No Refund, No Problem: Coordination and Cooperation in a Combined Linear-Threshold Public Good Game

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Abstract:

We use a lab experiment to study a combined linear-threshold public good game, with linear returns to contributions and an additional higher return if a threshold is met. This game structure leverages both voluntary cooperation and strategic coordination. We experimentally vary what happens to contributions that do not meet the threshold. Contributions are high, with almost all groups reaching the threshold. Refund institutions matter, but only a little: contributions are only slightly higher on average if insufficient contributions are automatically refunded than if they are not refunded. However, optional refunds chosen ex post perform relatively poorly. Risk aversion causes people to reduce their contributions when insufficient contributions are automatically refunded, so that treatment differences are even smaller for risk averse people. An online survey-experiment shows that people perceive refunds in this institution as desirable from a donor's perspective. However, a donor's taking advantage of a refund is perceived as non-normative, and this becomes even more true in a naturalistic charity context, pointing to the importance of domain-specific norms in situations like this with complex incentives and social dynamics.

JEL codes: C91, H41

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1. Introduction

In many situations, public goods provide benefits that continuously increase as contributions rise but that also have thresholds: for example, a forest may provide ever-greater hydrological services with each marginal increase in forest size, but once a forest grows to a particular size, it may also allow an important species to establish itself. As another example, many charities have regular program expenses that donations can cover, but if gifts reach certain targets they may enable large discrete purchases, like a new building. This structure can also arise artificially: for example, a lead donor to a charity may advertise that if other donors' gifts reach a certain level, the lead donor will make an additional large donation. We call this a combined linear-threshold public good game. While linear and threshold public goods have been investigated separately, little is known about how people behave when facing public goods with both characteristics, and the combination may have special features because it may give rise to both voluntary cooperation and strategic coordination. Further, while past research shows theoretically and empirically that refunding donors' contributions if a threshold is not met can improve performance in a threshold public good game (Cason, Tabarrok, and Zubrickas 2021, Cason and Zubrickas 2017, Cason and Zubrickas 2018), this may not hold when public good contributions also yield a linear return. We present a lab experiment in which we present subjects with this type of scenario, experimentally varying features of the game structure, complemented by an online experiment to assess norms and perceptions.

Threshold public goods with refunds have been studied since Bagnoli and Lipman (1989), as Li, Liu, and Swallow (2021) review. The literature has found that threshold public goods theoretically and empirically perform better when contributions are refunded if the threshold is not met (Croson and Marks 2000).[1] The focus of that literature has often been on ways of tweaking refunds to increase contributions; for example, Zubrickas (2014) studies a refund bonus which is proportional to individual contributions, and Li, Liu, and Swallow (2021) and Li, Chen, and Liu (2023) investigate an assurance payment–a fixed payment offered to anyone who contributes above a given amount if the threshold is not achieved. However, a combined linear-threshold public good game provides a piecewise linear return, similar to Bracha, Menietti, and Vesterlund (2011) and Recalde, Riedl, and Vesterlund (2018), though their focus is on sequential giving. Provision points (Isaac, Walker, and Thomas 1984) also are a specialized form of piecewise linear return, with zero return until a contribution threshold is met; the assurance game of Isaac, Schmidtz, and Walker (1989) shows that very high contributions can be sustained if the threshold is high enough and insufficient contributions are refunded. It is not clear whether the results from past studies on threshold public good refund and rebate mechanisms apply when a linear public good is combined with the threshold public good, as this change shifts the game from being largely about coordination to being about cooperation as well.

In this paper we report results of a lab experiment in which subjects play combined linear-threshold public goods games, and we experimentally vary the rule for how contributions are handled if the threshold is not met. We present four treatments: 1) Universal Refund, in which under-contributions are always refunded to the donors; 2) No Refund, in which under-contributions are always retained to provide the linear public good; 3) Optional Ex Post Refund, in which, after contribution decisions are

[1] Croson and Marks (2000) also find that rebates of excess contributions above the threshold do not significantly affect contributions.

made, members of groups that do not reach the threshold choose whether to receive a refund; and 4) Optional Ex Ante Refund, in which subjects decide in advance whether they want their contributions to be refunded if the threshold is not met and those decisions are shared with group members when they are making the contribution decision. We complement this lab experiment with an online survey-experiment in which we solicit people's perceptions of charities that do and do not offer refund options and of donors that do and do not choose to take refunds.

