Who Cooperates? Reciprocity and Public Good Contribution in Mass Populations*

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Abstract

Cooperation in public goods problems shapes the functioning and long-term fate of political and economic systems. This paper investigates the determinants of cooperative behavior in mass populations. We fielded large-scale representative surveys in four industrially advanced countries (France, Germany, the United Kingdom, and the United States) and included a public goods game that provides us with behavioral measures of cooperation. We find that socio-demographic factors, such as age, income, or education, largely fail to predict individual contributions but that expectations about the contributions of others are strong predictors of one’s own contribution. We provide experimental evidence that the relationship between the expected contribution of others and own contributions is causal. Further, we find that across all four countries about 45% of all individuals employ positively reciprocal strategies while only 5 to 12% can be classified as freeriders and document noteworthy differences in the distribution of reciprocal strategies across socio-demographic groups. These findings provide an explanation for the varying success of societies and socio-demographic groups within societies in realizing collective action and suggest a potentially major role for institutions in stabilizing expectations about others’ contributions to solve domestic and global cooperation problems.

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1 Introduction

Cooperation in public goods problems shapes the functioning and long-term fate of political and economic systems. Groups and states that succeed in providing public goods like security and the conservation of natural resources are more likely to survive. Societies in which individuals succeed in solving cooperation problems that allow for profitable exchanges are more likely to grow and develop. A large set of literatures in various academic disciplines, such as, biology, economics, sociology, and political science, have investigated theoretically and empirically the factors that lead individuals, groups, and states to succeed or fail in solving these pervasive social dilemmas. The empirical evidence in this research emphasizes two major patterns of behavior in the provision of public goods. First, individuals cooperate more than predicted by standard economic theory. Second, the willingness to cooperate is sensitive to expectations about the willingness of others to cooperate—conditional cooperation is an important feature of human behavior.

Building on this literature, we ask who cooperates and who employs reciprocal strategies in representative samples of mass populations. Answering these questions provides important information about whether cooperative behavior and norms of conditional cooperation are dispersed across different socio-demographic constituencies or concentrated within societies. Only by answering these questions can we better understand why some societies and socio-demographic groups of individuals realize high levels of public good provision while other groups face cooperation failure. Knowledge about the effects and distribution of reciprocity also appears crucial for our ability to design effective institutions that help solving cooperation problems. Although several previous empirical studies have begun to examine cooperative behavior in diverse and even relatively large groups of subjects, the samples are not representative of a national population (see e.g. Banuri and Keefer n.d.; Peysakhovich and Rand n.d.; Gächter and Herrmann 2009). While these studies have generated important insights, the general questions we pose require evidence from representative samples.\footnote{To the best of our knowledge, Fehr, Fischbacher, von Rosenbladt, Schupp and Wagner (2002) is the only
In this paper, we address these questions using data from large-scale representative surveys that we fielded in France, Germany, the United Kingdom, and the United States (total \( N = 8,500 \)) and included an anonymous, one-shot public goods game that provides us with behavioral measures of cooperation\(^2\). We find that socio-demographic factors, such as age, income, or education, largely fail to predict individual contributions but that expectations about the contributions of others are strong predictors of one’s own contribution. We provide experimental evidence that the relationship between the expected contribution of others and own contributions is causal. When classifying the types of strategies individuals use we find that conditional cooperation is a widely held norm: About 45% of the population employ conditionally cooperative strategies, while 5 to 13% freeride.

Although the propensity to cooperate in a static public good game appears to be quite evenly distributed across socio-demographic groups, we find pronounced differences when examining individuals’ strategy types: Women, the young, higher income, and higher educated respondents are all more likely to use positive reciprocity strategies compared to free riding. Among respondents using positive reciprocity strategies, we find that the young, higher income, and higher educated respondents are also more responsive to the contributions of others but that women are less so. Overall, these results provide an explanation for the varying success of societies and socio-demographic groups within societies in realizing collective action and suggest a potentially major role for institutions in stabilizing expectations about others’ contributions to solve domestic and global cooperation problems.

