Favor Trading in Grassroots Fundraising: The Girl Scout Cookie Phenomenon

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Abstract

Grassroots fundraising leverages favor trading within social networks to support the provision of a public good. We use a laboratory experiment to study the elements and dynamics of this type of fundraising institution. Peer-to-peer reciprocity is an important component of grassroots fundraising, and the ability to practice this targeted reciprocity in our experiment increases contributions to the public good by 14%. Subjects discriminate by rewarding group members who have been generous and withholding rewards from ungenerous group members. At least some of this reciprocal behavior is rooted in other-regarding preferences. When someone is rendered unable to benefit from favor trading, he gives much less to the public good than he does in other settings. People thus excluded from the "circle of reciprocity" provide a clean and strict test of indirect reciprocity, since they cannot benefit from a norm of cooperation. We do not observe indirect reciprocity.

Keywords: public goods, reciprocity, experiment, peer-to-peer fundraising

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1. Introduction

Peer-to-peer solicitation is an important fundraising avenue for nonprofit organizations. Active donors are asked to tap into their social networks to raise money. Information technology has made it easier for such citizen boosters to cast their fundraising nets through custom websites and social media. Some organizations rely heavily on fundraising drives executed through networks. For instance, peer to peer fundraising is used by charities ranging from Oxfam to the Juvenile Diabetes Research Foundation, as well as by political campaigns. The Girl Scouts of the USA raises a quarter of its operating revenues from member-driven fundraising sales such as an annual push to sell cookies (Girl Scouts of the USA, 2008). Donors also understand the benefit of this type of fundraising; roughly one-third of young people use email and social networking sites to inform friends about a charity (Preston, 2010). This method is popular and low cost and fundraisers are clearly aware of its effectiveness; however, its mechanics and dynamics have not received much attention from economists.

We hypothesize that by leveraging existing social networks, inherent social preferences and favor trading, an organization can use peer-to-peer fundraising to boost giving by simply changing the provision of information. We use a lab experiment to investigate this idea. The experiment allows us to identify motives for giving in this setting and quantify their effects. The design provides a window into what type of reciprocity is in action. In our lab environment, we find that the ability to engage in pro-social favor trading (a feature of grassroots fund drives) does increase giving by a statistically and economically significant amount. There is evidence of direct reciprocity rooted in other-regarding preferences and, contrary to previous studies, no evidence of indirect reciprocity.

There are two key features of grassroots (peer-to-peer) fundraising. First, volunteers who are strong supporters of the organization are enlisted to solicit contributions from their own social networks, that is, from people with whom they have ongoing relationships. Second, donations are revealed to the fundraiser and in many cases to everyone who is solicited. A classic example is the Girl Scouts of the USA, an organization that works with American girls. The Girl Scouts' most prominent fundraiser is the annual drive in which member girls and their families sell cookies to friends, family, and neighbors. The purchase of Girl Scout cookies is fairly public: donors write their names and contribution decisions on a common sheet, and cookie deliveries are often done in front of others.

How might this technique work to raise donations? Suppose that Joe and Frank work in an office together. Joe's son is in Boy Scouts and Frank's daughter is in Girl Scouts. Each organization has an annual fundraiser: Joe's Boy Scout sells popcorn in January and Frank's Girl Scout sells cookies in February. Each man has an interest in his own child's fundraiser because of the family's stake in the organization's success. As a result, Joe will buy popcorn and Frank will buy cookies. In addition, Joe wants Frank to buy popcorn, and Frank wants Joe to buy cookies. Even if Frank does not care about Boy Scouts (or popcorn), he may buy Joe's popcorn in January hoping that Joe will reciprocate when Frank's cookie fundraiser comes around next month. These peers use the promise of future reciprocation—in a favor trading exchange like many that arise in social situations—to pressure each other to perform the pro-social act of giving to charity.[1]

[1] Social favor trading is not limited to charitable fundraising. It may drive behavior in many cooperative settings. The same dynamic may exist when time and effort (as opposed to money) are solicited, for example, in a volunteer advisory board or a school's parent-teacher association. Klein (1990) argues that peer pressure played a role in the funding of turnpikes in early America.

We would like to know whether the opportunity to practice targeted reciprocity increases contributions to a public good and whether any increase is driven by direct reciprocity, indirect reciprocity or strategic self-interest. This is difficult to identify in a non-experimental setting because selective use of fundraising techniques can introduce endogeneity into the analysis. For example, Long (1976) found that the more "personal" a donor solicitation, the more contributions were solicited. This was because a more personal solicitation allowed the fundraiser to exert peer pressure on the donor. However, the analysis will likely overestimate the relationship. Personal solicitations are more costly to perform, so charities may limit their most personal solicitations to donors known to be generous. Experiments can avoid confounds of this type. In a field experiment, DellaVigna, List, and Malmendier (2009) find evidence of "social pressure" in door-to-door fundraising, but they study one-shot (stranger) interactions and do not try to identify components of this pressure.

Since our research looks at the effect of reciprocity on cooperative and contribution behavior, it is worth defining exactly what we mean to study. Sobel (2005) offers a review of the literature on interdependent preferences and reciprocity.[2] We use the phrase "strategic self-interest" to describe Sobel's "instrumental reciprocity," in which reciprocal actions are performed to win future rewards for purely selfish reasons. One characteristic of strategic self-interest is that, since strategic motivations depend on future rewards, the removal of those future rewards will destroy strategically-motivated cooperation.

In contrast to strategic cooperation, we use the terms "direct reciprocity" and "indirect reciprocity" to describe conditional motives rooted in other-regarding preferences (Sobel's

[2] Conditional cooperation is also a type of reciprocity and may influence giving in public goods games as surveyed in Gächter (2007). We do not discuss this here, as it will essentially be constant across our treatments.

"intrinsic reciprocity"). Important models of this kind of reciprocity include Rabin (1993) and Cox, Friedman, and Sadiraj (2008). Returning to our Girl Scout cookie favor trading analogy, most such models allow Joe's preferences over Frank's payoffs to depend on Frank's past actions. Because these kinds of reciprocity are rooted in other-regarding preferences, they can sustain cooperation even in cases where strategic cooperation would unravel, such as after future rewards are removed.[3] In our experiment, we can detect direct reciprocity by looking at whether people reward kind acts towards themselves and whether rewarding behavior persists in late periods of the repeated game.

Indirect reciprocity occurs when a disinterested third party rewards good behavior. For example, suppose that coworker Rita has no interest in Girl or Boy Scouts and has no pet cause of her own. If Rita rewards Frank for patronizing Joe's charity (if, for example, she buys Frank's cookies), she's showing indirect reciprocity.[4] We test for indirect reciprocity by assigning one subject to a position from which he can differentially reward others but he himself can never be directly rewarded. In this way, he benefits very little from establishing a norm of cooperation in his group. Other studies (e.g., Engelmann and Fischbacher, 2009; Seinen and Schram, 2006) have found evidence of indirect reciprocity by having subjects play one-shot cooperation games in pairs, randomly re-matching them, and reporting to each subject's new partner a summary of this subject's past generosity. This interpretation of indirect reciprocity is less strict than ours: in these experiments, indirect reciprocators can benefit from a group norm of cooperation.

[3] Biologists (e.g., Trivers, 1971) have recognized the potential for reciprocity in general to promote pro-social behavior and to help pass on positive traits. Other researchers have examined direct reciprocity using one-shot games, often with an investment game (e.g., Cox, 2004).

[4] Some argue that indirect reciprocity could be a powerful tool for boosting cooperation in a large, diffuse group (e.g., Nowak and Sigmund, 2005).

We contribute to the literature in a number of ways. First, we use experiments to systematically pull apart elements of an institution that models grassroots fundraising to determine how and to what extent the institution increases contributions. Second, we use a favor-trading public goods setting to isolate reciprocal behavior and test for other-regarding preferences.[5] Third, we include a "Bachelor" design as a clean test for indirect reciprocity.

We find that the effects of allowing people to engage in targeted reciprocity, akin to the grassroots fundraising setup of the Girl Scouts, are significant. Average contributions increase by 14.4% when targeted reciprocal acts are possible. While some reciprocal acts may be strategic, we show that not all are. Some are more consistent with direct reciprocity, in the sense that they seem to be rooted in other-regarding preferences. Using our strict, clean test, we do not find evidence of indirect reciprocity.

The paper proceeds as follows. Section 2 explains the general experimental design. Section 3 describes three experimental treatments. In Section 4, we present results. We conclude in Section 5.

2. Experimental Design

The experiment is a linear public goods game with publicly revealed contributions and asymmetric payoffs. The design mimics the setup of a peer-to-peer fundraising network that allows favor trading. In each treatment, subjects are assigned into five-person groups. Each person has an endowment of z tokens each round to allocate between a private investment with return a to himself and a public investment with some return to all group members. In each

[5] The citizen booster as public good stakeholder is one way to view asymmetric returns in a public goods game; others (e.g., Brandts et al., 2007) have examined the role of such a person as a potential leader.

round, one group member is the Stakeholder: he has a bigger stake in the public good because he gets a higher return (relative to other members) from tokens invested there. The Stakeholder position rotates through group members. The public good return is b for non-Stakeholders and c for Stakeholders. Person i's contribution to the public good in round t is g_{it}, and $Stake_t$ is the index of the person who is Stakeholder in round t. Payoffs are:

$$\pi_{it} = \begin{Bmatrix} c\sum_j g_{jt} + a(z - g_{it}) & if\ \ Stake_t = i \\ b\sum_j g_{jt} + a(z - g_{it}) & if\ \ Stake_t \neq i \end{Bmatrix}$$

The parameters are such that $b < a < c$ and $a < 4b + c$. The social optimum is achieved if everyone contributes fully. Since $(c - a)$ is positive, the Stakeholder maximizes profit by contributing his entire endowment to the public good, so even a selfish Stakeholder always contributes to the public good. Since $(b - a)$ is negative, non-Stakeholders face a dilemma: they maximize profit by keeping all of their tokens, but this free riding is anti-social. Non-Stakeholder contributions will be the focus of our analysis.

As in most public good environments, a selfish person would be predicted to free ride when he is non-Stakeholder. An altruist or a person with warm glow preferences would contribute a positive amount if his marginal gain in utility from increasing others' payoffs is larger than his marginal utility loss from the reduction in his own payoff. Against this backdrop, the strategic and reciprocal forces described above will be at play, given sufficient information.

If a subject can only see a list or summary of his group members' contributions, he may exhibit conditional cooperation as in other public goods settings. However, the asymmetry provided by the Stakeholder position and a more complete information set (information on when each group member will be Stakeholder and a contribution history for each member) allow

targeted reciprocal actions to occur. This is because a subject benefits quite a bit from contributions others make when he is Stakeholder, so subjects can target each other for rewards. That is, others' past behavior can help a subject decide when to make or withhold non-Stakeholder contributions. In particular, we expect that targeted reciprocal actions will be made to take advantage of the timing in which one is a Stakeholder . That is, we expect that a subject's directly reciprocal acts will occur in response to contributions others made when he was Stakeholder (though he also benefits, albeit much less, from contributions others make when he is not Stakeholder). Similarly, we expect these reciprocations to take the form of increased (or decreased) contributions timed to the rounds when his benefactor (or malefactor) is Stakeholder.

These reciprocal acts can be of two varieties. On the one hand, they may be motivated by other-regarding preferences—that is, to refer to our earlier taxonomy, they may reflect direct reciprocity. A person's willingness to pay to increase another person's payoff may depend on the history he has observed. Thus, direct reciprocity rooted in other-regarding preferences can cause giving to be conditional on others' contributions from past rounds.

On the other hand, if a subject is strategic, observed history may change his beliefs about the best strategic action. If a group member seems to be potentially generous, a strategic subject may think that if he contributes when that person is Stakeholder he will gain favor and earn future benefits when the contribution is reciprocated. The benefits of this strategic behavior are greatly reduced after a subject passes his last stint as Stakeholder, so even in the full-information Stakeholder setting, strategic motivations are discontinuously reduced in final periods. Here, conditional giving is caused not by other-regarding preferences but by strategic self-interest.

In either of these ways, a full information set of contributions made within the group, and by whom, and the timing of when each group member will be Stakeholder allows subjects to exhibit reciprocal giving.[6] If the information on Stakeholder timing and individual contribution histories is suppressed while the game structure remains otherwise identical, targeted reciprocal acts (strategic or rooted in other-regarding preferences) are not possible.