We find that, in our parameterization, contributions are extremely high, regardless of the refund rule. Full contributions are common, and the threshold is nearly always achieved; the only result in the literature we are aware of that is this strong is in the assurance game of Isaac, Schmidtz, and Walker (1989) but in that study contributions drop precipitously when there is no refund. In our setting, the refund rule has a detectable impact on contributions but it is small. Contributions are highest in the Universal Refund treatment and lowest in the Optional Ex Post Refund treatment, and Optional Ex Post is the only treatment in which the threshold is sometimes not met. However, the No Refund treatment performs only slightly (though significantly) less well than the Universal Refund treatment, showing that refunds matter less in the combined linear-threshold public good setting than they have been shown to matter in standard threshold public good games and the assurance game. We also find that refund decisions that are made before contribution decisions, with those choices becoming common knowledge during the contribution decision stage, are positively correlated with contribution decisions. Overall, these results are similar to results from the threshold public good literature in which full refunds result in the highest level of contribution, and either removing these refunds or making them optional reduces contributions, though the impact of these refunds is much smaller in our study than in past literature.

Since contributions are riskier in some treatments than in others, we test whether risk preferences moderate treatment differences, and we find they do. Specifically, risk aversion mutes treatment differences, which is sensible if people view reducing contributions in treatments other than the Universal Refund treatment as an act that could risk missing the threshold. This is notable, since past literature has assumed that people view contributing to a public good as risky, but in our setting *not contributing* also seems to be considered risky.

From a pecuniary focused perspective, our lab study results are puzzling not just because contributions respond so little to refund rules, but also because subjects do not always choose refunds when they are available. Thus, our observed behavior may result from how refund options are perceived by donors and how refund decisions are perceived by others, which may vary across contexts. In our online survey-experiment, we find that people express a preference for charities that offer refunds, but they express both descriptive and injunctive norms against a donor who chooses to receive a refund when refunds are optional. However, these normative feelings are weaker when the public good is framed as an ecosystem rather than a charity, and weaker still when framed as an abstract public good, suggesting that situation-specific norms are important in this structure in which incentives and social dynamics are complex.

Our contributions are as follows. First, we explore the properties of an institution (the combined linear-threshold public good game) that is novel in the literature though empirically relevant. Second, we show that a structure that leverages both coordination and cooperation can yield high levels of public good provision. Third, we show that strategic incentives by way of refund mechanisms do not always have

meaningful effects on behavior. Fourth, we demonstrate in a new setting how interplay of risk aversion, expectations of others' behavior, and voluntary cooperation affect behavior. Finally, we contribute to the literature showing significant context dependence of cooperative norms, but this time in a setting where both cooperation and coordination are relevant.

The rest of the paper proceeds as follows. First, we present the model of the combined linear-threshold public good game. Next, we present our lab experiment design. We then present the results of the lab experiment. We follow by describing the design and results of the online survey-experiment. Finally, we conclude.

2. **Model**

We start by briefly describing how linear and threshold public goods games each work alone. Both of these models have been studied extensively in the literature, with the linear public good game literature reviewed by Chaudhuri (2011) and a meta-analysis of the threshold public good literature provided by Croson and Marks (2000). We then go into detail on our combined linear-threshold public good model, first with a focus on symmetric Nash equilibria for agents who are purely self-interested and pecuniary-focused, and later suggesting how other motivations may alter behavior.

A group of *N* agents can each individually contribute toward a public good that would benefit everyone in the group. Every agent *i* starts with an endowment *z* and chooses how to allocate that endowment between contribution to the public good g_i and their own consumption.

If the public good has a simple linear return to everyone in the group of $\alpha > 1$, yielding a marginal per capita return of $\frac{\alpha}{N} < 1$, each agent's earnings are:

$$\pi_i = z - g_i + \frac{\alpha}{N}\sum_j g_j. \quad (1)$$

This is a pure linear cooperation game in which the social optimum is achieved if everyone contributes fully, but the private incentive is to contribute nothing.

