the linkages are credible. Consequently, we investigate public support for extrinsic rewards and punishments. We expect extrinsic reciprocity to be popular but think the public will prefer cheap measures such as diplomatic pressure over more expensive measures such as trade embargoes and military intervention.

Finally, we hypothesize that international institutions will shape public support for conditional strategies. International institutions (defined broadly to include not only formal organizations but also legal agreements and informal norms) can promote cooperation by establishing standards of behavior, monitoring the activities of countries, exposing countries that cheat, and suggesting appropriate punishments or inducements. But institutions can serve an additional function that has not received sufficient attention in the international relations literature. Treaties, we argue, can make conditional strategies more credible by strengthening public support for retaliation against nations that fail to cooperate. Other factors equal, we predict that the public will be more willing to apply sanctions against a country when that country's pollution violates a treaty, than when its pollution does not.

Evidence From Cross-National Surveys

The Prevalence of Unconditional Preferences

As a first step toward testing our hypotheses, we analyzed a survey of citizens of the United States and 12 European countries in 2009 (German Marshall Fund, 2009).³ The U.S. survey asked,

Some people say that the U.S. should do as much as it can to fight climate change, even if others do less. Others say that the U.S. should do only as much as other countries do. Which view is closer to your own?

Europeans received the same question, except that "U.S." was replaced with "European countries."

In every country, the vast majority of citizens supported unconditional action to fight climate change; they wanted to do as much as possible, even if other countries were not making comparable efforts (top half of Table 1). The percentage of respondents with unconditional preferences ranged from 61% in Turkey to 92% in Portugal and was 79% across the entire sample. In contrast, the share of conditional cooperators—those who refused to contribute

Table 1. Domestic Responses to Foreign Environmentalism.

(A) Responses in Europe and the United States					
Country	Unconditional		Conditional		N
Bulgaria	73%		27%		920
France	82		18		987
Germany	87		13		989
Italy	86		14		990
Netherlands	74		26		987
Poland	74		26		912
Portugal	92		8		981
Romania	77		23		949
Slovakia	75		25		964
Spain	84		16		992
Turkey	61		39		790
UK	83		17		985
US	76		24		888
Average	79		21		

(B) Responses in Developed and Developing Countries					
Country	Unconditional		Conditional		N
	Action	Inaction	Emulate	Counterbalance	
Bangladesh	96%	0%	4%	0%	984
Brazil	82	8	7	2	819
China	96	0	2	2	960
Egypt	84	3	9	4	693
France	88	2	10	1	586
India	83	3	8	6	1,036
Indonesia	91	2	5	3	633
Iran	81	3	13	3	728
Japan	77	5	12	6	1,000
Kenya	88	2	6	3	956
Mexico	94	1	2	3	781
Russia	67	13	19	2	528
Senegal	90	2	7	2	923
Turkey	87	3	5	5	552
US	73	13	12	3	1,079
Vietnam	97	1	2	1	765
Average	86	4	8	3	

Source. Panel A is based on authors' calculations from German Marshall Fund (2009). Panel B is based on authors' calculations from World Bank (2010).

Note. Panel A gives the percentage of respondents in each country who offered an unconditional response (do as much as we can, even if other countries do less), versus a conditional response (do only as much as other countries do). Panel B gives the percentage who favored unconditional action (act, even if other countries do not), unconditional inaction (abstain, even if others act); conditional mobilization (act only if other countries do), or conditional demobilization (act only if other countries do not).

more than other countries—was only 21% on average and did not exceed 39% in any country. Apparently, citizens in Europe and the United States see climate change as a serious problem that merits action even if other countries do not reciprocate.⁴

To assess opinions in developing countries, we analyzed a poll by the World Bank (World Bank, 2010). The poll explained that “countries from around the world will be meeting in December in Copenhagen to develop a new agreement to take steps against climate change by limiting greenhouse gas emissions.” It then presented two scenarios. First, “(i)f the other countries come to an agreement, do you think [your country] should or should not be willing to commit to limiting its greenhouse gas emissions as part of such an agreement?” Second, respondents were told to

imagine that at the meeting, the other countries do not come to a global agreement on taking steps against climate change. If this happens, do you think our country would have a responsibility to take steps against climate change, or would it not have a responsibility?