\(^2\)The surveys were carried out by YouGov in summer 2012. YouGov employs an opt-in panel together with matched sampling to approximate a random sample of the adult population (Rivers 2011). Matched sampling involves taking a stratified random sample of the target population and then matching available internet respondents to the target sample. Ansolabehere and Rivers (2013) and Ansolabehere and Schaffner (2013) show that matched sampling also produces accurate population estimates and replicates the correlational structure of random samples using telephones and residential addresses.
2 Who Contributes in Mass Populations? The Role of Expectations about Cooperation

Reciprocity and the Socio-demographics of Cooperation

A vast array of cooperation problems that characterize common human social dilemmas are captured by the general framework of a public goods problem. Individuals have the opportunity to contribute to a public good which is valued by all but the payoffs associated with contributing and not contributing do not create an incentive for any individual to actually contribute. The public goods framework can be applied to problems of bilateral cooperation such as David Hume’s classic account of two farmers considering draining a marsh (Hume 2003 [1740]) as well as multilateral cooperation such as Mancur Olson’s account of mass collective action (Olson 1965). Standard economic theory applied to the problem of public goods provision predicts that individuals should freeride, i.e., always contribute nothing to the public good. This prediction suggests that individually rational, self-interested behavior leads to the underprovision of public goods and socially inefficient outcomes.

However, hundreds of lab and lab-in-the-field experiments (see e.g. Fehr and Fischbacher 2002; Fehr and Schmidt 2006; Henrich, Boyd, Bowles, Camerer, Fehr, Gintis and McElreath 2001; Ostrom 2000) have demonstrated that individuals often make non-zero contributions to public goods and have explored various explanations for this behavior. Most of the evidence in this body of research is based on student participants or self-selected nonstudent populations raising the question of whether the distribution of cooperative behavior established in this research describes the central tendencies of the adult populations of entire countries. In this section, we describe behavior in a public goods game for representative samples of the adult population of four countries.

We embedded a behavioral measure of cooperation in surveys conducted on large, representative samples of the adult population in France ($N = 2,000$), Germany ($N = 2,000$), the United Kingdom ($N = 2,000$), and the United States ($N = 2,500$). We use a two-player
A linear public goods game (Camerer and Fehr 2004) was used to obtain a measure of the willingness to contribute to a public good in these mass populations. Specifically, respondents were told that individuals completing the survey had a chance to win one of two Amazon gift cards and that the amount of the gift card would depend on their decision about whether to give some amount of the gift card to another winner and the analogous decision made by that winning respondent. Any amount given to another respondent would be subtracted from the individual’s base winnings of 100 €/£/$ and doubled before it was distributed to the other winner. We then asked respondents how much they would like to contribute and how much they expect the other winner to contribute.

Figure 1 shows the distribution of individual contributions to the public good in the pooled data (N = 8,500). Only about 12% of the individuals in France, Germany, the United Kingdom, and the United States make zero contributions. The vast majority contributes substantively to the public good. The modal contribution is 50 €/£/$, which is suggestive of an equity norm. Overall, contributions cluster at 0, 10, 20, 25, 50, and 100 €/£/$ and the average contribution is about 29 €/£/$. The high percentage of respondents that contribute to the public good resonates with the main claim of the lab-experimental literature that cooperative behavior in public goods games is substantially more prevalent than predicted by standard economic theory. Moreover, the average contribution implies a 29.4% of endowment contribution which is broadly similar to average values reported in laboratory studies for one shot static public goods games like ours.

Figure 1 reveals substantial variation in the distribution of public goods contributions in a representative population. One strategy for learning why some people contribute and

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3 One can think of the public good in this case as the amount of money that the group takes from the experimenter. Note that regardless of the decision of the other winner, a respondent can maximize his or her individual payoff by contributing nothing to the other winner. Consequently, standard economic theory predicts that with no contributions the payout to the two winners is the minimum aggregate payoff of 200 €/£/$ while the maximum aggregate payout is 400 €/£/$.