Alternatively, if public good benefits are only provided if contributions reach or exceed a threshold level *T*, we can parameterize those benefits as $\beta \sum_j g_j$ where $\beta > 1$ and $\frac{\beta}{N} < 1$, and thus earnings are

$$\pi_i = z - g_i + \begin{cases} f(g_1, \dots, g_N) & if \ \sum_j g_j < T \\ \frac{\beta}{N}\sum_j g_j & if \ \sum_j g_j \geq T \end{cases}, \quad (2)$$

where $f(g_1, \dots, g_N)$ defines what happens to contributions if the threshold is not met. If such insufficient contributions are refunded, $f(g_1, \dots, g_N) = g_i$; if they are instead lost, $f(g_1, \dots, g_N) = 0$.

In the threshold public good model, it is socially optimal for the threshold to be exactly met, and there are two symmetric Nash equilibria if people are self-interested. One is at zero, because increasing one's own contribution alone would yield a loss as an increase that will not reach the threshold generates no return, but even if the person's contribution could reach the threshold alone, $\frac{\beta}{N} < 1$ so they are selfishly better off staying at zero. The other symmetric equilibrium is at $\frac{T}{N}$ where total donations exactly meet

the threshold; from this equilibrium, if anyone reduced their contribution, the public good return would drop to zero, so that everyone is pivotal, and no-one would increase their contribution by the same logic that applies to the zero-contribution equilibrium. As such, a threshold public good game is a coordination game, with one more efficient and one less efficient equilibrium. In this context, refunding insufficient contributions ($f(g_1, \dots, g_N) = g_i$) reduces the cost of contributing, as subjects are guaranteed the zero-contribution payoff (z) if the threshold is not met.

The combined linear-threshold public good game brings these two models together to represent a situation in which a threshold exists at which a higher return (which we represent with $\beta > 1$) is unlocked, while contributions that are insufficient to meet the threshold still provide linear benefits to the group at a lower rate α such that $\beta > \alpha > 1$. Similarly, if the threshold is achieved, contributions above that level also yield return α. This is a departure from the standard literature (e.g., Croson and Marks 2000) in which contributions are wasted if insufficient and not refunded or if made in excess of the threshold and not rebated, designs which keep a sharp focus on coordination and thus strategic behavior; the presence of a linear public good return may make prosocial motives more relevant.

The payoff in the combined linear-threshold public goods game for agent *i* is

$$\pi_i = z - g_i + \begin{cases} f(g_1, \dots, g_N) & if \ \sum_j g_j < T \\ \frac{\beta}{N} T + \frac{\alpha}{N}\left[\sum_j g_j - T\right] & if \ \sum_j g_j \geq T \end{cases}, \quad (3)$$

This payoff function is isomorphic to a case with a social return $\alpha > 1$ for all contributions, with a lump sum of $(\beta - \alpha)T$ added to group earnings of total contributions at least equal the threshold *T*. This incentive structure is similar to the "assurance problem" of Isaac, Schmidtz, and Walker (1989), except that in that study and those that follow its model, contributions that fall short of the "provision point" (for us, the threshold) generate no public good benefit.

The temporal structure of the decisions is as follows. In Stage 1, all *N* agents simultaneously choose their contributions g_i. In Stage 2, the provision is realized.

We investigate several empirically relevant scenarios, across which the *f* function and the action space vary; in the following subsections, we detail those scenarios and give the self-interested symmetric Nash equilibrium prediction for each. After we discuss the three main scenarios (universal refund, no refund, and optional refund) under assumptions of self-interest focused on payoffs, we discuss how risk preferences and social preferences may affect behavior in this setting.

Before we provide that detail, two general theoretical features are worth noting. First, it is social welfare maximizing for everyone to donate their entire endowment, because even the continuous public good is socially beneficial. If everyone contributes their entire endowment, group earnings are $\alpha N z + (\beta - \alpha)T$, whereas they are only Nz if people keep everything. Second, if the threshold public good were a linear public good with an MPCR (marginal per capita return) of either $\frac{\alpha}{N}$ or $\frac{\beta}{N}$, then the self-interested Nash equilibrium would be for everyone to contribute nothing.