These two questions, taken together, revealed whether and how the policy preferences of citizens depended on the behavior of foreigners. In every country, at least two thirds of respondents favored *unconditional action*; they wanted to take steps against climate change, regardless of whether other parties at Copenhagen were willing to do the same (bottom half of Table 1). Support for unconditional action was 86% in the sample as a whole and at least 90% in 6 of the 16 countries in the survey.

The survey also allowed us to measure support for *unconditional inaction*. This strategy was most popular in Russia and the United States, where around 13% said their countries should not restrain emissions, regardless of what other countries decided at Copenhagen. Unconditional inaction was less popular in other nations and was supported by only 4% of respondents in the sample as a whole.

Finally, we measured support for two conditional strategies: *emulation* and *counteraction*. On average, 8% of World Bank respondents favored emulation; they wanted their country to restrain emissions but only if other countries took similar steps. Around 3% took the opposite approach: They felt a responsibility act if other countries could not strike a deal, but were willing to free ride if other countries made sacrifices.

One might wonder whether the wording of the World Bank survey influenced these findings. Participants in the World Bank study were asked if their country “would have a responsibility” to act, even if other countries did not. If respondents thought the interviewer was fishing for a positive answer and

felt social pressure to comply, they might have expressed unconditional preferences while secretly harboring contingent ones. Fortunately, this concern does not apply to the Marshall Fund Survey, which presented the options in an evenhanded manner by acknowledging that “some people” have one view whereas “other people” have the opposite view. As Table 1 shows, unconditional preferences were nearly as common in the Marshall Fund study as in the World Bank study. Thus, our findings are not an artifact of the way the World Bank survey was phrased.

Costly Versus Costless Action

One might also wonder whether respondents voiced environmental preferences because they assumed that action would be costless. To check this possibility, we split the World Bank sample into two groups: those who predicted that it would be “necessary to increase the cost of energy, to encourage individuals and businesses to conserve more or to use alternative forms of energy” (60%), and those who did not expect that action would require higher energy prices (40%). In every country, support for unconditional action was at least as high among people who anticipated higher energy prices as among people who did not.

Other studies reinforce this conclusion. Li et al. (2004) measured U.S. support for two types of climate agreements: a narrow agreement that demanded sacrifices from developed countries and a wider agreement that also required developing countries to cut emissions. Each respondent read that the agreement “would cost your household t dollars per year in increased energy and gasoline prices,” where t was randomly drawn from a list of nine values ranging from \$6 to \$2,400. Respondents were further cautioned, “Keep in mind that dollars spent on increased energy and gasoline prices could not be spent on other things, such as other household expenses, charities, groceries or car payments” (p. 333). We reanalyzed their data and found no evidence that costs affected the preference for a wide agreement over a narrow one.

Similarly, Bechtel and Scheve (2013) measured public support for hypothetical climate agreements that varied not only in the cost per household but also in the number of participating countries. Some adults in France, Germany, the United Kingdom, and the United States preferred agreements that encompassed many countries over agreements that involved relatively few countries. When we reanalyzed their data, though, we found no correlation between the desire for broad participation and the stipulated cost per household. Citizens preferred the broad agreement by roughly the same margin, regardless of how much the agreement would cost them personally.

Detailed Evidence From the United States

We now deepen the analysis by examining four additional questions. Would our conclusions differ if the surveys named specific countries that were taking action instead of asking generically about other countries in the world? How would citizens respond if foreigners substantially *increased* their emissions, instead of simply failing to decrease them? Would citizens support the idea of linking climate policy to other issues, thereby engaging in extrinsic reciprocity? And finally, would formal international commitments such as treaties make citizens more willing to support intrinsic and extrinsic strategies of reciprocity? We answer these questions by analyzing detailed data from the United States.