4 We randomly assigned the order in which we asked respondents to state their own contribution and their expectations about the other winner’s contribution. After completion of the field work the winners were drawn and their contribution decisions determined the payoffs.

5 For example, Fischbacher, Gächter and Fehr (2001) report that the total average ‘unconditional contribution’ for a static one-shot public goods game is 33.5% of the initial endowment in their study.
why some contribute more than others aims at determining whether different types of people are more or less likely to make contributions. Particularly, because we have representative samples, answering the question “Who cooperates?” may help identify why some groups within a society or even whole societies succeed or fail to cooperate and what sort of social, economic, and political public goods problems are likely to be most difficult to solve.

We constructed the variable *Own Contribution* equal to each respondent’s stated contribution to the linear public goods game. In our initial analysis we try to identify the socio-demographic correlates of contributions. We focus on those characteristics that appear most relevant for explaining cooperative behavior in the type of anonymous, static cooperation game we study. In particular, we abstract away from contextual factors, such as, group attachment and social position that previous studies of cooperation in social dilemmas have emphasized (see e.g. Baldassari and Grossman 2013; Habyarimana and Weinstein 2009). Figure 2 reports the ordinary least squares coefficient estimates—with 95% confidence intervals based on heteroskedasticity-robust standard errors—for the regression of *Own Contribution* on indicator variables for sex, age, income, and education. The results are striking. In general, socio-demographic characteristics are uncorrelated with observed contribution behavior. The estimates reported in Figure 2 are small and statistically insignificant for age, income and education. The one exception to this pattern is that on average, women tend to contribute about 2 €/£/$ less than men. This general pattern is further confirmed by investigating other socio-demographic characteristics of respondents. We also find no significant differences in our pooled analyses by marital status, employment status, and ideology. Overall, there exists little evidence in our data to suggest that certain types of socio-demographic groups are generally more cooperative in public goods games and thus that groups or places

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6The results reported in this section are robust to using a tobit model which accounts for contributions censored at 0 and 100.

7See Appendix for additional results. In country-specific analyses, we also examined whether there were differences by partisan identification. In France, individuals identifying with the National Front on average contributed 5 € less than those not identifying with a party. In Germany, individuals identifying with the CDU on average contributed 4 € more than those not identifying with a party. We observe no significant partisan differences in the UK and the US though in the UK right ideology was modestly correlated with lower contributions.
with a higher incidence of a given type are advantaged in solving cooperation problems.\footnote{In unreported results, we find that the relationship between expectations about the other individual’s contribution and respondent’s own contribution is robust to including a variety of additional control variables including a behavioral measure of altruism which itself correlates positively with contributions. We also reestimate the model 2 separately for those randomly selected 50% of respondents that were first asked to indicate their own contribution and for the remaining 50% of respondents that were first asked to indicate their expectations about how much the other winner contributes. The results for these two subgroups are virtually identical (see Figure \textit{\textsuperscript{3}} in the Appendix.)}

In a second step, we explore how expectations about the other individual’s contribution affect an individual’s willingness to cooperate. We converted the continuous expected contribution measure into three indicator variables based on the 25th and the 75th percentile of the observed distribution and added these variables to the OLS regression described above. Figure \textit{\textsuperscript{2}} also reports these estimates. Compared to those with a low expected contribution (between 0 and below 3 €/£/$), respondents that expect a medium contribution (3 to below 50 €/£/$) decide to contribute about 24 €/£/$ more on average. Respondents that expect the other winner to make a high contribution (50 or more €/£/$) contribute about 50 €/£/$ more on average. We find that, when compared to coefficients on the socio-demographic variables, an individual’s expectation about how much the other individual will contribute is, by far, the strongest predictor. In short, the answer to the question of “Who cooperates?” in mass publics is in part those individuals who expect others to cooperate. These results are consistent with the view that reciprocity is an important norm that guides individuals’ contribution behavior.\footnote{These results inform the debate about potential explanations for variation in public goods contributions. For example, it is inconsistent with the idea that higher income individuals feel better able to afford contributions and thus cooperation is facilitated among higher income individuals. These result are also inconsistent with the argument that higher educated individuals are better able to see the advantages of everyone contributing and thus cooperate more easily.}