3. Experimental Treatments

We use three treatments: Private, Public, and Ineligible, all described in detail below. All three use endowment z = 20 tokens, private good return a = \$0.02, non-Stakeholder public good return b = \$0.01, and Stakeholder public good return c = \$0.03. For non-Stakeholders, the personal return from public good contribution is half the return if the same tokens were invested in the private good; for Stakeholders it is1.5 times that return. We use a within subject design. Subjects made decisions in all three treatments, in a different group for each treatment, with treatment order varied across sessions.

The experiment is computerized and proceeds as follows. (All instructions are in Reviewers' Appendix A.) Subjects enter the lab and are given general instructions. They are told that they will make decisions in three sets of multiple rounds with three different groups, but they do not know the exact nature of the decisions they will make in each set (treatment) until the treatment-specific instructions are read. The first treatment begins with instructions that explain the information condition and the number of rounds for that treatment. The subjects play through all of the rounds for the treatment. When the first treatment is over, the groups are

[6] History (and information about history) could also affect current behavior through contagion: a person treated well (badly) in the past could react by behaving well (badly) not because they wish to reciprocate but because they have "caught" a good (bad) mood from their experience. This is outside of these type of models. However, tests indicate that our data show no evidence of contagion across treatments (results available upon request).

randomly re-matched. The second and third treatments proceed in much the same way, each with treatment-specific instructions read first. After all three treatments are complete, a questionnaire is administered and the subjects are paid anonymously. Subjects' total earnings are the sum of their earnings in each treatment, which in turn are the sum of earnings in each round.

In the software for all three treatments, subjects see first a decision screen and then, after making a decision, a review screen for each round. In both the decision and review screens, the central feature is the contribution table. This table contains a row for each round in the treatment. Columns contain information on the subject's contribution and the contributions of others in his group, the group's total contributions, and the subject's own earnings. Information is filled into this table after the decision stage of each round and remains visible for the rest of the treatment.

The Public treatment, which lasts ten rounds, follows the basic favor-trading public goods design outlined in the previous section. The Stakeholder position rotates through all five group members so everyone is Stakeholder twice. Contributions are publicly revealed and tracked individually, and Stakeholder assignments are common knowledge. Figure 1 shows the Public treatment decision screen (with simulated data). Each group member is randomly assigned a letter code (A, B, C, D, or E) and keeps the same letter code for all ten rounds. The contribution table shows in which rounds each subject will be the Stakeholder. Since contribution history is public and everyone knows when each group member will be Stakeholder, subjects can reward each other for past generosity. For example, returning to our previous analogy, if Joe is subject A and Frank is B, Joe can see how much Frank contributed in Round 1 when Joe was the Stakeholder (when he fundraised for the Boy Scouts). Joe can reward Frank with a large

contribution when Frank is Stakeholder in Round 2 (when Frank fundraises for the Girl Scouts), or Joe may withhold that reward if he deems Frank's contribution stingy.

The Private treatment also lasts for ten rounds. The Stakeholder position rotates through all group members so everyone is Stakeholder twice. However, the information environment differs from the Public treatment. Each subject still sees the disaggregated, individual contributions of his group members, but subjects are not assigned letter codes. It is no longer possible to track reputations. Figure 2 shows the review screen for the Private treatment. In each round's row, the contribution table reports the contributions of all group members in a randomly-ordered list, re-shuffled for each round. Further, even if a subject thinks he can identify a group member as being worthy (or unworthy) of reward, he still does not know when that person will be Stakeholder. He only knows when he himself will be the Stakeholder, so he cannot target reciprocal acts toward any other subject.

Finally, the Ineligible treatment is very much like the Public treatment, with randomly-assigned letter codes (not linked to the Public treatment letter codes), public reputations, and public Stakeholder timing. However, one subject in each five-member group, the "Bachelor," is ineligible to be the Stakeholder. In our analogy, the Bachelor is Rita, Joe and Frank's officemate who will never have a pet cause for which to fundraise. Because only four subjects are eligible to be Stakeholder, the Ineligible treatment lasts eight rounds so each eligible subject is still Stakeholder twice. The Bachelor is randomly chosen and remains the Bachelor for the entire treatment. The screens for the Ineligible treatment are like those for the Public treatment except that the Bachelor is indicated in the screen header and in the contribution table as the "Ineligible" person. Figure 3 shows the review screen for the Bachelor treatment. The Stakeholder position

rotation skips the Bachelor: if person D is the Bachelor, the Stakeholder is A, then B, then C, then E, etc.

The difference between the Public and Private treatments is that direct reciprocity, indirect reciprocity, and strategic self-interest cannot motivate giving in the Private treatment. Subjects do not have the information they would need to respond to each others' actions. Unconditional altruism and general conditional cooperation can affect giving in both treatments. Actions targeted directly at an individual, however, are only possible in the Public treatment. This means that, in the Public treatment, all of these forces are in play because reputations and Stakeholder identities are public. Any difference between the Public and Private treatments must be due to targeted direct reciprocity, indirect reciprocity, and/or strategic giving. (As discussed earlier, indirect reciprocity can only be cleanly isolated in the behavior of Bachelors in the Ineligible treatment; however, it can still drive the behavior of potential Stakeholders in the Public and Ineligible treatments.)

Within the Public treatment, we will be able to see whether subjects are responsive to past generosity. That is, we can see whether they give larger contributions when the current Stakeholder is someone who was previously generous.[7] This is precisely the favor trading we would expect to see in peer-to-peer fundraising. We can identify direct reciprocity as responsiveness of this type that does not disappear after the subject's last Stakeholder stint.

The Ineligible treatment allows us to investigate two additional issues. First, the Bachelor herself (Rita, in our analogy) is not subject to direct reciprocity or strategic self-interest. If the Bachelor *does* give in a way that responds to the Stakeholder's past generosity,

[7] In each round, subjects may respond to the past behavior of both the current Stakeholder and the current non-Stakeholders. However, if we detect this kind of responsiveness with regard to the current Stakeholder's past actions, this is sufficient to demonstrate reciprocal giving.

this would be evidence of indirect reciprocity. Second, the presence of a Bachelor shrinks the "circle of reciprocity" from five people to four people. Like agents in other public goods settings, the Bachelor can reap benefits from other subjects' increased generosity even if she herself does not contribute. We can observe whether this change in the group dynamic affects non-Bachelor contributions. For example, others may be discouraged by supporting a Bachelor who freeloads off the public good.

The experiments were run in the Experimental Economics Center (E*x*CEN) at Georgia State University in six separate 20-subject sessions, for a total of 120 subjects. The software was written in z-Tree (Fischbacher, 2007). The protocol was double anonymous (subjects could not identify which subjects they were interacting with, and the experimenters could not identify which subject made any set of decisions). Of the 120 subjects, 75 (62.5%) were female, and the average age was 21.8. The experiment lasted about 90 minutes, and subjects earned on average $24.33 (standard deviation $2.67).

4. Results

Our within subject design means that each subject participated in all three treatments. The three treatments were run in all six possible orders, with each order run once. We do not observe effects of treatment order on variables of interest so we pool the data across sessions.[8]

[8] There is an order effect in that non-Stakeholder contributions are higher in the Private treatment if the Private treatment is run first. We believe this is due to error: that treatment is more difficult to understand, and this is supported by the fact that Stakeholder contributions are lower in the Private treatment if the Private treatment is first. To check that our main results are unaffected by this order effect, we exclude those 40 subjects who were in the Private treatment first and rerun all our analysis. All results still hold. Further evidence that order effects are not affecting our main results come from parametric tests that control for order. These results tell the same story as results reported in this paper (see Reviewer's Appendix for the parametric tests). These analyses give us confidence that our main results are not due to the order in which the treatments were run.

Figure 4 shows contribution data across rounds.[9] Stakeholder contributions in all treatments (the dashed lines) are close to the endowment. This is expected because the Stakeholder's return from the public good is greater than his return from the private good.[10] Non-Stakeholder contributions (the solid lines) for each treatment are lower but positive in all rounds. These contributions show the downward trend usually seen in public goods games. Bachelor contributions in the Ineligible treatment are well below contributions in the other treatments and do not decline across the rounds.

Contributions by non-Stakeholders in the Private treatment compare well to previous research using linear public goods games with similar symmetric "prices of giving." Non-Stakeholder contributions start at 41% in round 1 and end at 21% in round 10, averaging 33% across all rounds. In the final round, 47% of non-Stakeholders make positive contributions. In Ledyard's (1995) survey of public goods game results, first period contributions range from 31%-68% of endowment, and final period contributions range from 9%-19% of endowment.

Results from asymmetric-return public goods games are difficult to compare because of differences in the payoff structure. In a one-shot game with asymmetric returns, subjects with lower marginal per capita returns in somewhat similar treatments gave 20% on average in Goeree, Holt, and Laury (2002) and 18% in Glöckner et al. (2009). These results give us confidence that our overall results are not far off from previous work, despite the asymmetry of payoffs.

[9] The round numbers used in Figure 4 indicate the round number within that treatment. Since data are pooled across orders, the first round of a given treatment (e.g. Private) is also pooled across all orders. This means that round one is behavior in the first round ,even though that might not be the subjects first round overall (e.g. if Private was the second or third treatment).

[10] Contributions are not strictly 100%. This could be caused by subject error or myopic inequity aversion.

4.1 Treatment Effects

Recall that the main difference between the Private and Public treatments is that the Public treatment opens the door to targeted direct reciprocity, indirect reciprocity, and strategic self-interest. Thus, we can test whether these forces can increase the provision of a public good simply by determining whether non-Stakeholder contributions are higher in the Public treatment than they are in the Private treatment.[11]

Figure 4 shows that average non-Stakeholder contributions in the Public treatment exceed those in the Private treatment in all rounds. These differences are only statistically significant in a few rounds, but are significant when pooled across rounds. As shown in Table 1, the average non-Stakeholder contribution is 14.4% larger in the Public (37.8% of endowment) than in the Private treatment (33.0%). Using a paired Wilcoxon signed-rank test to test the difference between the two averages yields a p-value of 0.051.[12] Thus, allowing these social forces to manifest increases cooperation by a significant amount. This increase was achieved by a small, low-cost change to the information structure of the game to allow targeted reciprocity.

How does this increase in contributions compare to the effect of other public goods institutions that manipulate information on the contributions of others? Simply reporting disaggregated individual contributions, as in our Private treatment, rather than total contributions, increased contributions by 21% in Sell and Wilson (1991) but had no effect in Croson (2001). Revealing donors' contributions to each other increases contributions to external

[11] Results in this section are mostly based on non-parametric tests. All results in this section hold under parametric specifications as well, including pooled and panel regressions with individual fixed effects controlling for group average contributions, round number, and a dummy indicating whether the subject's last Stakeholder stint had passed. (Results of selected parametric tests are in Reviewers' Appendix B.)

[12] Note that because our design is within subjects, we are using paired statistical tests to take into account the non-independence across observations when comparing the behavior of the same subjects across treatments (within subjects). When we compare behavior across subjects within a treatment, we use standard non-paired tests.

charities by 10% in Soetevent's (2005) study of church collections, but only for external causes and only temporarily. Andreoni and Petrie (2004) find an increase in giving of 59% when subjects see a photograph and contribution history for each group member, but there is no increase in giving when only a photograph or (most relevantly) only contribution history is revealed.[13] In sum, providing the information structure needed to engage in favor trading does increase contributions as some similar institutional changes do. Favor trading requires only a simple change in information conditions, and the increase in contributions thus afforded may be less costly on net than other institutional changes that yield greater increases.

We now turn to behavior in the Ineligible treatment. Table 2 shows that Bachelors contribute significantly less (23.4% of endowment) than they did in the Private (29.9%) or Public (37.6%) treatments (paired Wilcoxon signed-rank test p=0.043 and p=0.020, respectively). However, Bachelor contributions in the Private treatment are not statistically different from non-Bachelor (non-Stakeholder) contributions (Mann-Whitney test p=0.507). Also, Bachelor contributions and non-Bachelor (non-Stakeholder) contributions are not statistically different in the Public treatment (Mann-Whitney test p=0.653). This suggests that the effect of the Ineligible treatment on Bachelor contributions is not due to idiosyncrasies of those subjects who were randomly assigned to be Bachelors. Bachelors' low contributions may be caused by any of a number of factors. First, Bachelors may feel a weakened urge to conform to a contribution norm. Second, their reduced earnings potential may render them less willing to trade off their payoff to benefit others. Finally, although the game has changed from the perspective of non-

[13] Costly punishment, another tool of interest in public good provision, has generally been found to increase giving by a large amount but often decreases efficiency overall because of the cost of punishment. An important paper in this area is Fehr and Gächter (2000), and the paper by Bochet, Page, and Putterman (2006) contains a useful discussion of the literature. Nonmonetary "punishment" has also been studied, as the use of social disapproval in Masclet et al. (2003) and Carpenter and Seki (2010). However, while social disapproval increased contributions by 37% in the former, its effects in the latter were mixed and contributions actually decreased for some populations.