2.1. Universal Refund

In this scenario, if the threshold is not met, all contributions are refunded to the donors so that $f(g_1, \ldots, g_N) = g_i$. Contribution decisions are made in Stage 1. What happens in Stage 2 depends on whether the threshold is reached. If it is not, everyone receives their contribution back. If it is, everyone receives benefits based on the threshold public good as well as, if there are excess donations, any additional linear public good provision. This is similar to how Kickstarter campaigns, which raise small investments to launch a product, work: if enough money is pledged, the product can be launched (and otherwise, it is not), and if more money is pledged that is used to fund more production. There are differences; notably, rather than making a contribution and having it refunded if a threshold is not met, people giving in Kickstarter make pledges that are only fulfilled if the threshold is met, and what is funded is typically provision of a private good, not a public good. Of course, there are charity crowdfunding endeavors that take this form as well and do provide public goods at least in part.

In this game, there is an equilibrium in which everyone contributes zero. No-one would have a financial incentive to deviate because positive contributions below the threshold achieve return $\frac{\alpha}{N} < 1$, and even if they can reach the threshold alone, $\frac{\beta}{N}$ is also less than 1, so the classic public good problem applies. However, as in a standard threshold public good game, if a donor is pivotal in the sense that if they reduced their contribution the threshold would not be achieved, they receive a particularly high MPCR because they transform all cumulative contributions up to that point from having a low MPCR of α to a high MPCR of β. As a result, as in the simple threshold public good game described above, there is a symmetric[2] self-interested Nash equilibrium in which each agent contributes $\frac{T}{N}$. If all agents contribute that amount, agent *i* earns:

$$\pi_i = z - \frac{T}{N} + \frac{\beta}{N}T = z + \frac{(\beta-1)T}{N}. \quad (4)$$

If agent *i* deviates by contributing some amount ε less, they instead earn:

$$\pi_i = z, \quad (5)$$

since there is no public good provision. Since $\beta > 1$, this reduction is not a best response. To this point, the model behaves like that in Croson and Marks (2000). However, if *i* deviates by increasing their donation by ε, they earn

$$\pi_i = z - \frac{T}{N} - \varepsilon + \frac{\beta}{N}T + \frac{\alpha}{N}\varepsilon = z + \frac{(\beta-1)T}{N} + \left(\frac{\alpha}{N} - 1\right)\varepsilon. \quad (6)$$

Since $\frac{\alpha}{N} < 1$, this increase is also not a best response for a self-interested person. Thus $\frac{T}{N}$ is a symmetric Nash equilibrium contribution for self-interested agents. However, since $\alpha > 1$, a marginal increase in donations is always total welfare-enhancing. Therefore, the social optimum occurs when all agents contribute their endowment, making this a social dilemma. This differs from the model in Croson and Marks (2000); it is more similar to the money-back guarantee treatment in Isaac, Schmidtz, and Walker (1989), though again in that paper there is no public good return to contributions below the threshold.

[2] There are also asymmetric equilibria. We do not explore those, but they are all the cases in which the sum of group contributions exactly reaches the threshold.

2.2. Universal Donation Retention (No Refund)

This scenario differs in that if the threshold is not met, donations are retained and are used toward the linear public good with the lesser return, so that $f(g_1, \dots, g_N) = \frac{\alpha}{N}\sum_i g_i$. This is similar to the no-refund threshold public good model discussed in Croson and Marks (2000), though in past literature, contributions above the threshold are typically either rebated or lost while in our model they fund the linear public good.