The Causal Effect of Expected Cooperation by Others

The results we have presented so far appear suggestive, but their interpretation remains correlational. It is possible that expectations about others’ contributions proxy for other unobserved characteristics of respondents and do not have a direct causal effect. To address this possibility, we exploit the design of the public goods game to present experimental evidence.
on the effects of expected contributions by others on one’s own public good contribution in mass populations. Specifically, the instructions of the public goods game randomly encouraged respondents to have higher or lower expectations about the other winner’s contribution. After informing all respondents in each country that we would raffle two 100 €/£/$ Amazon vouchers among all respondents that completed the survey, the exact instructions that followed were: “The ultimate value of the voucher depends on your decision on the following: If you win a voucher, you can decide to increase the value of the second voucher that another person has won. You can give any amount between 0 and 100 €/£/$ by which the value of your voucher will be decreased. Each dollar that you decide to give to the other individual will be doubled. This means that if you decide to give, say, [10, 30, 60, 90]€/£/$, the other person will receive (20, 60, 120, 180) €/£/$ and you will receive (90, 70, 40, 10)€/£/$. Likewise, if the other person decides to give, say, [10, 30, 60, 90]€/£/$, you will receive (20, 60, 120, 180)€/£/$ and they will receive (90, 70, 40, 10)€/£/$.” We randomized the value in parentheses and computed the corresponding values stated in square brackets. For example, one possible treatment for a respondent in the United States was: “This means that if you decide to give, say, $10, the other person will receive $20 and you will receive $90. Likewise, if the other person decides to give, say, $30, you will receive $60 and they will receive $70.”

We regress an individual’s own contribution decision on the treatment indicator Other Contribution Treatment: High which equals 1 if the respondent received instructions in which the other winner’s contribution was 30, 60, or 90€/£/$ and is zero otherwise. Model 1 in Table 1 shows the reduced form results. We find that individuals in the high other contribution treatment contribute 2.4€/£/$ more than respondents in the low other contribution treatment. When we add a full set of socio-demographic covariates and control for country fixed effects as well as for the own contribution treatment frame, the average treatment effect is estimated at 2.5€/£/$.

10 The results are identical when we create indicator variables for all treatment conditions.
To estimate the causal effect of expectations about the other winner’s contribution on own contribution, we use Other Contribution Treatment: High as an instrument for Expected Contribution. This estimation assumes that the randomly assigned treatment Other Contribution Treatment: High encourages respondents to have higher expectations about the other winner’s contribution and that there is no other direct effect of this treatment on own contributions. We provide evidence of the first assumption in Table 1. Models 3 and 4 report the regression of Expected Contribution on Other Contribution Treatment: High without and with covariates. We find that individuals in the high other contribution treatment expect about 1.7€/£/$ higher contributions from the other winner than respondents in the control group. The second assumption that the exclusion restriction holds cannot be tested but is plausible given that the treatment is exclusively a weak suggestion about the other winner’s contribution. Models 5 and 6 in Table 1 report the instrumental variable estimates of the effect of Expected Contribution on Own Contribution. We find that a one €/£/$ increase in the contribution that an individual expects from the other winner increases an individual’s own contribution by about 1.4 (model 5) to 1.5 (model 6) €/£/$. This is strong evidence of reciprocity having a causal effect on public goods provision in a static setting for a representative sample of the mass population.