Bachelors, shrinking the "circle of reciprocity" to four people and adding a public good beneficiary who is outside that circle, the effect of these changes is small and not statistically significant. There is no difference between non-Bachelor, non-Stakeholders' contributions in the Ineligible treatment (36.0% of endowment) and their behavior in the Private (33.8%) and Public (37.8%) treatments (paired Wilcoxon signed-rank test p=0.233 and p=0.410, respectively).

Figure 5 shows the distribution of non-Stakeholder contributions, pooled across all rounds of all sessions. All treatments show a peak at zero tokens, a possible peak at 6-10 tokens, a dip between 10 and 20, and a peak at 20 tokens. The only statistically significant differences are the following. Bachelors give zero tokens more often in the Ineligible than in the Private (paired Wilcoxon signed-rank test p=0.007) and the Public (p=0.014) treatments. Also, in the Public treatment, subjects give 20 tokens more often than in the Private (p=0.021) and Ineligible (p=0.098 for Bachelors, p=0.041 for non-Bachelors) treatments.

4.2 Direct Reciprocity and Other-Regarding Preferences

We next look at reciprocity, i.e. responsiveness to the current Stakeholder's past behavior. We will first examine reciprocal acts that could either be strategic or rooted in other-regarding preferences, and then we will isolate reciprocity rooted in other-regarding preferences. To do this, we use within-subject tests of aggregate statistics. For each person, we examine whether, as non-Stakeholder, he gave more on average to the public good in rounds in which the current Stakeholder was previously generous to him as compared to rounds in which the current Stakeholder was previously ungenerous. Stakeholder past generosity is determined by the current Stakeholder's average contribution to the public good in rounds in which this subject was the Stakeholder. For example, Joe is Stakeholder in rounds 1 and 6, and Frank is Stakeholder in

rounds 2 and 7. In round 2, Joe will remember how generous Frank was in round 1. "Stakeholder past generosity" will be Frank's contribution in round 1. In round 7, when Frank is Stakeholder, our measure of "Stakeholder past generosity" for Joe would be the average of Frank's contributions in rounds 1 and 6 when Joe was Stakeholder.

We look at the effects of generosity using nonparametric tests. To do so, we define a "generosity threshold" such that contributions greater than this amount are called generous. For each subject, we calculate his average contribution when facing a Stakeholder whose past generosity meets this threshold and his average contribution when facing a Stakeholder whose past generosity does not. We tried many thresholds, including 6, 8, 10, 12, 15, and 19 tokens and the group's cumulative average contribution, with robust results. We report results from a threshold of 10 tokens (50% of endowment). To clarify how this works, suppose that a group contains only Joe, Frank, and Mary. Frank gave 15 tokens every time Joe was Stakeholder, and Mary always gave 2 tokens. Joe's average contribution to a generous Stakeholder is his average contribution when Frank was Stakeholder, and his average contribution to an ungenerous Stakeholder is his average contribution when Mary was Stakeholder.

A subject displays reciprocal behavior if he gives more when facing a previously-generous Stakeholder than when facing a previously-ungenerous Stakeholder. Table 3 presents averages of these measures. In all treatments in which it is possible to attribute previous generous and ungenerous acts to a particular group member (the Public and Ineligible treatments), generosity is rewarded. In the treatment in which previous generosity cannot be attributed to a person (the Private treatment), it is not rewarded.[14] We would not expect rewards

[14] We find similar results in panel regressions of non-Stakeholder contribution regressed on the current Stakeholder's past contributions to the subject, group average past contributions, round, and a dummy for whether the subject is past his last opportunity to be Stakeholder.

to generous behavior in the Private treatment because subjects cannot tell who is Stakeholder or what the current Stakeholder did in the past. In the Public and Ineligible treatments, however, subjects give over 50% more to previously-generous Stakeholders than they give to previously-ungenerous Stakeholders.[15]

We compare responsiveness, the difference between the amount given to a generous Stakeholder and the amount given to an ungenerous Stakeholder, between treatments. Responsiveness is greater in both the Public (14.8% of endowment) and Ineligible (17.3% of endowment) treatments than in the Private (-1.6% of endowment) treatment (paired Wilcoxon signed-rank test p=0.000 and p=0.000, respectively). This is evidence of directly reciprocal behavior, although this behavior may be rooted in strategic self-interest. Responsiveness does not differ between the Public and Ineligible treatments (p=0.966).

We look next at whether subjects discriminate their contributions because of other-regarding preferences or because of strategic self-interest. We dispose of strategic concerns by looking for reciprocal giving after a person has passed his last Stakeholder stint. For example, again assume that Joe was Stakeholder in rounds 1 and 6 and Frank was Stakeholder in rounds 2 and 7. Assume no further fundraising rounds follow. If Frank was kind to Joe in rounds 1 and 6, will Joe reciprocate in round 7? If Joe is purely strategic, he has little to gain, so he should not contribute and therefore not reciprocate.

We test for non-strategic reciprocity by constructing statistics of each subject's average contribution to previously generous and ungenerous Stakeholders in rounds after this subject's last Stakeholder stint. These results, shown in Table 4, imply that strategic concerns are not the

[15] Recall that subjects could respond to past actions of the current Stakeholder *and* the current non-Stakeholders, although their contributions benefit the former three times as much as the latter. If subjects were responding to non-Stakeholders in this way, this would attenuate our within-subject test of responsiveness to Stakeholder history.

sole motivator. Other regarding preferences are more strongly at play. Subjects in the Public treatment continue to discriminate between generous Stakeholders (to whom they give 30.0% of endowment) and ungenerous Stakeholders (16.9%) even after they have no strategic motive to do so.[16] This difference is statistically significant (paired Wilcoxon signed-rank test p=0.026). In the Ineligible treatment, the sample size is reduced because only non-Bachelors are considered and the treatment has fewer rounds. Because of this reduced power, discrimination in late rounds is not statistically significant, although the difference is in the same direction.

4.3 Indirect Reciprocity

An indirect reciprocator is a disinterested party who rewards one subject for generosity toward another subject. Indirect reciprocity cannot be tested by looking at the responsiveness of a subject who has the opportunity to be Stakeholder because he is not disinterested. He can benefit from fostering a norm of cooperation. The behavior of Bachelors in the Ineligible treatment gives us a clean test of indirect reciprocity. These randomly-selected subjects will never be Stakeholder, so they can never receive the benefits of targeted reciprocity. Therefore, direct reciprocity and strategic self-interest cannot drive Bachelor giving.

We have shown that Bachelors give significantly less than non-Stakeholders in the Ineligible treatment and less than they themselves gave in other treatments. The data also show that Bachelors do behave reciprocally when they are part of the circle of reciprocity, in that they have positive responsiveness in the Public treatment (giving 35.02% of endowment to previously generous Stakeholders and 22.28% of endowment to previously ungenerous Stakeholders, significantly different with paired Wilcoxon signed-rank p=0.004). However, Bachelors in the

[16] Again, similar results hold in panel regressions, only using rounds after which the subject is no longer Stakeholder.

Ineligible treatment do not give more when facing previously generous Stakeholders. They give 21.9% of endowment when facing previously generous Stakeholders and 25.5% when facing previously ungenerous Stakeholders. These levels are not significantly different (paired Wilcoxon signed-rank p=0.823). Therefore, indirect reciprocity does not seem to be a motivator in this setting.

This result is intriguing because other studies have found evidence of indirect reciprocity (e.g., Engelmann and Fischbacher, 2009; Seinen and Schram, 2006). The re-matching structure of those experiments, however, allows subjects to have a financial interest in the group's overall cooperation. Subjects are not wholly disinterested as our Bachelors are. Both conditions are valid settings in which to examine cooperation. However, our results align more closely with the "bystander" interpretation of indirect reciprocity.

5. Conclusions

Favor trading is a natural element of social networks. Grassroots fundraising harnesses the tendency to trade favors and uses the drive to reciprocate to increase the provision of public goods. In an experiment that allows different forms of reciprocity to be turned on and off, we explore the power of favor trading and the mechanisms through which institutions such as grassroots fundraising may work. In our setting, favor trading increases cooperation by 14.4%, an amount that is both statistically and economically significant.

Our results also provide a new window into reciprocity. We find evidence of direct reciprocal giving rooted in other-regarding preferences. While some studies have found direct reciprocity in laboratory institutions like the investment game (e.g., Berg et al., 1995), others have criticized the abstraction of those institutions (e.g., List, 2006). The presence of direct

reciprocity in our slightly richer setting may be a good step in understanding how institutions outside of the lab can take advantage of direct reciprocity for social gain.

On the other hand, we find no evidence of indirect reciprocity in our Ineligible treatment. While most experiments that examine indirect reciprocity allow actors to directly benefit from an increased tendency to cooperate within the group, we strip our Bachelor of strong incentives to foster cooperative norms. When given the costly chance to reward a kind act without the possibility of future reciprocation, our Bachelors do not.

Nonprofit organizations clearly are aware of the benefits of soliciting donations from within social networks. In the past few years, more low-cost avenues for peer-to-peer solicitation have become available, from Facebook cause promotion to custom donor-based solicitation websites like DonorPages.com. Our results suggest that grassroots fundraising adds a small, low-cost change to the standard public goods model, and can yield significant financial benefit for the organization. We view our results as a lower bound for the efficiency gains possible with grassroots fundraising. In a social situation with friends, coworkers or family, rewards and sanctions are much stronger than the incentives offered in the lab and social interactions are longer term. Of course, other factors in charitable giving could diminish this effect. Notably, a donor's peer-pressured gift to a friend's charity may reduce his gift to another charity. A field study could address these general equilibrium-type effects.

Acknowledgements

We thank the National Science Foundation (Award SES-0752754) and Georgia State University for funding this research.

Reviewers' Appendix A: Instructions for the Girl Scout Cookie Experiment

There are four components to the instructions: the General Instructions, which are read at the start of the experiment; and then the specific instructions for each of three treatments. Each treatment's instructions starts with the text, "Instructions for the [next] set of rounds." In this Appendix, the name of the treatment is noted on the same line of text, although the treatment name was not included in the instructions the subjects saw. Otherwise, except for details of pagination, these instructions are identical to those provided to the subjects.

General Instructions

Welcome to the experiment! This is a study of decision-making behavior. It will last about two hours.

Complete Privacy

This experiment is structured so that no one, including the experimenters and the other participants, will ever know the decisions or earnings of anyone in the experiment. You will collect your earnings, in a sealed envelope, from a numbered mailbox that only you will have the key for. Your privacy is guaranteed because neither your name nor your student ID number will appear on any form that records your decisions or your earnings. The only identifying mark that will be used is the identification number on the mailbox key that you will select. Each key opens a mailbox in the hallway adjacent to this room. After the experiment, you will each collect your payment from your mailbox alone and privately. The key and mailbox are labeled with the same identification number. You are the only person who will know your identification number.

Random Group Assignments and Anonymity

Each person will be randomly matched with 4 other people to form a 5-person group. No one will learn the identity of the people in his/her group. The composition of your group will

change after a number of rounds, and you will be randomly matched in a new group of 5 people (you and 4 others). You will be notified when the groups have been rearranged. Once you are matched with a group, you will learn how many rounds you will play with this group. In total, you will play in 3 different 5-person groups.

Your Payment

In each round of the experiment, you will make a decision. What you earn in each round will depend on decisions that you and the other 4 people in your group make. Your payment for this experiment will be the sum of your earnings in all rounds.

The Task

For each decision, you will choose how to divide 20 tokens between two funds: the Personal Fund and the Group Fund. You are free to contribute some of your tokens to the Personal Fund and some to the Group Fund. Alternatively, you can contribute all of them to the Personal Fund, or all of them to the Group Fund. You will earn money from the tokens you put in each fund (below we describe how). Your total earnings for each round is the sum of your earnings from the Personal Fund plus your earnings from the Group Fund.