Reciprocity With Respect to Specific Countries

The Marshall Fund and World Bank surveys asked how citizens would respond to the climate policies of other countries, without naming the countries or indicating their level of development. The identities of foreign countries could make a difference, however. In 1997, the U.S. Senate passed the Byrd-Hagel Resolution, which said the United States should not sign any international agreements to control greenhouse gas emissions unless they mandated “new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period.” And when President George W. Bush took office, he famously criticized the Kyoto Protocol not only because it would straightjacket the U.S. economy but also because it did not demand enough from the developing world. It is, therefore, important to know how Americans would react to the climate policies of major developing-country emitters such as China and India.

Since 2002, Anthony Leiserowitz and his colleagues (Leiserowitz, 2003; Leiserowitz et al., 2013) have been asking Americans whether their country should reduce its greenhouse gas emissions “regardless of what other countries do, only if other industrialized countries (such as England, Germany, and Japan) reduce their emissions, only if other industrialized and developing countries (such as China, India and Brazil) reduce their emissions,” or if instead the United States “should not reduce its emissions.” The vast majority of people who expressed opinions had unconditional preferences. Across all nine surveys in Table 2, around 80% wanted the United States to reduce emissions unilaterally and an additional 7% felt the United States should not act at all. The remainder demanded sacrifices from other industrial countries (4%) or from both the industrial and the developing world (9%). Thus, unconditional preferences predominated even when the questions mentioned specific countries at different stages of development.

Table 2. U.S. Responses to Industrial and Developing countries.

	November		January		June		May		November		March		September		April	
	2002	2008	2010	2010	2010	2010	2011	2011	2011	2011	2012	2012	2012	2012	2013	Average
Unconditional preferences																
Reduce emissions regardless of others	82	84	77	80	80	78	80	80	80	80	80	80	80	80	79	80
Don't reduce emissions, regardless of others	2	5	9	6	7	8	8	7	6	6	8	8	8	7	8	7
Conditional preferences																
Reduce emissions only if other industrial countries do	8	3	4	4	4	4	4	4	4	4	4	3	3	4	4	4
Reduce emissions only if industrial and developing countries do	9	9	9	10	9	10	10	9	10	9	10	9	9	9	9	9

Source. Based on authors' calculations from survey reports (Leiserowitz et al., 2013).

Note. Table gives percentages among respondents who offered opinions. Initial sample sizes (before excluding people who offered no opinion) were 673 in November 2002; 2,164 in November 2008; 1,001 in January 2010; 1,024 in June 2010; 1,010 in May 2011; 1,000 in November 2011; 1,008 in March 2012; 1,061 in September 2012; and 1,045 in April 2013.

Responses to a Wider Range of Foreign Actions

In previous sections we compared public reactions to two situations: a scenario in which foreign countries acted and a scenario in which they did not. For additional insight we designed a survey with five scenarios. The first one read, "If most of the other countries in the world increase their use of fossil fuels by a large amount, what should the United States do?" In a similar way we asked what the United States should do if foreign countries increased their use by a small amount, kept their use at current levels, decreased their use by a small amount, and decreased their use by a large amount.⁵ After each scenario, respondents chose from a list of five policy options. We assigned each answer a score of -100 if the respondent wanted the United States to increase its consumption of fossil fuels by a large amount, -50 if she wanted the United States to boost consumption by small amount, 0 if she wanted to keep U.S. consumption at current levels, 50 if she wanted the United States to decrease consumption by a small amount, and 100 if she wanted the United States to decrease consumption by a large amount. This scale is easy to interpret: Positive numbers represent improvements over the status quo, whereas negative numbers represent shirking relative to the status quo.