3 Strategy Types and the Elasticity of Conditional Cooperation

The previous section has explored the effects of reciprocity. We find surprisingly little evidence that individuals’ level of cooperation differs across socio-demographic groups. Instead, expected cooperation by others turns out to be a major predictor of individuals’ contributions, which seems to suggest that a large share of the population uses conditionally cooperative strategies. It remains unclear, however, how precisely individuals condition on their expectations about the contributions of others, what the distribution of types of condition-
ally cooperative strategies is in representative samples, and whether the types of reciprocal strategies used differs across socio-demographic groups.

**Types of Strategies**

To answer these questions, immediately after our survey respondents played our public goods game, we used the strategy method (Selten 1967; Fischbacher et al. 2001; Rauhut and Winter 2010) to identify the functional form that individuals use to map from the set of contributions by others to their own set of contributions. The strategy methods asks how much a respondent would like to give the other winner if they knew that respondent’s gift to them.

Figure 3 plots individual contribution mappings by country. Although a considerable share of respondents use strategies that are inelastic to the other individual’s contribution, the large number of lines that have a positive slope suggest that positive reciprocity appears to be widespread. To explore the distribution of strategy types in all four countries we code respondents depending on the functional form that relates their own contribution and the contribution by the other individual (see the Appendix for detailed coding rules). Figure 4 breaks down the distribution of strategy types by country. We distinguish five types: Freerider, Positive Nonconditional, Positive Reciprocity, Inverse U-shaped Reciprocity, and Other. We find that in three out of four countries (the United States being the exception), the plurality of individuals, about 40 to 50%) use positively reciprocal strategies, where one’s own contribution increases in the other individual’s contribution to the public good. The second most frequently used strategy is positive nonconditional, where individuals contributed a fixed, positive amount to the public good. Again, the United States is the exception where constant non-zero contribution strategies are used by the plurality of individuals.

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11 The exact question wording was: “Now suppose you knew how much the other winner of the voucher was going to contribute. Please indicate how much you would like to give if the other winner of the voucher gives the following amount? Remember that any amount that you decide to give to the other winner is doubled.” The respondent then chose a value they would give if they knew the other winner contributed 0, 25, 50, 75, 100 €/£/$.
The distribution of the types of strategies in our representative sample is similar in important ways to the distribution of strategies documented in the laboratory literature examining static public goods games. For example, overall about 45% of the individuals in our sample employ conditionally cooperative strategies, which is comparable to lab-experimental findings (Fischbacher et al. 2001). However, in other important ways the distribution of types differs from lab experimental results. Specifically, freeriding is somewhat less widespread than observed in our data. For example, (Fischbacher et al. 2001) report that 30% of their participants are free riders while in our data 5% respondents always make zero contributions. If we also code respondents that contribute less than 5 €/£/$ on average as freeriders, this share increases to about 12 percent. This difference could be due to a number of factors. For example, the students or selected populations in these studies may simply be more likely to free ride in the public goods games than others. Alternatively, differences in how laboratory public goods games and our survey game are presented to respondents may result in differences in understanding of or motivation for free riding.

To examine whether different types of respondents use different reciprocal strategies, we regressed strategy type on sex, age, income, and education using a multinomial logit model. Table 2, columns 1a to 1d, report our results. The baseline outcome is the freerider strategy and thus the coefficients indicate if the strategy type in that column is more or less likely than free riding for a given demographic group. For example, the positive estimate of 0.443 for the variable Female in column 1b indicates that women were more likely than men to employ a positive reciprocity strategy than a freerider strategy. Several patterns stand out in these results. First, women, the young, higher income, and higher educated respondents are all more likely to use a positive reciprocity strategy compared to free riding. Second, moving from the low to the high education group increases the probability of employing a positive reciprocity strategy and decreases the probability of using all other strategies. Third, higher income also increases the probability of using an inverse U-shaped strategy. Fourth, older

12 Among the the group of positive nonconditional types, 26% contribute up to 10 €/£/$, 30% contribute between 10 and less than 50 €/£/$, and 44% contribute 50 €/£/$ or more.
respondents not only are more likely than younger respondents to freeride but also are more likely to use a positive nonreciprocal strategy. In short, reciprocal strategies significantly correlate with socio-demographic characteristics which suggests that specific groups within societies and the regions in which they are concentrated may enjoy an advantage in solving public goods type social dilemmas. Specifically, policies and institutional arrangements adapted to suit the types of strategies prevalent in particular groups and regions may be more effective in solving cooperation problems.