1. *The Personal Fund*: each token you contribute to the Personal Fund will earn you $0.02.

Example: Suppose you contribute 0 tokens to the Personal Fund. Then you would earn nothing from the Personal Fund.

Example: Suppose you contribute 10 tokens to the Personal Fund. Then you would earn $0.20 from the Personal Fund.

Example: Suppose you contribute 20 tokens to the Personal Fund. Then you would earn $0.40 from the Personal Fund.

2. *The Group Fund*: What you earn from the Group Fund will depend on the **total number of tokens** that you and the other 4 members of your group contribute to the Group Fund. Every token any member of your group puts in the Group Fund earns money for each member of the group, but not everyone will earn the same amount of money.

Before we explain more about the earnings from the Group Fund, you must learn about the **Stakeholder**. In each round, one member of your group will be the **Stakeholder**. This person earns more money (relative to the rest of the group) from all of the tokens in the Group Fund. You will always know whether you are the Stakeholder. If you **are not the Stakeholder**, you earn $0.01 for each token any member of your group puts in the Group Fund. If you **are the Stakeholder**, you earn $0.03 for every token any member of your group puts in the Group Fund.

Example: Suppose you contribute 0 tokens to the Group Fund and no one else contributes any tokens to the Group Fund. Then you would earn nothing from the Group Fund. Everyone else in your group would also earn nothing from the Group Fund.

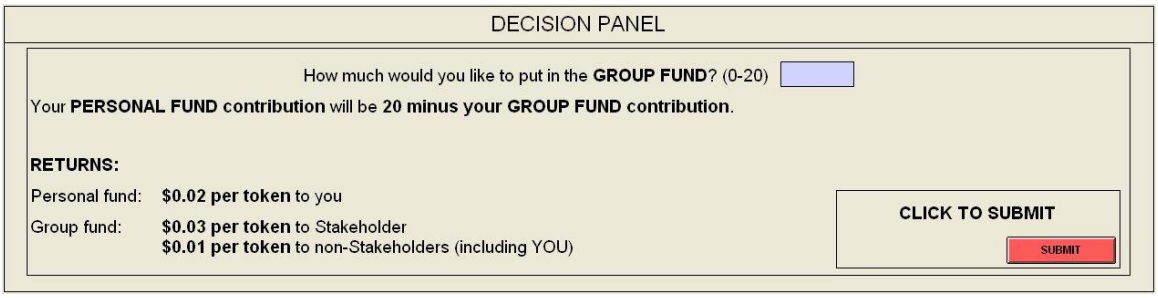
Example: Suppose you contribute 13 tokens to the Group Fund and no one else contributes any tokens to the Group Fund. Suppose that you are the Stakeholder. Then you would earn $0.39 from the Group Fund. Everyone else in your group would earn $0.13 each from the Group Fund.

Example: Suppose you contribute 20 tokens to the Group Fund and no one else contributes any tokens to the Group Fund. Suppose that you are not the Stakeholder. Then you would earn $0.20 from the Group Fund. The Stakeholder would earn $0.60 from the Group Fund. All of the other members of your group would earn $0.20 each from the Group Fund.

Everyone will earn money from every token contributed to the Group Fund, whether they contribute tokens to the Group Fund or not.

Decision Panel

For each decision, you will enter your Group Fund contribution in the Decision Panel. The Decision Panel is a box at the bottom of the screen that looks like the following:



Type the amount you want to put in the **Group Fund** in the box. This must be a number between 0 and 20. The amount that will go into your Personal Fund is 20 minus the amount you

type. For example, if you type the number 0, 0 tokens will go into the Group Fund and 20 into the Personal Fund. If you type 6, 6 tokens will go into the Group Fund and 14 into the Personal Fund. If you type 13, 13 tokens will go into the Group Fund and 7 into the Personal Fund.

When you are satisfied with the allocation of tokens you entered, you will click the "SUBMIT" button to submit your allocation.

Contributions Table

The Contributions Table gives you information about what has happened in past rounds and what will happen in future rounds. The table will show all of the rounds you will play with your current group, and will indicate when you will be the Stakeholder. Also, after everyone has made their decisions for a round, the table will tell you what the Group Fund contributions were in that round, and what your earnings were.

The table will change slightly in different parts of the experiment. Before each part starts, you will receive specific instructions and you will see what the table will look like.

Each Round Has Two Steps

In each Round, you will proceed through two screens, one after the other. The first screen is the decision screen. In the decision screen, you will make your decision and click the "SUBMIT" button when you are done. After everyone has clicked "SUBMIT", everyone will proceed to the review screen.

The review screen will look very much like the decision screen, but you will have no decision to make. You will see information about the decisions that were made in that round and previous rounds, and you will learn how much money you earned in that round. In the Decision Panel of the review screen, you will see exactly how your earnings for that round were calculated. When you are done reviewing this information, you must click "DONE" to continue.

The information in the Contributions Table will stay in the table through all rounds you play with the group, in both the decision and review screens

Questionnaire and Payment

After you have finished all of your decisions, you will complete a brief questionnaire. Then you will receive payment anonymously and privately, and the session will be over. You will collect your payment with no one watching, and no one else will learn your earnings.

QUIZ

Case 1: Suppose out of your 20 tokens you contributed 5 tokens to the Personal Fund and 15 tokens to the Group Fund. Suppose that the other 4 members of your group together contribute a total of 60 tokens to the Group Fund. Returns for the two Funds are:

Personal Fund:	\$0.02 per token to you
Group Fund:	\$0.03 per token to Stakeholder
	\$0.01 per token to non-Stakeholders

a) How much do you earn from the Personal Fund? _____

b) How many tokens in total were contributed by your group to the Group Fund? _____

c) If you ARE the Stakeholder, how much do you earn from the Group Fund? _____

d) If you ARE the Stakeholder, how much do each of the other members of your group earn from the Group Fund? _____

e) If you ARE the Stakeholder, how much do you earn altogether? _____

f) If you ARE NOT the Stakeholder, how much do you earn from the Group Fund? _____

g) If you ARE NOT the Stakeholder, how much does the group's Stakeholder earn from the Group Fund? _____

h) If you ARE NOT the Stakeholder, how much do each of the group's other non-Stakeholders earn from the Group Fund? _____

i) If you ARE NOT the Stakeholder, how much do you earn altogether? _____

Case 2: Suppose out of your 20 tokens you contributed 20 tokens to the Personal Fund and 0 tokens to the Group Fund. Suppose that the other 4 members of your group together contribute a total of 8 tokens to the Group Fund. Returns for the two Funds are:

Personal Fund:	\$0.02 per token to you
Group Fund:	\$0.03 per token to Stakeholder
	\$0.01 per token to non-Stakeholders

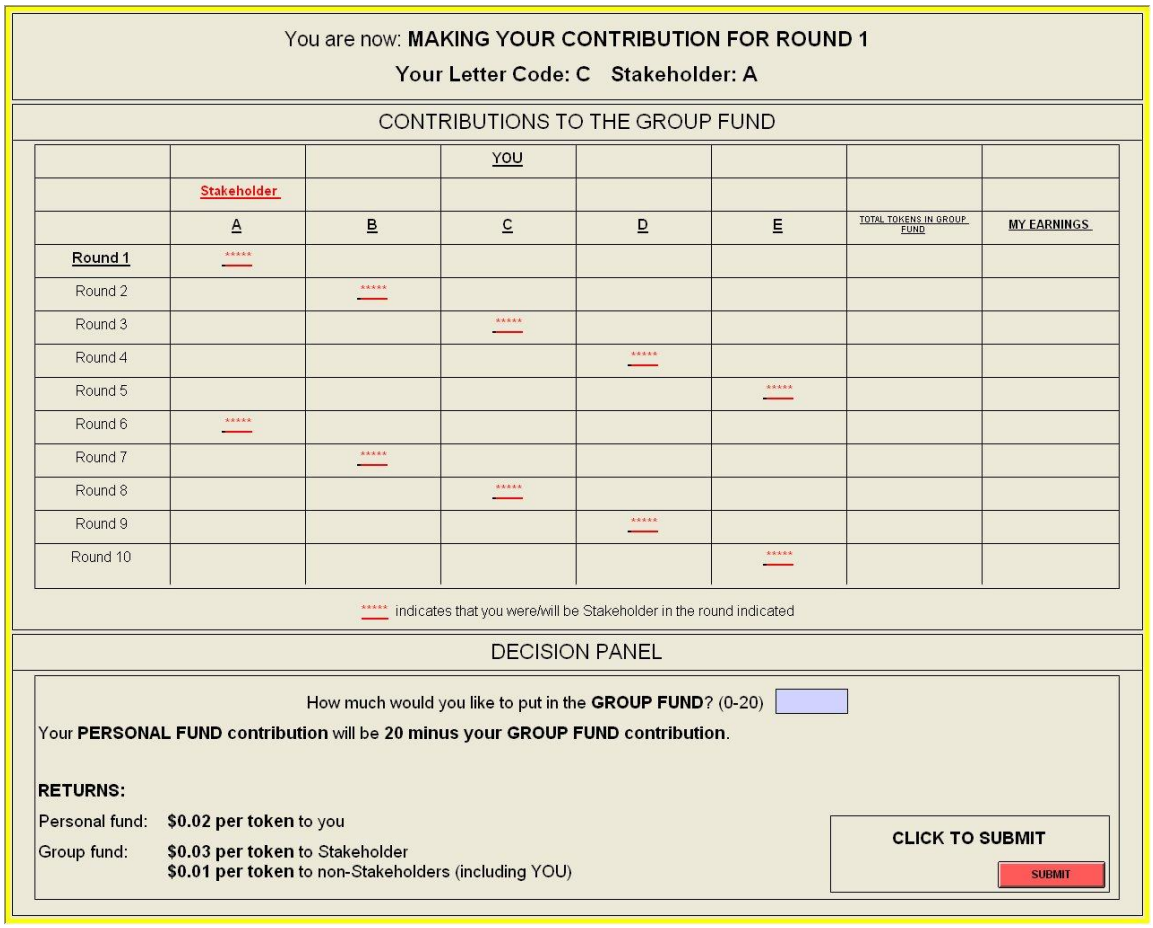
- How much do you earn from the Personal Fund? _____
- How many tokens in total were contributed by your group to the Group Fund? _____
- If you ARE the Stakeholder, how much do you earn from the Group Fund? _____
- If you ARE the Stakeholder, how much do each of the other members of your group earn from the Group Fund? _____
- If you ARE the Stakeholder, how much do you earn altogether? _____
- If you ARE NOT the Stakeholder, how much do you earn from the Group Fund? _____
- If you ARE NOT the Stakeholder, how much does the group's Stakeholder earn from the Group Fund? _____
- If you ARE NOT the Stakeholder, how much do each of the group's other non-Stakeholders earn from the Group Fund? _____
- If you ARE NOT the Stakeholder, how much do you earn altogether? _____