We presented all five scenarios to a sample of 708 U.S. adults, who we recruited through an online service called Amazon Mechanical Turk. Berinsky, Huber, and Lenz (2012) show that experiments on Mechanical Turk produce roughly the same effects as experiments on nationally representative samples. Nevertheless, Mechanical Turk subscribers are substantially more liberal than the national population. In our sample, 53% of respondents were Democrats, whereas only 25% were Republicans, and 22% did not identify with either major party.⁶ This skew in the political views could be consequential, since Democrats and Republicans are known to have different opinions toward climate change (Dunlap & McCright, 2008; Krosnick, Holbrook, & Visser, 2000; McCright & Dunlap, 2011). For robustness we present data not only for the sample as a whole but also separately for each political party.⁷

The top left panel of Figure 1, which displays the average reactions of all respondents, supports two conclusions. First, some Americans responded positively to foreign conservation. When most countries in the world were maintaining the status quo, the average environmental score among U.S. respondents was 53. But when other countries curtailed their fossil fuel consumption by a small amount, U.S. environmentalism jumped to 64, and when foreigners curtailed their consumption by a large amount, the U.S. index climbed above 70. These changes in the average level of U.S. environmentalism were substantively large and almost certainly did not arise by chance alone.

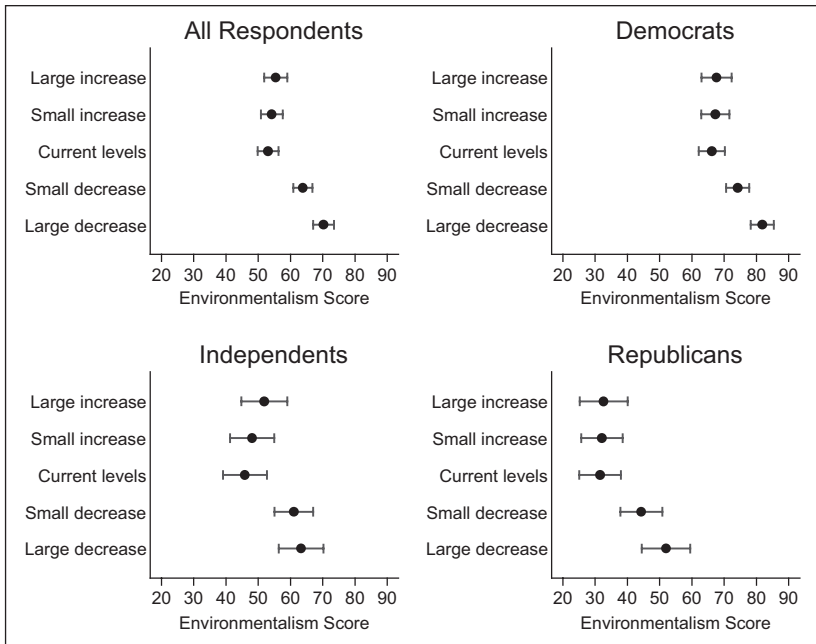


Figure 1. Effect of changes in foreign energy consumption on the average level of U.S. environmentalism.

Note. The figure shows the average environmental score among U.S. respondents, conditional on whether other countries increased, maintained, or decreased their use of fossil fuels. The dots represent the means, and the horizontal lines are 95% confidence intervals. Each estimate is based on a sample of 708 respondents, consisting of 374 for Democrats, 158 Independents, and 176 for Republicans.

Second, Americans did not respond negatively to foreign pollution. The average environmental score among U.S. respondents was just as high when foreigners increased consumption of fossil fuels, as when foreigners maintained the status quo. The same conclusions held when we subdivided the sample into Democrats, Independents, and Republicans (remaining panels of Figure 1). In summary, U.S. reactions were asymmetric: on average Americans were willing to undertake reciprocal reductions, but they were not willing to engage in reciprocal shirking.

This asymmetry is inconsistent with traditional theories of reciprocity. We expected that American environmentalism would waver if other countries consumed more fossil fuels. The asymmetry was also at odds with recent empirical studies about how citizens respond to information about energy consumption by their neighbors. In one study, Schultz, Nolan, Cialdini,

Goldstein, and Griskevicius (2007) provided homeowners with data about the average energy use of other homes in the neighborhood. High-consuming households responded by conserving energy but low-consuming households started using *more* energy, a phenomenon psychologists call the “boomerang” effect.⁸ Fischer (2008) reviewed 12 additional experiments and found that informing people about the actions of neighbors had no net effect on consumption. The reason, Fisher speculated, is that social information “stimulates high users to conserve” but encourages low users to “upgrade a little.” We found no boomerang effect. Even after hearing that most countries were increasing emissions, Americans did not retreat from their environmental stances on average.