The Elasticity of Positive Reciprocity

A large share of individuals in all four countries follow a norm of positive reciprocity. Although theoretically and empirically this facilitates cooperative behavior, even conditional cooperation may eventually result in a breakdown of cooperation. This can happen if individuals employ strategies that are only imperfectly conditionally cooperative, i.e., if for any additional unit contributed by the other, the individual contributes less than one unit. If these actors play against each other repeatedly, the contributions will converge to zero over time, a prediction supported by previous lab-experimental results (Fischbacher and Gächter 2010).

To explore to what extent individuals in mass populations employ imperfectly reciprocal strategies we estimated an auxiliary regression for each respondent in which we regressed her/his contribution on a variable that indicated the amount given by the other person (0, 25, 50, 75, and 100 €/£/$). A regression coefficient that has a value of one indicates perfectly reciprocal behavior while values less than one indicate imperfectly positive reciprocity.

Figure 5 shows the distribution of elasticities by country. In all four countries, the modal elasticity of positively reciprocal strategies is one. However, a large share of conditionally cooperative individuals exhibit elasticities that are smaller. Across all four countries, the

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13 Table 3 in the Appendix reports results from models that include additional socio-demographics, such as, marital status indicators and political ideology. However, there exist relatively few significant differences with the exception that left ideology correlates with using both a positive reciprocity strategy and an inverse U-shaped reciprocity strategy compared to the other alternatives.
median elasticity is 0.70 (the mean is 0.67). This value is somewhat smaller than previous lab experimental evidence (Fischbacher and Gächter 2010), where the correlation has been close to one (0.99). However, these experiments used students as subjects. Thus, the difference in these findings may result from the fact that we use representative samples. Indeed, when we only analyze respondents who are currently in education and between 18 and 29 years old, we find that the median elasticity is 0.9 and the mean 0.75.

Our analysis of strategy types suggests that some socio-demographic groups are more likely to employ reciprocal strategies than others. This is consistent with the view that specific sub-groups of the population may have an advantage in the provision of public goods. This advantage is more substantial if those groups also have relatively high contribution elasticities. To explore whether the extent of reciprocity is unevenly distributed across socio-demographic groups, we consider the set of respondents that use positively reciprocal strategies and regress individual contribution elasticities on a full set of income, age, gender, and education indicator variables. Table 2 column 2, shows the results. We find that the level of positive reciprocity varies significantly across socio-demographic groups. Female individuals that use a positively reciprocal strategy have a significantly lower contribution elasticity than male respondents. This seems consistent with the finding that women contribute significantly less to the public good in the payoff-relevant public goods game (see Figure 2). We also find significant intergenerational differences, as older individuals have significantly lower contribution elasticities. In contrast, those with higher income and higher education play reciprocal strategies that are significantly more responsive to the other individual’s contribution to the public good. In sum, these findings suggest that the level of reciprocity is not evenly distributed within societies. The highest levels of contribution elasticities are present among the male, young, highly educated and high income individuals. In contrast, female respondents that are older, have lower income, and lower levels of education use less conditionally cooperative strategies.
4 Conclusion

This paper examines who cooperates and who employs reciprocal strategies using representative samples of mass populations. We find that socio-demographic factors explain surprisingly little variation in individual contribution behavior in an anonymous, one-shot public goods game. Thus, there do not seem to exist significant divides in the general level of cooperation across age, income, and education groups. Our results suggest that expectations about others contributing to the public good are the strongest predictor of contributions and we use a randomized experiment to demonstrate that this relationship has a causal interpretation. We also find that 45% percent of the populations in France, Germany, the United Kingdom, and the United States use positively reciprocal strategies and that, despite levels of cooperation being relatively evenly dispersed, important differences exist in the distribution of reciprocal strategies across socio-demographic groups.