Instructions for the First Set of Rounds ***(PUBLIC TREATMENT)***

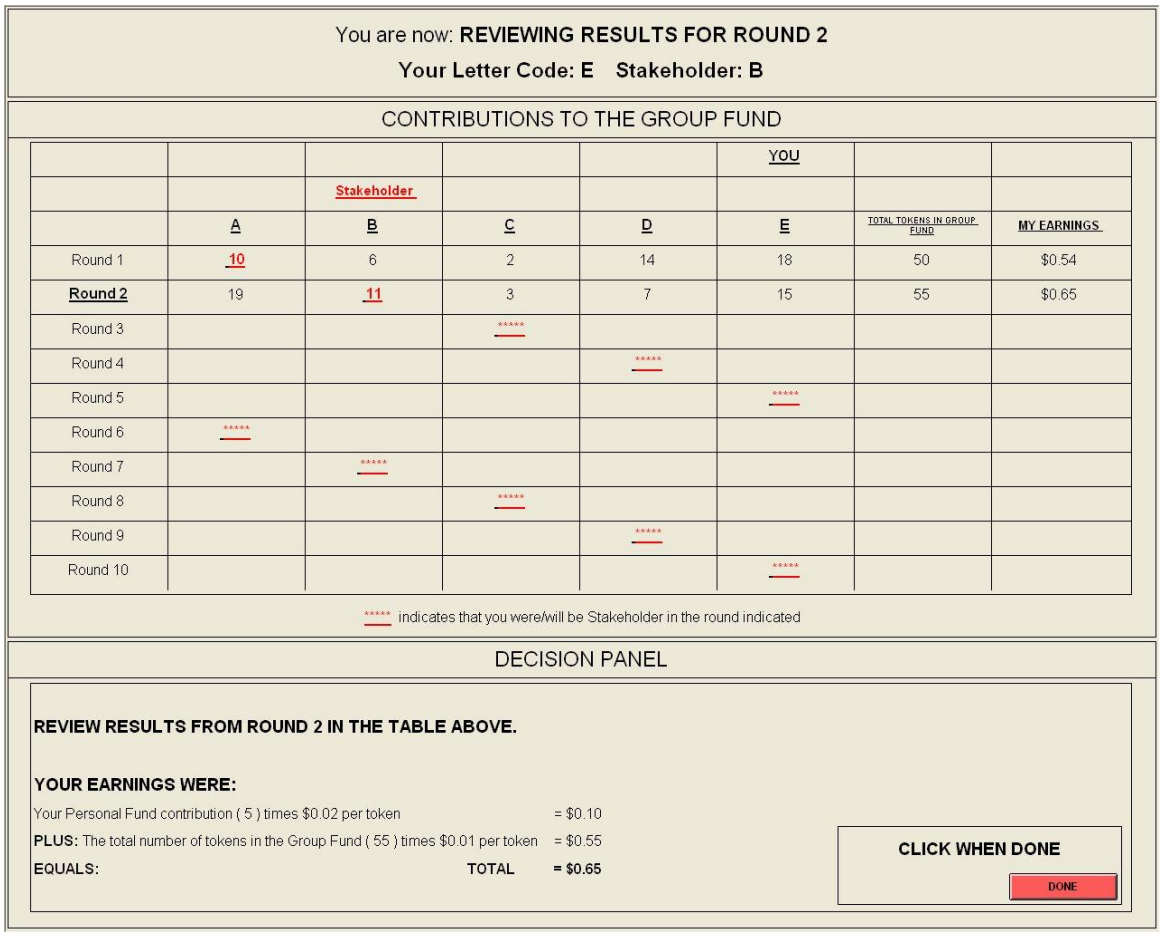
- You will now be randomly assigned by the computer into groups of 5 people.
- You will be with the same group for 10 rounds.
- Each member of your group will be randomly assigned a *new*, *different* letter code that you will keep for these 10 rounds: A, B, C, D, or E.
- The Stakeholder position will rotate through all 5 members of the group, in alphabetical order (A, then B, then C, etc.). Each member of the group will be Stakeholder twice.
- You will always know who is currently Stakeholder, when you are going to be Stakeholder, and when each other member of your group (identified by their letter code) will be Stakeholder, because the Stakeholder position will be marked in the Contributions Table and in the status bar.
- In each round, you must decide how many of 20 tokens to put in the Personal Fund and how many in the Group Fund.
- When you have made your decision (by typing how many tokens (0 to 20) you want to put in the Group Fund), you must click "SUBMIT".
- The Contributions Table will show, for each past round:
    - what each member (identified by letter code) has contributed to the Group Fund; that is, there will be a column in the table corresponding to each group member, and that member's contributions for each round will be filled in after the round
    - the total number of tokens in the Group Fund
    - your earnings
- You will be able to tell what each group member contributed in each round; they will also be able to tell what you contributed in each round.
- The table will indicate in which rounds each person will be the Stakeholder by marking those rounds in each person's column with red, underlined stars (*********).

- You will see which column corresponds to you because your column will say the word **YOU** above it. Each person has **YOU** marked at the top of their own column.
- Also at the top of each table, in each round, the word **Stakeholder** will appear in red above the column of the person who is the Stakeholder in this round.
- After everyone has made their decisions for each round, you may examine the Contributions Table and the calculation of your earnings in the review screen. Click "DONE" when you are ready to move on to the next round.

When you are entering your contribution, the screen will look like this:



When you are reviewing your results, the screen will look like this:



You are now: **REVIEWING RESULTS FOR ROUND 2**

Your Letter Code: E Stakeholder: B

CONTRIBUTIONS TO THE GROUP FUND

					YOU		
		Stakeholder					
	A	B	C	D	E	TOTAL TOKENS IN GROUP FUND	MY EARNINGS
Round 1	10	6	2	14	18	50	$0.54
Round 2	19	11	3	7	15	55	$0.65
Round 3			*****				
Round 4				*****			
Round 5					*****		
Round 6	*****						
Round 7		*****					
Round 8			*****				
Round 9				*****			
Round 10					*****		

***** indicates that you were/will be Stakeholder in the round indicated

DECISION PANEL

REVIEW RESULTS FROM ROUND 2 IN THE TABLE ABOVE.

YOUR EARNINGS WERE:

Your Personal Fund contribution (5) times $0.02 per token = $0.10

PLUS: The total number of tokens in the Group Fund (55) times $0.01 per token = $0.55

EQUALS: **TOTAL** **= $0.65**

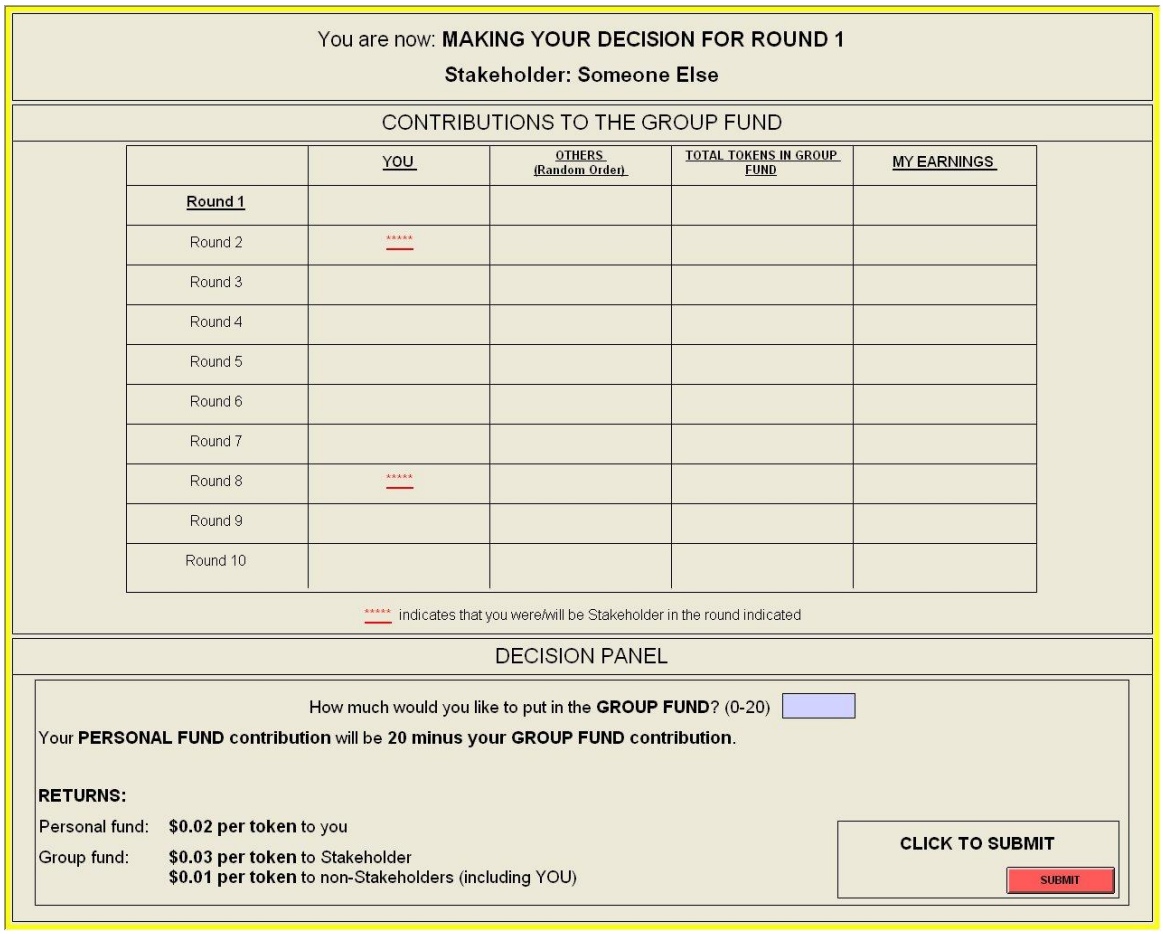
CLICK WHEN DONE

DONE

Instructions for the Second Set of Rounds ***(PRIVATE TREATMENT)***

- You will now be randomly assigned by the computer into groups of 5 people.
- You will be with the same group for 10 rounds.
- All 5 members of the group will be Stakeholder twice.
- You will only know when YOU are the Stakeholder—you will not know which group member is the Stakeholder in any given round if it is not you.
- In each round, you must decide how many of 20 tokens to put in the Personal Fund and how many in the Group Fund.
- When you have made your decision (by typing how many tokens (0 to 20) you want to put in the Group Fund), you must click "SUBMIT".
- The Contributions Table will show, for each past round:
    - what you have contributed to the Group Fund
    - a list of the Group Fund contributions of the other members of your group; these contributions will be listed in a **random order that is reshuffled** for each round
    - the total number of tokens in the Group Fund
    - your earnings
- No one will not be able to track any other individual group member's contributions.
- The table will indicate in which rounds you will be the Stakeholder by marking those rounds in your column with red, underlined stars (*********).
- After everyone has made their decisions for each round, you may examine the Contributions Table and the calculation of your earnings in the review screen. Click "DONE" when you are ready to move on to the next round.

When you are entering your contribution, the screen will look like this:



You are now: **MAKING YOUR DECISION FOR ROUND 1**

Stakeholder: Someone Else

CONTRIBUTIONS TO THE GROUP FUND

	YOU	OTHERS (Random Order)	TOTAL TOKENS IN GROUP FUND	MY EARNINGS
Round 1				
Round 2	*****			
Round 3				
Round 4				
Round 5				
Round 6				
Round 7				
Round 8	*****			
Round 9				
Round 10				

***** indicates that you were/will be Stakeholder in the round indicated

DECISION PANEL

How much would you like to put in the **GROUP FUND**? (0-20)

Your **PERSONAL FUND contribution** will be **20 minus your GROUP FUND contribution**.

RETURNS:

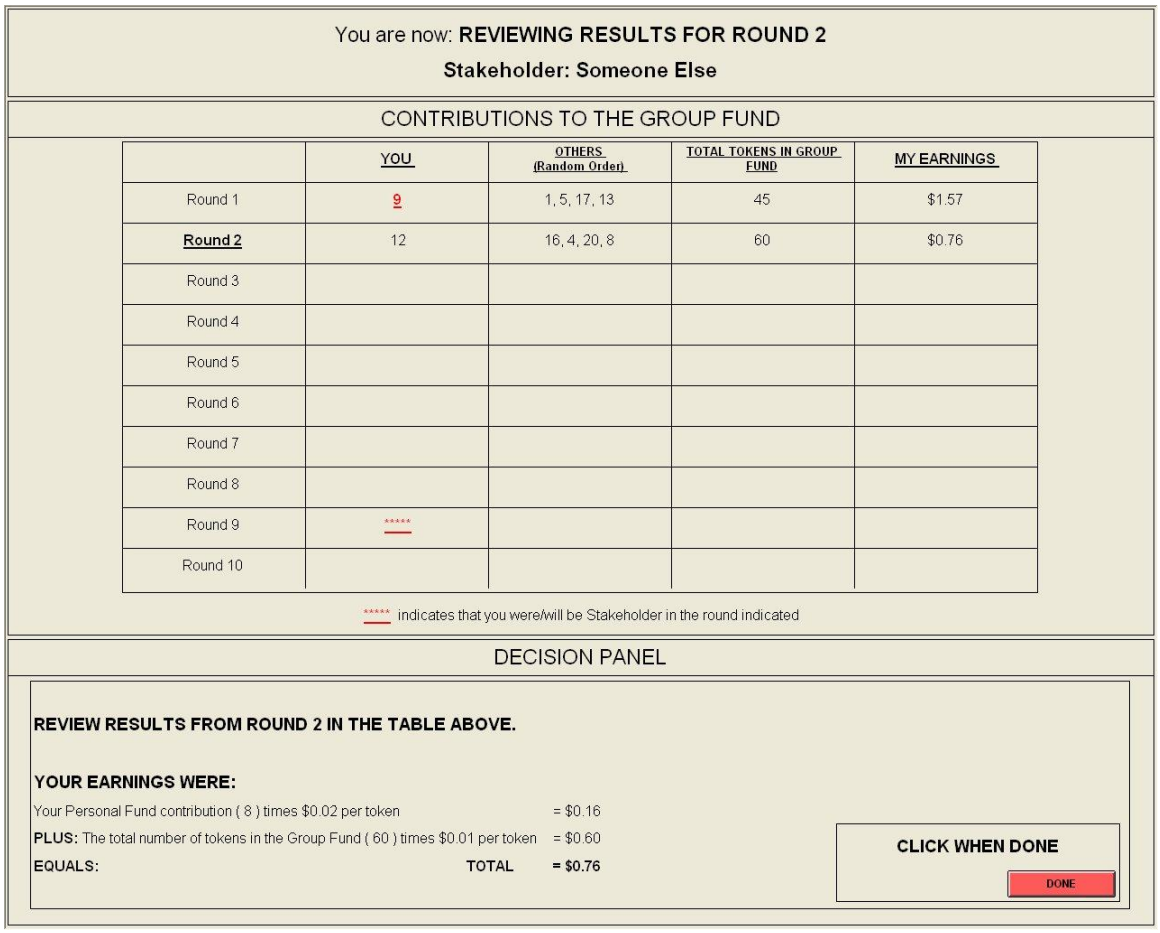
Personal fund: **$0.02 per token** to you