There are several potential explanations for the asymmetry. Perhaps some Americans were not currently sacrificing, and therefore had no flexibility to respond to foreign pollution by reducing their own sacrifices. Other Americans might have been reluctant to burn more fossil fuels because they were worried about smog and other local environmental pollutants. Still others might have maintained restraint because higher energy consumption would hurt future generations. Finally, some Americans might have preferred issue linkage, discussed below, over intrinsic reciprocity.

Analysis at the Individual Level

To better understand how many Americans responded to foreign pollution, we analyzed the reactions of each individual (Table 3). Three patterns emerged.

First, most individuals had unconditional preferences. In the sample, as a whole and for each political subgroup, between 70% and 86% of Americans did not adjust their policy preferences to the actions of other countries.

Second, a minority thought the United States should follow in the green footsteps of foreign countries. Approximately 22% responded positively when other countries decreased their emissions by a small amount instead of maintaining the status quo. Only 3% responded negatively, and the remainder were unfazed. Positive responses were seven times more prevalent than negative ones, and the net effect, measured as the frequency of positive responders (emulators) minus negative responders (counterbalancers), was 19 points. When foreign countries climbed the next rung of the environmental ladder by making large cuts instead of small ones, some Americans again responded positively. Around 18% of the sample became more environmental, whereas only 5% moved in the opposite direction, for a net effect of 13 points. Here, emulators outnumbered counterbalancers by more than 3 to 1. Thus, when

Table 3. Individual Responses to Changes in Foreign Energy Consumption.

Change in foreign consumption	Effect on U.S. Conservation			
	None	Positive	Negative	Net positive
All respondents				
Keep the same → small decrease	75	22	3	19 (16 to 23)
Small decrease → large decrease	77	18	5	13 (10 to 16)
Keep the same → small increase	83	9	7	2 (-1 to 5)
Small increase → large increase	83	10	8	2 (-1 to 5)
Democrats				
Keep the same → small decrease	78	19	3	16 (11 to 20)
Small decrease → large decrease	77	19	4	15 (10 to 20)
Keep the same → small increase	82	10	8	2 (-2 to 6)
Small increase → large increase	82	9	9	1 (-3 to 5)
Independents				
Keep the same → small decrease	73	25	1	24 (17 to 31)
Small decrease → large decrease	79	14	7	7 (0 to 14)
Keep the same → small increase	86	8	6	3 (-3 to 8)
Small increase → large increase	81	13	6	8 (1 to 14)
Republicans				
Keep the same → small decrease	70	26	3	23 (15 to 30)
Small decrease → large decrease	76	19	5	15 (8 to 22)
Keep the same → small increase	84	9	7	1 (-5 to 7)
Small increase → large increase	86	7	7	-1 (-6 to 5)

Note. Table shows the percentage of U.S. respondents who reacted neutrally positively, or negatively to changes in foreign energy consumption; 95% confidence intervals appear in parentheses. Sample sizes were 708 for all respondents, 374 for Democrats, 158 for Independents, and 176 for Republicans.

foreign countries improved upon the status quo, some U.S. citizens wanted to follow. We obtained similar results for each partisan affiliation.

Third, although some Americans wanted to shirk in response to foreign shirking, an equal number wanted to take up the slack. For instance, when foreign countries increased consumption by a small amount, 7% of Americans responded negatively but 9% responded positively. Likewise, when most countries switched from increasing consumption by a small amount to increasing consumption by a large amount, positive responders in the United States almost exactly offset the negative ones. These conclusions, which held when we split the sample along partisan lines, help explain why foreign shirking did not cause a net increase in American shirking. The positive reactions of some Americans offset the negative reactions of others.

Table 4. Consistency of Individual Responses to Changes in Foreign Energy Consumption.