These results contribute to several important literatures and carry noteworthy implications for both scientists and policymakers. First, the findings provide a nuanced picture of the distribution of cooperation and strategies in mass populations, thereby extending and complementing previous work that has explored cooperative behavior using relatively small self-selected samples in lab and lab-in-the-field experiments. Second, our study provides a new research design for estimating the causal effect of expectations about public goods contributions. Only by studying behavior in representative samples is it possible to determine if there are societies or sub-populations within societies that have a greater underlying propensity for public goods provision or employ reciprocal strategies that make them more responsive to interventions that influence expectations about the behavior of others. These insights improve our knowledge about the potential impact of institutions that aim at stabilizing expectations about contributions to public goods by others. If, for example, individuals do not play conditionally cooperative strategies, such institutions will have at best small effects. However, institutions will matter most when created for a population or subpopulations that indeed use positively reciprocal strategies. Thus, policymakers and sci-
entists engaging in the design of institutions to facilitate solving cooperation problems may want to take into account which types of strategies individuals in the target populations employ and how these are distributed.
References


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Table 1: The Causal Effects of Expected Contribution on Own Contribution. This table reports coefficients, robust standard errors (in parentheses) and p values from several regression analyses. Columns 1 and 2 report reduced form OLS regression results of Own Contribution on the Other Contribution Treatment: High which is equal to 1 if the randomized example of the other lottery winner’s contribution is equal to 30, 60, or 90 and equal to zero if it is 10. Columns 3 and 4 report the first stage regression of Expected Contribution on Other Contribution Treatment: High. Columns 5 and 6 report the instrumental variable estimates of Own Contribution on Expected Contribution using Other Contribution Treatment: High to instrument for Expected Contribution.
Table 2: The Socio-Demographic Correlates of Strategy Choice and Contribution Elasticity. 
This table reports coefficients with heteroskedasticity-robust standard errors in parentheses (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$). Strategy choice (columns 1a to 1d) is estimated using a multinomial logit model with freerider as the base outcome. Column 2 reports OLS regression results for positive reciprocity types with individuals’ contribution elasticity as the outcome variable. All models include country fixed effects.
Figure 1: *Distribution of Own Contribution to the Public Good.* The upper panel shows the distribution of contributions to the public good (pooled data, $N = 8,500$). The lower panel shows the distribution by country. Based on representative samples of the adult population in France ($N = 2,000$), Germany ($N = 2,000$), the United Kingdom ($N = 2,000$), and the United States ($N = 2,500$).
Figure 2: Correlates of Cooperative Behavior in France, Germany, the United Kingdom, and the United States (pooled data). This plot shows OLS coefficients (dots) and 95% confidence intervals computed from heteroskedasticity-robust standard errors (Model 1 $N = 8,497$, Model 1 $N = 8,495$). Expected contribution is measured using the following question: "How much do you think the other winner will contribute?" Answers were coded using three categories based on the distribution of responses. Expected contributions are coded as low if the respondent expects the other winner to contribute below 3€/£/$ (25th percentile). Expected contributions are coded as medium if the expected contribution is between 3€/£/$ and below or equal to 50€/£/$ (75th percentile), and high if the expected contribution is greater than 50€/£/$ (75th percentile). The coefficient without a confidence interval indicates the reference group (Expected Contribution: Low).
Figure 3: Distribution of Conditional Contributions (Strategies). The upper panel shows the distribution of contributions to the public good game conditional on the contribution by the other respondents in representative samples of the adult population in France, Germany, the United Kingdom, and the United States (total $N = 8,498$). The lower panel shows the conditional contributions by country. Strategies are measured using the strategy method (see text for details).
Figure 4: Distribution of Strategies by Country. The upper panel shows the distribution of individuals' strategies in the pooled data. The lower panel shows the distribution by country. Based on representative samples of the adult population in France ($N = 2,000$), Germany ($N = 2,000$), the United Kingdom ($N = 2,000$), and the United States ($N = 2,500$).
Figure 5: Distribution of Positive Reciprocity The upper panel shows the distribution of individuals’ contribution elasticities. The lower panel shows the distribution by countries. Elasticities are estimated using the strategy method in combination with a regression analysis. The strategy method asks individuals how much they would like to give the other winner if they knew that respondent’s gift to them (see text for details). We estimated an auxiliary regression for each respondent in which we regressed her/his contribution on a variable that indicated the amount given by the other person (0, 25, 50, 75, and 100 €/£/$). The regression coefficient provides us with a measure of reciprocity. A value of one indicates perfectly positive reciprocity. Values less than one indicate less than perfectly positive reciprocity and values greater than one imply more than perfectly positive reciprocity. Based on representative samples of the adult population in France (N = 2,000), Germany (N = 2,000), the United Kingdom (N = 2,000), and the United States (N = 2,500).
Appendix