Group fund: **$0.03 per token** to Stakeholder
$0.01 per token to non-Stakeholders (including YOU)

CLICK TO SUBMIT

SUBMIT

When you are reviewing your results, the screen will look like this:



You are now: **REVIEWING RESULTS FOR ROUND 2**

Stakeholder: Someone Else

CONTRIBUTIONS TO THE GROUP FUND

	YOU	OTHERS (Random Order)	TOTAL TOKENS IN GROUP FUND	MY EARNINGS
Round 1	9	1, 5, 17, 13	45	$1.57
Round 2	12	16, 4, 20, 8	60	$0.76
Round 3				
Round 4				
Round 5				
Round 6				
Round 7				
Round 8				
Round 9	*****			
Round 10				

***** indicates that you were/will be Stakeholder in the round indicated

DECISION PANEL

REVIEW RESULTS FROM ROUND 2 IN THE TABLE ABOVE.

YOUR EARNINGS WERE:

Your Personal Fund contribution (8) times $0.02 per token = $0.16

PLUS: The total number of tokens in the Group Fund (60) times $0.01 per token = $0.60

EQUALS: **TOTAL** **= $0.76**

CLICK WHEN DONE

DONE

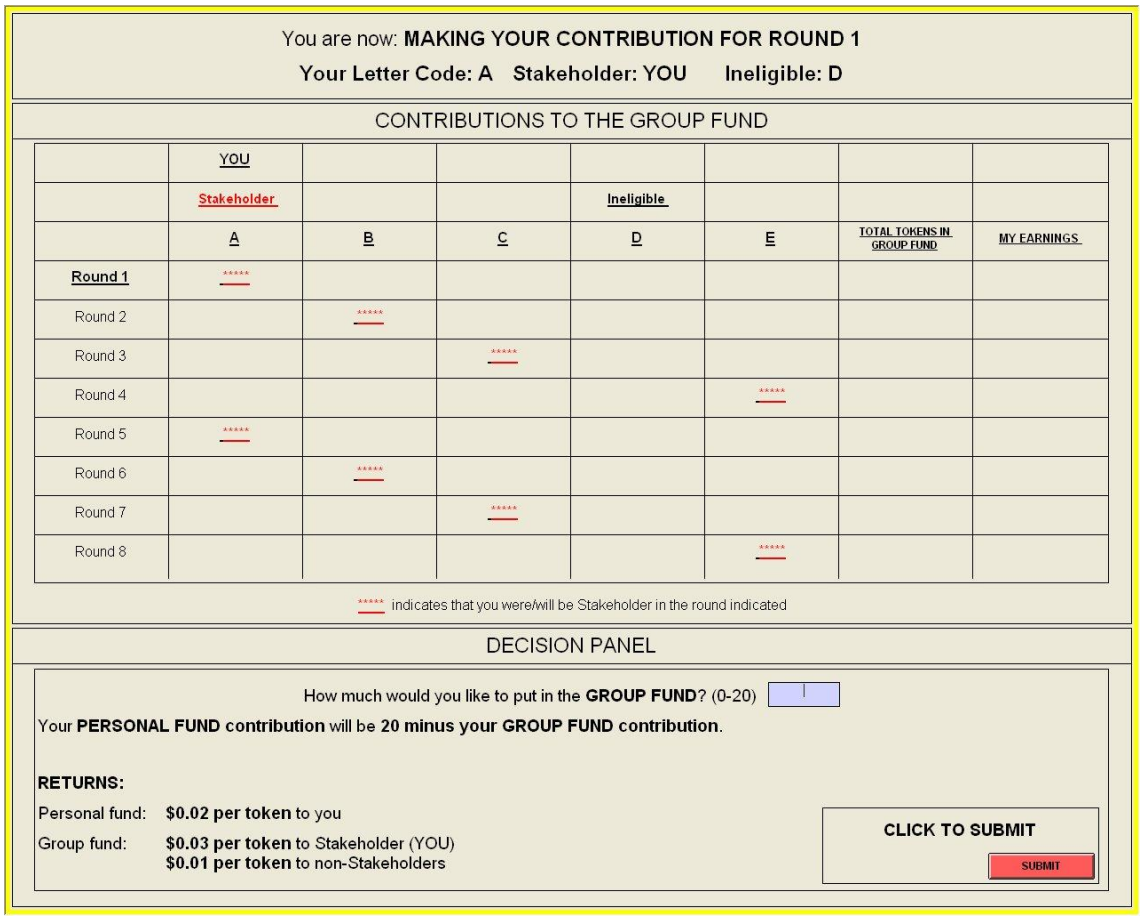
Instructions for the Third Set of Rounds ***(INELIGIBLE TREATMENT)***

- You will now be randomly assigned by the computer into groups of 5 people.
- You will be with the same group for 8 rounds.
- Each member of your group will be randomly assigned a *new*, *different* letter code that you will keep for these 8 rounds: A, B, C, D, or E.
- The Stakeholder position will rotate through 4 of the 5 members of the group.
- The one person in your group who will never be the Stakeholder is the **Ineligible Person**. This person is randomly selected at the start of this set of rounds, and will be Ineligible (will never be the Stakeholder) for all 8 rounds. The Ineligible Person is identified to all group members in the Contributions Table and in the text in the status bar.
- The Stakeholder position rotates through the four eligible members of the group for all 8 rounds, in alphabetical order. For example, if person C is randomly chosen as Ineligible, the first Stakeholder will be person A, the second will be B, the third will be D, etc.
- Everyone who is not Ineligible will be Stakeholder twice.
- You will always know who is currently Stakeholder, when you are going to be Stakeholder, and when each other member of your group (identified by their letter code) will be Stakeholder, because the Stakeholder position will be marked in the Contributions Table and in the status bar.
- In each round, you must decide how many of 20 tokens to put in the Personal Fund and how many in the Group Fund.
- When you have made your decision (by typing how many tokens (0 to 20) you want to put in the Group Fund), you must click "SUBMIT".
- The Contributions Table will show, for each past round:
    - what each member (identified by letter code) has contributed to the Group Fund; that is, there will be a column in the table corresponding to each group member, and that member's contributions for each round will be filled in after the round
    - the total number of tokens in the Group Fund

    - your earnings

- You will be able to tell what each group member contributed in each round; they will also be able to tell what you contributed in each round.
- The table will indicate in which rounds each person will be the Stakeholder by marking those rounds in each person's column with red, underlined stars (*********).
- You will see which column corresponds to you because your column will say the word **YOU** above it. Each person has **YOU** marked at the top of their own column.
- Also at the top of each table, in each round, the word **Stakeholder** will appear above the column of the person who is the Stakeholder in this round.
- The word **Ineligible** will appear above the column of the Ineligible person.
- After everyone has made their decisions for each round, you may examine the Contributions Table and the calculation of your earnings in the review screen. Click "DONE" when you are ready to move on to the next round.

When you are entering your contribution, the screen will look like this:



You are now: **MAKING YOUR CONTRIBUTION FOR ROUND 1**

Your Letter Code: A Stakeholder: YOU Ineligible: D

CONTRIBUTIONS TO THE GROUP FUND

	YOU						
	Stakeholder			Ineligible			
	A	B	C	D	E	TOTAL TOKENS IN GROUP FUND	MY EARNINGS
Round 1	*****						
Round 2		*****					
Round 3			*****				
Round 4					*****		
Round 5	*****						
Round 6		*****					
Round 7			*****				
Round 8					*****		

***** indicates that you were/will be Stakeholder in the round indicated

DECISION PANEL

How much would you like to put in the **GROUP FUND**? (0-20)

Your **PERSONAL FUND contribution** will be **20 minus your GROUP FUND contribution**.

RETURNS:

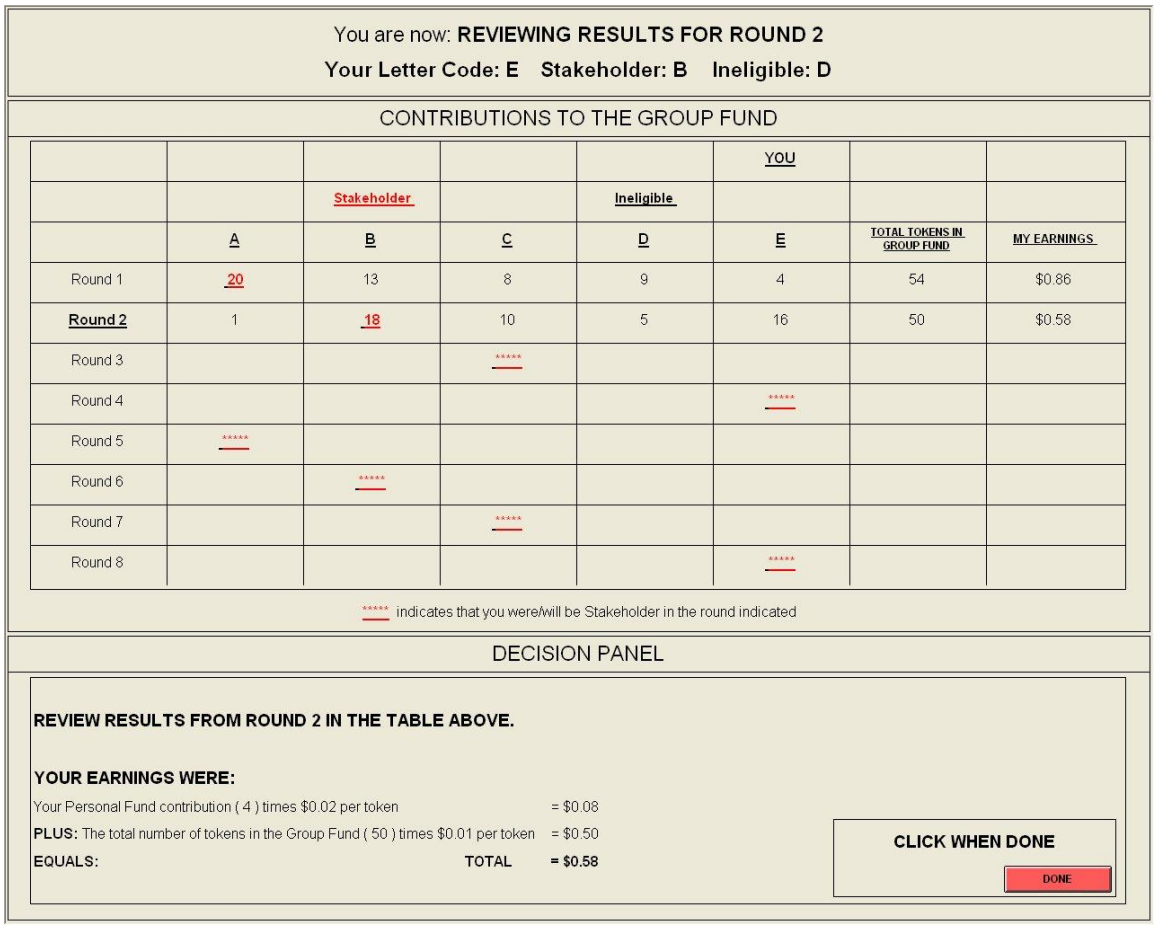
Personal fund: **$0.02 per token** to you

Group fund: **$0.03 per token** to Stakeholder (YOU)
$0.01 per token to non-Stakeholders

CLICK TO SUBMIT

SUBMIT

When you are reviewing your results, the screen will look like this:



You are now: **REVIEWING RESULTS FOR ROUND 2**

Your Letter Code: E Stakeholder: B Ineligible: D

CONTRIBUTIONS TO THE GROUP FUND

					YOU		
		Stakeholder		Ineligible			
	A	B	C	D	E	TOTAL TOKENS IN GROUP FUND	MY EARNINGS
Round 1	20	13	8	9	4	54	$0.86
Round 2	1	18	10	5	16	50	$0.58
Round 3			*****				
Round 4					*****		
Round 5	*****						
Round 6		*****					
Round 7			*****				
Round 8					*****		

***** indicates that you were/will be Stakeholder in the round indicated

DECISION PANEL

REVIEW RESULTS FROM ROUND 2 IN THE TABLE ABOVE.