Pattern	All	Democrats	Independents	Republicans
Always unconditional	55	56	55	53
Large increase	0	0	0	0
Small increase	0	0	1	1
Keep the same	11	3	17	24
Small decrease	8	6	10	10
Large decrease	35	47	27	19
Consistent emulator	23	21	21	28
Consistent counterbalancer	5	6	5	4
Other	17	17	19	14

Note. Table gives the percentage of U.S. respondents who exhibited each pattern consistently. Sample sizes were 708 for the all, 374 for Democrats, 158 for Independents, and 176 for Republicans.

The Consistency of Individual Responses

We next examined the consistency of each individual's responses to foreign activity. We coded people as *always unconditional* if their policy preferences never varied with the behavior of other countries; as *consistent emulators* if their environmentalism increased monotonically with the environmentalism of foreign countries; as *consistent counterbalancers* if their environmentalism decreased monotonically with the environmentalism of other countries; or *other* if their responses did not fit any of the categories.

Table 4 shows the percentage of people who exhibited each pattern. The first column shows that 55% had reliably unconditional preferences, approximately 23% were consistent emulators and 5% were consistent counterbalancers. We were particularly intrigued by counterbalancers and asked them to explain their preferences in a few sentences. Many cited the need to compensate for bad behavior by other countries, or the opportunity to free ride without destroying the environment. As one respondent wrote,

If other countries increase their use of fuels by a large amount, the U.S.A. should decrease by a large amount to offset the increase in other countries. But if other countries decrease by a large amount ... it would take the burden off citizens of the U.S.A. to decrease by a lot.

A few people provided a different rationale, which invoked the laws of supply and demand. According to one sophisticated respondent,

In the situation wherein most countries increase their use of fossil fuels, the equilibrium price of fossil fuels in general would go up. Therefore the U.S. should use less, being as what the U.S. should use is dependent upon the laws of supply and demand. Conversely, if most countries decrease their use of fossil fuels, the equilibrium price of fossil fuels would go down. Therefore the U.S. should use more, in accordance with those same laws.⁹

Finally, around 17% of the sample had other nonmonotonic preferences. More than half of these nonmonotonic patterns were U-shaped, such as (100, 50, 50, 50, 100). Perhaps people with U-shaped preferences had mixed motives: They wanted to reciprocate when other countries improved upon the status quo but sought to compensate when other nations fell short. Future analysis could reveal why some respondents expressed nonmonotonic preferences.

When we subdivided the sample by political party (rightmost columns of Table 4), the patterns were similar. Two additional findings about partisanship deserve mention. First, contrary to the conventional stereotype, Republicans were not more likely to go it alone. Unconditional preferences were as prevalent among Democrats and Independents as among Republicans, and emulation was actually most common among Republicans. Second, although all three groups had similar rates of unilateralism, the content of their unilateralism differed. About five sixths of the Democrats with unconditional preferences wanted to decrease consumption by a large amount. In contrast, Republicans exhibited a wide range of unconditional positions, with a plurality wanting to keep U.S. consumption at present levels.

Public Support for Issue Linkage

Finally, we compared support for intrinsic versus extrinsic reciprocity. Half of our Mechanical Turk subjects considered the following scenario:

Five years ago, a country said that it would reduce its use of fossil fuels and work with the United States and other nations on the problem of global warming. In the past five years, the country has increased its use of fossil fuels by a large amount, and it is refusing all efforts to reduce the use of fossil fuels. The country is now encouraging businesses to drill for more fossil fuels. Experts think that the country's use of fossil fuels will double over the next twenty years. The country has high levels of trade with the United States.¹⁰

The other half of our respondents received the same scenario, but we replaced the phrase "the country said that it would reduce its use of fossil fuels" with the phrase "the country signed a treaty, in which it promised under international law that it would reduce its use of fossil fuels."

Table 5. Preferred Methods of Responding to a Country That Increases Consumption.