Coding of Strategies

Survey respondents first played a linear public goods game in which each decided how much of his or her lottery winnings (if he or she won) to give to another respondent who also won a lottery and was also given an opportunity to transfer some of his or her winnings to the respondent. Any amount transferred between lottery winners was doubled. Consequently, total payoffs were maximized if each respondent gave all his or her winnings to the other winner, but each respondent had an incentive to give nothing to the other winner.

After playing the linear public goods game, respondents were asked a set of follow up questions. Using the strategy method, survey respondents were asked how much they give to the other respondent if they knew the other respondent had given them 0, 25, 50, 75, or 100 €/£/$.

For all 8,500 respondents, we have plotted their contributions against the stated contributions of the other winner. These plots measure how responsive each respondent was to knowledge about the other winners contribution. We code each respondent in one of the following categories:

1. Free-riders. The respondent always contributes 0.

2. Positive nonconditional. The respondent gives a constant positive contribution. This contribution does not vary across the different known values of the other winners contribution (graph is a horizontal line placed above 0). The horizontal line need not be perfectly flat but cannot vary across all values by more than 10.

3. Positive reciprocity. Contributions increase monotonically and the total increase is greater than 10.

4. Negative reciprocity. Contributions decrease monotonically and the total decrease is greater than 10.

5. U-shaped reciprocity. The contribution function is convex and the difference between max and min contribution is greater than 10.

6. Inverse u-shaped reciprocity. The contribution function is concave and the difference between max and min contribution is greater than 10.

7. Other. All cases that do not fit the six definitions above.

\(^{14}\)Because of the large number of these plots and large file sizes the corresponding figures are available from the others upon request.
Appendix Figures

Figure 6: Correlates of Cooperative Behavior in France, Germany, the United Kingdom, and the United States by Question Order (pooled data). This plot shows OLS coefficients (dots) and 95% confidence intervals computed from heteroskedasticity-robust standard errors (Total N = 8,495). Expected contribution is measured using the following question: "How much do you think the other winner will contribute?" Answers were coded using three categories based on the distribution of responses. Expected contributions are coded as low if the respondent expects the other winner to contribute below 3€/£/$ (25th percentile). Expected contributions are coded as medium if the expected contribution is between 3€/£/$ and below or equal to 50€/£/$ (75th percentile), and high if the expected contribution is greater than 50€/£/$ (75th percentile). The coefficient without a confidence interval indicates the reference group (Expected Contribution: Low).
### Table 3: The Socio-Demographic Correlates of Strategy Choice and Contribution Elasticity (All Covariates)

This table reports coefficients with heteroskedasticity-robust standard errors in parentheses (*** \( p < 0.01 \), ** \( p < 0.05 \), * \( p < 0.1 \)). Strategy choice (columns 1a to 1d) is estimated using a multinomial logit model with freerider as the base outcome. Column 2 reports OLS regression results for positive reciprocity types with individuals’ contribution elasticity as the outcome variable.