YOUR EARNINGS WERE:

Your Personal Fund contribution (4) times $0.02 per token = $0.08

PLUS: The total number of tokens in the Group Fund (50) times $0.01 per token = $0.50

EQUALS: **TOTAL** **= $0.58**

CLICK WHEN DONE

DONE

Reviewers' Appendix B: Parametric Tests of Reciprocity

In this Appendix, we use regression techniques to identify reciprocal behavior resulting from direct reciprocity and strategic self-interest. These results may be biased because of the endogeneity inherent in group dynamic behavior. We take care to limit the influence of this bias, but it is to some extent unavoidable.

We perform a panel regression for one treatment at a time, with fixed effects and errors clustered by group. Non-Stakeholder contributions in each round g_{it} are regressed on characteristics of that round, including h_{ikt} (a summary of the current Stakeholder k's past generosity toward subject i: here, the current Stakeholder's cumulative average contributions when subject i was Stakeholder) and $\mathbf{X}_{it}$ (other variables):

$$g_{it} = a + bh_{ikt} + \mathbf{C}\mathbf{X}_{it} + \varepsilon_{it}$$

If direct reciprocity or strategic self-interest is important, b (the coefficient on h_{ikt}) should be positive in both the Public and Ineligible treatments. In the Private treatment, b should be zero, because in each round, no-one knows who the current Stakeholder is or what that person has done in the past. Group-level conditional cooperation could bias this coefficient upward, so we counteract that bias by including a control for group generosity in $\mathbf{X}_{it}$. Our control for group generosity is the group's cumulative average non-Stakeholder contribution in past rounds. For each subject in each round, this measure excludes his own past contributions and those of the current Stakeholder. In the Ineligible treatment, this group measure also excludes data from the Bachelor (although the same results obtain if the Bachelor's data is included).

The panel regression also includes in $\mathbf{X}_{it}$ the current round number and an indicator for whether this subject has passed his last Stakeholder stint. If the coefficient on the round number is negative, cooperation decreases from round to round. The coefficient on the post-last-Stakeholder stint dummy can be interpreted as the importance of strategic giving. If a subject gives strategically in the rounds before his last Stakeholder stint, there should be a discontinuity in contributions that should be reflected in a large, negative coefficient on this dummy.

Results are shown in Table A-1. Directly reciprocal behavior is supported for the Public and Ineligible treatments. The coefficient on the post-last-Stakeholder stint dummy in the Public and Ineligible treatments is insignificant. This implies that strategic motives are not important. The same results obtain in an AR1 specification (results available upon request), except that in the Private treatment the post-last-Stakeholder stint dummy is no longer significant.

We can further test for the importance of other-regarding preferences by restricting our attention to the rounds after a subject has passed his final Stakeholder stint. See results in Table A-2. Due to the reduced population size, particularly for the Ineligible treatment, the power of the test is significantly reduced and the Stakeholder past contribution coefficient is not statistically significant for the Ineligible treatment. However, the coefficient on Stakeholder past contribution is positive for the Public treatment. This implies that reciprocal behavior is at least partly rooted in other-regarding preferences.

Finally, we build error clustering by group and fixed effects into a test using aggregate statistics, since this should eliminate the bias of our panel analysis while checking for robustness to intra-class correlation. We create two stacked observations per subject: one to represent the subject's average contribution in rounds in which the current Stakeholder was previously

generous (using the 10 token, or 50%-of-endowment, threshold; similar results obtain for other thresholds) toward this subject, and one to represent his average contribution in rounds when the Stakeholder was ungenerous toward this subject. A "nice dummy" differentiates between the two observations for each subject. We perform a panel regression using these two observations per subject, in which we regress contributions on the "nice dummy." The same results obtain if we use group dummies, individual random effects, or individual fixed effects. In Table A-3 we show results of the individual fixed effects regression without group dummies. The "nice" dummy is significant and positive for the Public and Ineligible treatments, but not for the Private treatment. The result that reciprocal behavior continues after the last Stakeholder stint also persists in this specification.

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Figures

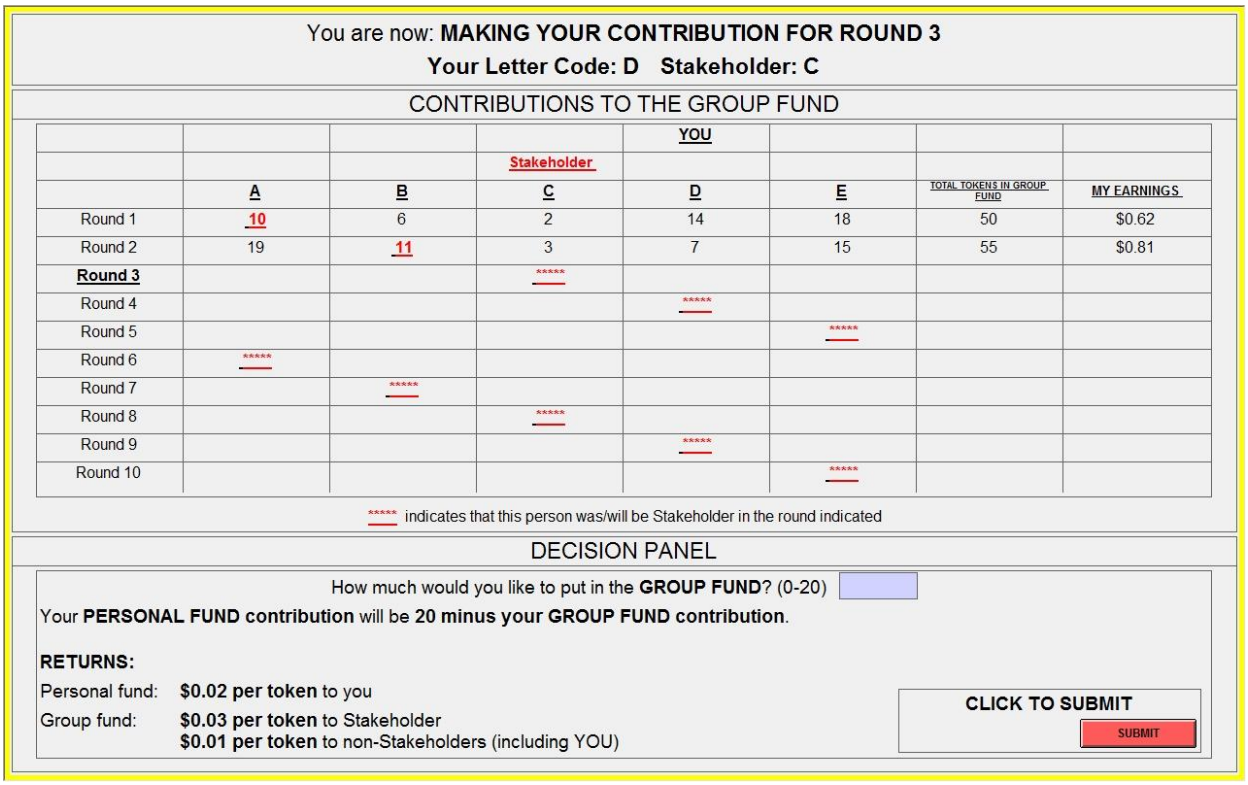


Figure 1. Public Treatment Decision Screen

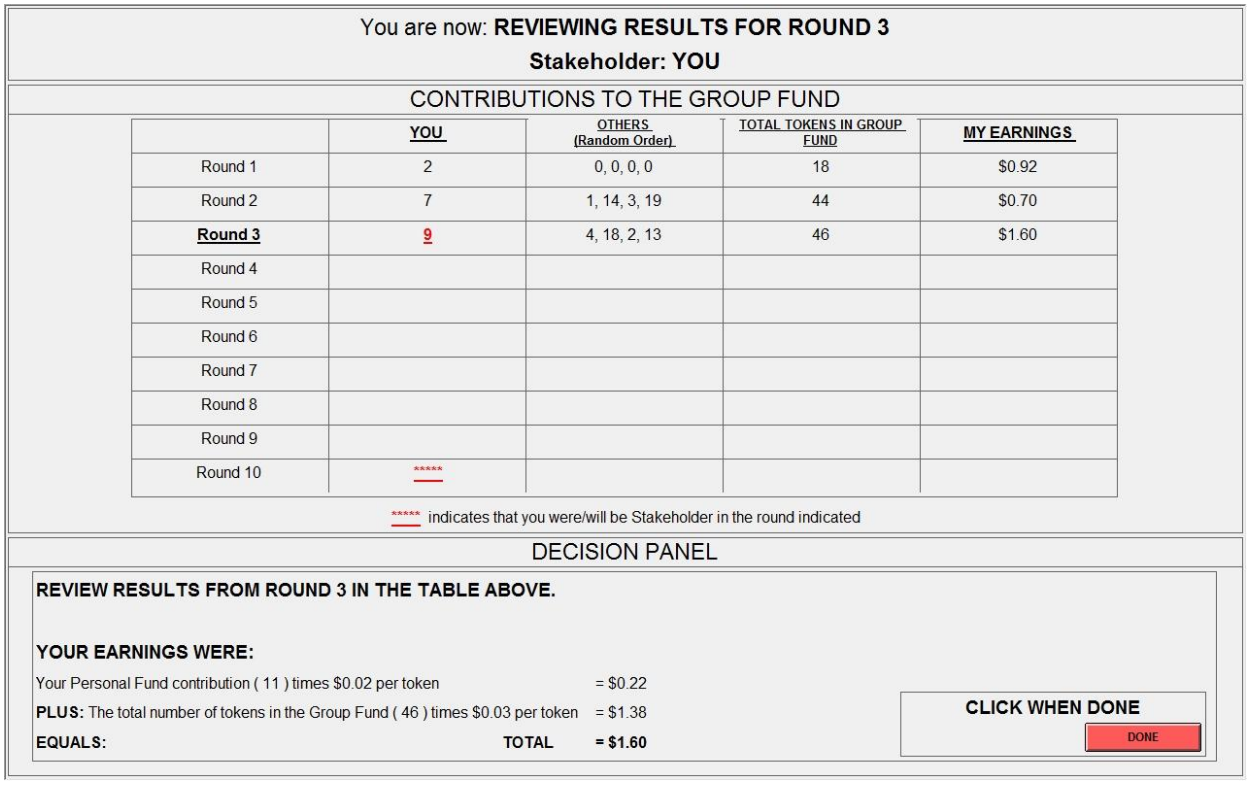


Figure 2. Private Treatment Review Screen

You are now: **REVIEWING RESULTS FOR ROUND 2**

Your Letter Code: C Stakeholder: B Ineligible: D

CONTRIBUTIONS TO THE GROUP FUND

			YOU				
		Stakeholder		Ineligible			
	A	B	C	D	E	TOTAL TOKENS IN GROUP FUND	MY EARNINGS
Round 1	1	4	2	16	8	31	$0.67
Round 2	20	0	17	9	3	49	$0.55
Round 3			*****				
Round 4					*****		
Round 5	*****						
Round 6		*****					
Round 7			*****				
Round 8					*****		

***** indicates that this person was/will be Stakeholder in the round indicated

DECISION PANEL

REVIEW RESULTS FROM ROUND 2 IN THE TABLE ABOVE.