	Other country signed treaty		
United States should	No	Yes	Effect of Treaty
Selected options			
Increase U.S. use of fossil fuels	3	2	0 (-3 to 2)
Criticize the country publicly	48	59	11 (4 to 19)
Cut off trade with the country	37	51	14 (7 to 21)
Take military action against the country	2	3	1 (-2 to 3)
Not take any action in this situation	19	11	-7 (-12 to -2)
Volunteered options			
Decrease U.S. use of fossil fuels	7	6	-1 (-5 to 3)
Help the country decrease its use	8	7	-1 (-5 to 3)
Engage in private diplomatic talks	22	19	-3 (-9 to 3)
Refer the problem to the UN	3	2	-1 (-3 to 1)

Note. Table gives the percentage of U.S. respondents who chose or volunteered each option. Analysis is based on 375 cases in which the country signed a treaty, and 333 cases in which the country did not sign a treaty. The last column, gives the effect of the treaty; 95% confidence intervals appear in parentheses.

After presenting the scenario, we listed several ways the United States could respond and asked respondents to “check all actions that you think the United States should take in this situation.” The options were: not take any action in this situation, increase U.S. use of fossil fuels, criticize the other country publicly, cut off trade with the country, take military action against the country, or take some other action. Participants who selected “some other action” were invited to describe it.

Table 5 shows how Americans responded. Beginning with the first column, in which the country had not signed a treaty, we once again found little willingness to match shirking with shirking. Only 3% thought the United States should respond by using more fossil fuels, and 7% volunteered that the United States should start using less.

However, many people favored alternative methods of enforcement. Roughly half thought the United States should criticize the country publicly, and 37% advocated trade sanctions. These options were at least 10 times more popular than the intrinsic sanction of increasing U.S. emissions. As expected, very few respondents—only 2%—favored the costliest punishment,

military action. Finally, some respondents called for nonpunitive measures. They argued that hostile measures were disproportionate to the crime and could backfire by hurting the United States. As an alternative, 22% proposed private diplomatic talks and 8% recommended economic and technical aid to help the country consume less. Only 19% said the United States should do nothing at all.

In sum, most Americans do not support intrinsic strategies, but they are willing to use extrinsic ones. The vast majority favor carrots such as foreign aid, sticks such as public humiliation and trade sanctions, or methods of quiet diplomacy. They regard extrinsic sanctions as more appropriate and effective than in-kind retaliation.

Finally, Table 5 confirms our hypothesis that treaties boost public support for several types of punishments. Around 51% wanted to sever trade with a polluter who was violating a treaty but only 37% endorsed that response when an otherwise equivalent country had not signed a treaty. Likewise, 59% wanted to criticize the polluter publicly when it had previously signed a treaty, whereas only 48% favored public criticism when the country had made a purely verbal commitment. Thus, the treaty caused a 14-point surge in public support for trade sanctions and an 11-point jump in public support for naming and shaming. Interestingly, the treaty did not affect support for intrinsic responses, military intervention, foreign aid, or quiet diplomacy.

Conclusion

In this paper, we investigated support for conditional cooperation on the issue of climate change. Using surveys from 26 countries, we found that most people have unconditional policy preferences: They insist that the climate policies of their own country should not depend on the climate policies of foreigners. A smaller percentage of citizens are emulators, but their emulation is asymmetric: They will make extra sacrifices when foreigners do, but they will not shirk when foreigners shirk. Finally, some citizens have counterbalancing preferences: They will compensate for rising pollution by foreign countries but free ride if others start protecting the global commons.

Overall, public support for intrinsic trigger strategies is extremely low—a finding with important implications for international cooperation. Many theorists have argued that countries can sustain cooperation by employing conditional strategies such as tit for tat. On the topic of climate change, each country could offer to protect the commons if others reciprocate, while threatening to resume pollution if other countries shirk. Most people in the United States and other countries do not endorse such strategies, however. We conclude that climate

cooperation is unlikely to arise from the kinds of intrinsic trigger strategies that have received so much attention in the international relations literature.

Citizens in our surveys were, however, willing to apply extrinsic sanctions: to punish polluters by retaliating in other spheres of international affairs. They stood ready to slap economic sanctions on polluters and shame them in international forums. Moreover, citizens were especially willing to take these measures when the polluter was violating a treaty. Cooperation could, therefore, emerge from efforts to link climate policy with other issues and embed climate commitments in international law. Indeed, Barrett (2007) has called for a climate treaty system in which countries pledge to reduce emissions and subject themselves to periodic reviews. "Such a pledge and review system would not carry binding consequences for noncompliance but instead rely on moral suasion and naming and shaming in the international arena."