YOUR EARNINGS WERE:

Your Personal Fund contribution (3) times $0.02 per token = $0.06

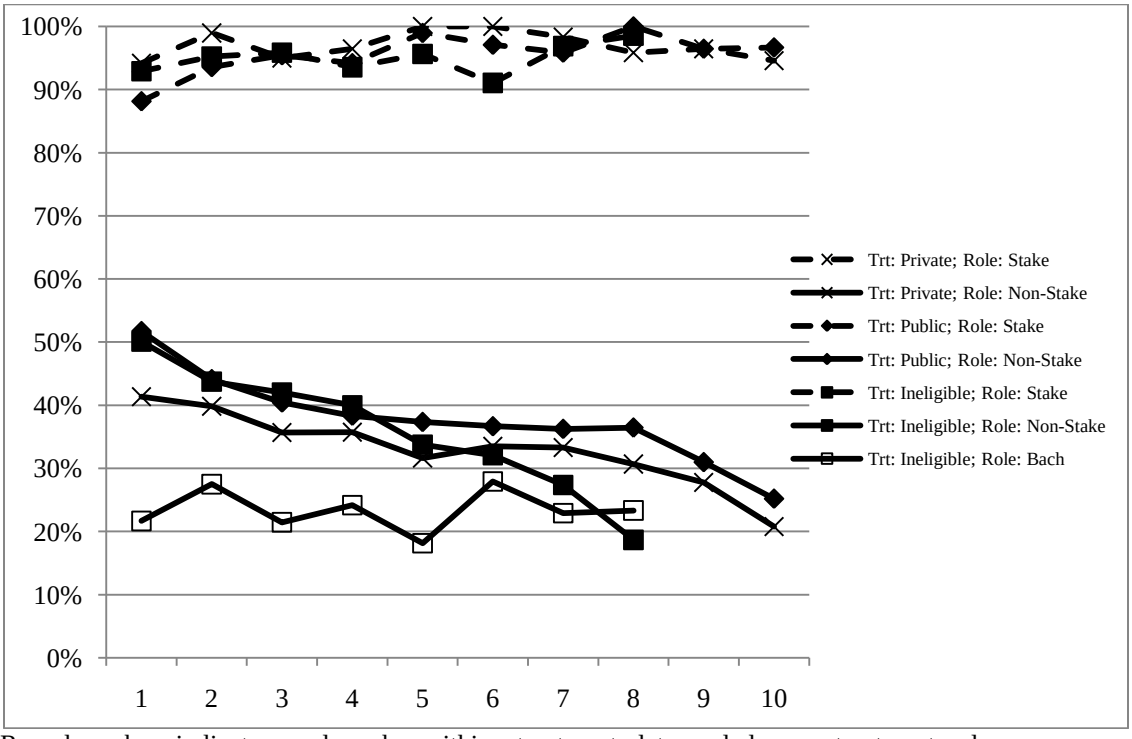
PLUS: The total number of tokens in the Group Fund (49) times $0.01 per token = $0.49

EQUALS: **TOTAL** **= $0.55**

CLICK WHEN DONE

DONE

Figure 3. Ineligible Treatment Review Screen



Round numbers indicate round number within a treatment; data pooled across treatment orders

Figure 4. Contributions by Treatment and Role across Rounds (in Percent of Endowment)

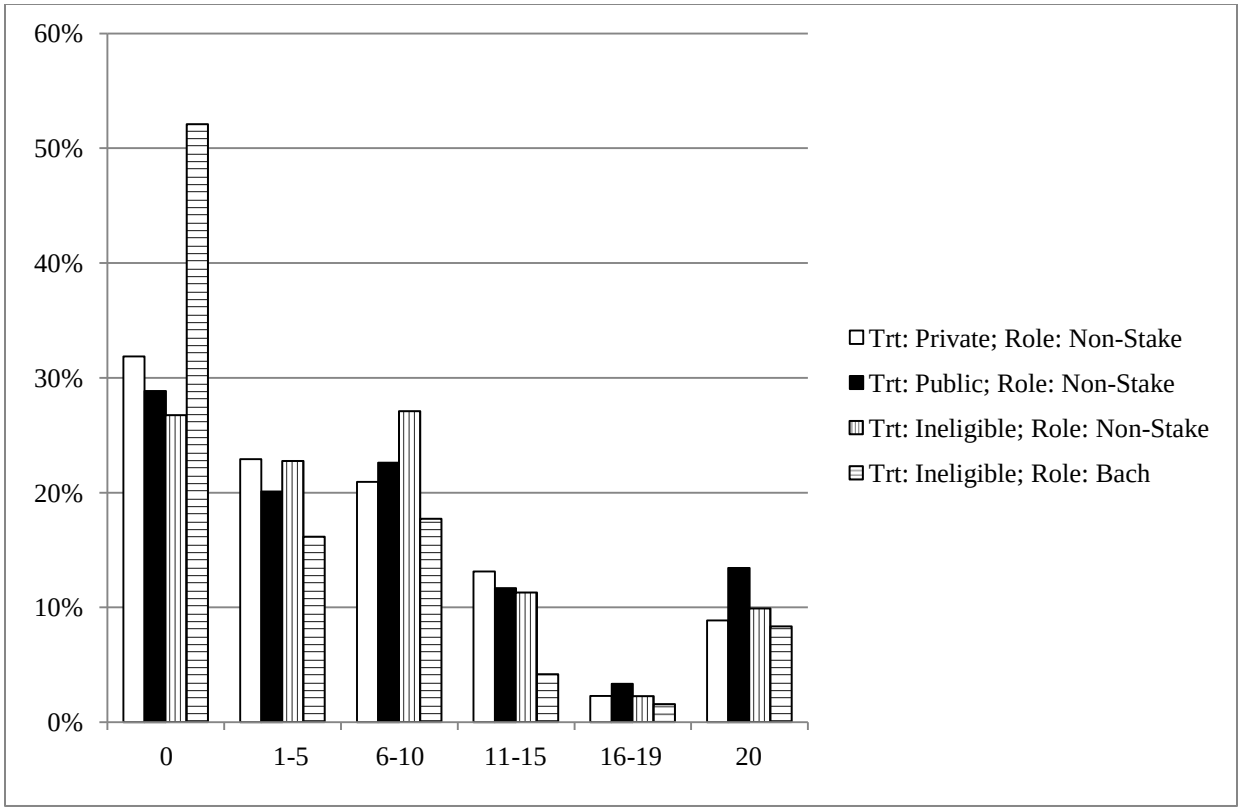


Figure 5. Distribution of Non-Stakeholder Contribution Amounts, Pooled across Rounds

Tables

Table 1. Average Contributions by Treatment and Role (Percent of Endowment)

	Non-Stakeholder	Stakeholder
Private Treatment	33.02 (25.98) N=120	96.98 (10.30) N=120
Public Treatment	37.75 (25.93) N=120	95.63 (10.36) N=120
Ineligible Treatment, Non-Bachelors	35.96 (22.26) N=96	94.95 (11.74) N=96
Ineligible Treatment, Bachelors	23.39 (28.41) N=24	N/A

Standard deviations in parentheses

Table 2. Average Non-Stakeholder Contributions by Treatment and Bachelor Status (Percent of Endowment)

	Non-Bachelor	Bachelor
Private Treatment	33.80 (25.83) N=96	29.90 (26.89) N=24
Public Treatment	37.79 (24.86) N=96	37.60 (28.41) N=24
Ineligible Treatment, Non-Bachelors	35.96 (22.26) N=96	N/A
Ineligible Treatment, Bachelors	N/A	23.39 (28.41) N=24

Standard deviations in parentheses

Table 3. Average Non-Stakeholder Contributions across All Rounds by Stakeholder's Past Generosity toward Subject (in Percent of Endowment)

	Private Treatment	Public Treatment	Ineligible Treatment (excl. Bachelors)
Stakeholder gave ≥ 10 on average in past rounds in which subject was Stakeholder	27.57 (26.62)	41.92 (32.06)	41.22 (29.11)
Stakeholder gave < 10 on average in past rounds in which subject was Stakeholder	29.16 (29.59)	27.09 (27.63)	23.92 (24.08)
N	82	95	75
P-value (paired Wilcoxon signed-rank test)	0.773	0.000	0.000

Standard deviations in parentheses

N's are less than 120 because some subjects did not face both a generous and an ungenerous stakeholder. For this reason, we dropped 38 of 120 subjects in Private, 25 of 120 in Public, and 21 of 96 subjects in Ineligible.

Table 4. Average Non-Stakeholder Contributions by Stakeholder's Past Generosity toward Subject, after Last Stakeholder Stint (in Percent of Endowment)

	Private Treatment	Public Treatment	Ineligible Treatment (excl. Bachelors)
Stakeholder gave ≥ 10 on average in past rounds in which subject was Stakeholder	14.60 (25.70)	30.00 (30.99)	26.60 (31.98)
Stakeholder gave < 10 on average in past rounds in which subject was Stakeholder	18.60 (29.24)	16.93 (27.43)	19.30 (27.75)
N	31	41	25
P-value (paired Wilcoxon signed-rank test)	0.436	0.026	0.435

Standard deviations in parentheses

N's are less than 120 because 48 subjects had to be dropped from each treatment because there were less than two rounds remaining after their last Stakeholder stint; additionally, more subjects had to be dropped from each treatment (41 of 120 from Private, 31 of 120 from Public, and 23 of 96 from Ineligible) if they did not face both a generous and an ungenerous Stakeholder after their last Stakeholder stint.

Table A-1. OLS Fixed Effects Panel Regression of Non-Stakeholder Contribution (in Percent of Endowment) on Period-Level Covariates

	Private Treatment	Public Treatment	Ineligible Treatment (excl. Bachelors)
Stakeholder average	0.05	0.24***	0.23**
past contributions to me	(0.06)	(0.05)	(0.09)
Group average	0.25	0.05	-0.08
contributions	(0.16)	(0.17)	(0.27)
Round number	0.03	-1.69	-2.86**
	(0.65)	(1.22)	(1.34)
Post-last Stakeholder	-9.66**	-1.66	-4.85
Stint? (dummy)	(3.86)	(5.05)	(5.40)
Constant	22.15***	34.65**	42.50**
	(7.48)	(13.68)	(16.18)
Observations (rounds)	720	720	432
Number of subjects	120	120	96
F	4.50	13.37	31.47
R^2 (overall)	0.078	0.182	0.156

Robust standard errors in parentheses; errors are clustered on groups; individual fixed effects

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A-2. OLS Fixed Effects Panel Regression of Non-Stakeholder Contribution (in Percent of Endowment) on Period-Level Covariates, Post-Last Stakeholder Stint

	Private Treatment	Public Treatment	Ineligible Treatment (excl. Bachelors)
Stakeholder average	-0.19	0.21*	0.17
past contributions to me	(0.11)	(0.11)	(0.22)
Group average	0.39	-0.09	0.30
contributions	(0.44)	(0.32)	(0.60)
Round number	-4.12**	-5.90***	-4.89
	(1.83)	(1.96)	(2.26)
Constant	48.39**	76.14***	42.89
	(22.93)	(25.80)	(25.08)
Observations (rounds)	240	240	144
Number of subjects	96	96	72
F	2.03	3.70	1.78
R^2 (overall)	0.036	0.106	0.083

Robust standard errors in parentheses; errors are clustered on groups; individual fixed effects

* significant at 10%; ** significant at 5%; *** significant at 1%

Table A-3. Panel Stacked Regression of Average Contribution (in Percent of Endowment) on "Nice Dummy"

	Private Treatment	Public Treatment	Ineligible Treatment (excl. Bachelors)
"Nice dummy"	-1.59	14.83***	17.30***
	(2.72)	(2.68)	(2.72)
Constant	29.16***	27.09***	23.92***
	(1.36)	(1.34)	(1.36)
Subjects	82	95	75
Observations	164	190	150
R^2 (overall)	-0.001	0.058	0.096
F	0.34	30.54	40.37

Robust standard errors in parentheses; errors clustered on groups; individual fixed effects. There are two observations per subject: one to summarize the subject's average contribution when facing a Stakeholder who had been generous to him, and one for his average contribution when facing a previously-ungenerous Stakeholder. The "nice dummy" is the indicator that differentiates these two observations for each subject.

* significant at 10%; ** significant at 5%; *** significant at 1%