In addition to identifying enforcement strategies that stand the best chance of garnering public support, our research suggests the potential value of public relations campaigns. Although most citizens have unconditional preferences, minorities in every country would exert more effort if they thought other countries were making substantial contributions. David Victor (2011) points out that most people are unaware of the major steps China and India are taking to control greenhouse gas emissions. If news of Chinese and Indian efforts spread, it could raise support for environmental action in the United States and other developed countries. By the same logic, bold action in the United States and other rich countries could encourage action in the developing world.¹¹

Future research could study public support for reciprocity in other policy areas such as arms control and international trade. On which issues are individuals most likely to support intrinsic strategies of reciprocity, or to prefer intrinsic sanctions over extrinsic ones? Do people have overarching views about unilateralism or reciprocity and apply them in many realms, or do they develop different strategies for different issues? Research could also examine public support for treaties and other institutions. Under what conditions will citizens support treaties in the first place? What institutional features will they demand and what sacrifices would they make to put treaties and other institutions in place? These themes should be central to future studies about international cooperation.

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Notes

1. One interesting nuance is whether countries that make early investments to combat climate change, for example, by shifting parts of the economy to low-carbon technologies might be vulnerable to exploitation by other countries in the future. The concern could be mitigated by employing trust-building gestures (Kydd, 2005), by phasing in environmental policies gradually, or by making national policy conditional on costly and potentially irreversible investments by foreign countries.
2. "Some countries have sufficiently strong environmental constituencies that they will reduce greenhouse gas emissions regardless of FCCC requirements or the actions of other states. These 'unilateral compliers' will be joined by some 'contingent compliers,' who will comply once they are assured that enough others will comply . . . Despite compliance by some actors, many are likely to violate regime rules" (Mitchell, 2001, p. 231).
3. The survey was given to a random sample of around 1,000 adults in each country. It was administered face-to-face in Bulgaria, Poland, Slovakia, Romania, and Turkey, and by telephone elsewhere. The field dates were June to July 2009, and the average response rate was 18%.
4. If most Europeans and Americans support unilateral action, why aren't their governments doing more to address climate change? Interest groups could be blocking action, or leaders might be delaying in an effort to extract concessions from foreigners. Future research should examine the connection between public opinion and government action on climate change.
5. The scenarios were presented in the following order: increase large, keep the same, decrease large, increase small, decrease small.
6. The American National Election Study (2008; <http://www.electionstudies.org/>), by contrast, found that the U.S. national population was approximately 51% Democrat, 37% Republican, and 11% Independent.
7. Mechanical Turk respondents are also younger and more likely to be female than the population at large. We did not have a strong prior reason to expect differences by age or gender. Previous work on gender differences in public goods games is inconclusive (Brown-Kruse & Hummels, 1993), though Kurzban and Houser (2001) find that women are more likely to be conditional cooperators than men, and men are more likely to be unilateral cooperators than women. One implication is that our Mechanical Turk sample underestimates the extent of unilateralism.

8. Researchers have also studied ways to counteract the boomerang effect, for example, by suggesting that low consumption is morally desirable, or by providing all households with energy conservation tips; see Schultz, Nolan, Cialdini, Goldstein, and Griskevicius (2007) and Allcott (Allcott, 2011).
9. We hypothesized three potential motives for counterbalancing: benign (compensating for bad behavior by other countries), malign (exploiting the opportunity to free ride without destroying the environment), and market based (responding to changes in the world economy, such as declines in the price of fossil fuels or shifts in the pattern of comparative advantage). The open-ended responses to our survey were not detailed enough to reveal how many of these motives counterbalancers had in mind. Future research could use closed-ended questions to measure the prevalence of each motive.
10. We also informed half of the respondents that the country was a democracy and told the other half that the country was an autocracy. That random variation is not the focus of our analysis.
11. For example, unilateral domestic policy changes could lead to increasing environmental standards in other countries through “investing up” dynamics (Perkins & Neumayer, 2012).

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