In this case, it is clear that there is again a zero-contribution Nash equilibrium. Now, suppose there is a symmetric self-interested Nash equilibrium in which each donor contributes $\frac{T}{N}$. At this proposed equilibrium, every agent *i* earns:

$$\pi_i = z - \frac{T}{N} + \frac{\beta}{N}T = z + \frac{(\beta-1)T}{N}. \quad (7)$$

If any agent *i* were to reduce their donation by a marginal ε, they would earn:

$$\pi_i = z - \left(\frac{T}{N} - \varepsilon\right) + \frac{\alpha}{N}(T - \varepsilon) = z - \frac{T}{N} + \varepsilon + \frac{\alpha T}{N} - \frac{\alpha}{N}\varepsilon = z + \frac{(\alpha-1)T}{N} + \left(1 - \frac{\alpha}{N}\right)\varepsilon. \quad (8)$$

Equation (7) is larger than equation (8), and thus this is a Nash equilibrium, if $(\beta - 1)T > (\alpha - 1)T + (N - \alpha)\varepsilon$. This is true if $(\beta - \alpha)T > (N - \alpha)\varepsilon$. This inequality certainly holds for small ε. For the parameters in our experiment ($\beta = 2.4$, $\alpha = 1.6$, and $N = 4$), ε can never get large enough (6.67) for this to cease to hold, as it can get no larger than $\frac{T}{N} = 5$.[3] Therefore, with parameters such as these, symmetric contributions that just reach the threshold are again an equilibrium, so the equilibria are the same as in the universal refund case.

However, we can informally note that the equilibrium in which the threshold is met is weaker than that of the case with universal refunds, in the sense that the cost of deviating is lower in this no-refund case. In the universal refund case discussed in the previous section, if group contributions do not achieve the target, everyone earns their endowment, just as in past threshold public good research with full refunds. In contrast, in our no-refund case, subjects lose their endowment, but earn the public good return from any contributions, whereas in the threshold public good game they simply lose their endowment. Thus, contributions are less costly in the no-refund scenario of the combined linear-threshold public good game than they are in a standard threshold public good game with no refunds.

2.3. Optional Refund

In this scenario, each person can choose whether, on failure to reach the threshold, their donation is refunded to them or retained by the group and used toward the linear public good. This optionality would not be sensible to test in a traditional threshold public good game since the choice would be

[3] Further, since we know $\alpha < \beta$ and $\frac{\alpha}{N} < 1$, the quantities on both sides are positive. Further, as ε can never get larger than $\frac{T}{N} = 5$, this must hold as long as $(\beta - \alpha)T > (N - \alpha)\frac{T}{N}$, which is true if $\beta - \alpha > \frac{N-\alpha}{N}$ or $\beta - 1 > \alpha - \frac{\alpha}{N}$ or $\frac{\beta-1}{\alpha} > \frac{N-1}{N}$. This means it must hold for any given ε and N as long as α and β are different enough.

between receiving a refund and having the contribution wasted, so we are aware of no literature testing this kind of mechanism.

We define r_i as person *i*'s choice of whether to get a refund and *R* as the group of donors who decided to receive a refund. Since the refund decision is only relevant if the threshold is not met, and payoffs are the same as the other treatments if it is met, we focus on the case in which it is not met. In that case, $f(g_1, \dots, g_N) = (r_i - 1)g_i + \frac{\alpha}{N}\sum_{j \notin R} g_j$ and payoffs are:

$$\pi_i = z + \frac{\alpha}{N}\sum_{j \notin R} g_j \quad (9)$$

for someone who chose a refund and

$$\pi_i = z - g_i + \frac{\alpha}{N}\sum_{j \notin R} g_j \quad (10)$$

for someone who did not, where in the former (but not the latter) case *i* is part of *R* and thus is excluded from the sum. A person who switches from opting for a refund to not opting for one would reduce their payoff by $1 - \frac{\alpha}{N}$ (which is a positive reduction since $\frac{\alpha}{N} < 1$), and thus pecuniary-focused people who make contributions will choose to get a refund.

Our experiment features an ex ante refund treatment, in which the refund decision is made in Stage 1 before the contribution decision, and an ex post refund treatment in which it occurs in Stage 2 after the total contributions have been revealed. In the ex ante refund treatment, each person's decision of whether to receive a refund is communicated to all donors before contribution decisions are made. In this way, there are two differences between our optional refund treatments: the decision timing and the availability of information on others' refund choices. However, people focused solely on pecuniary outcomes will select the refund regardless of the timing, and we chose to combine these two elements to differentiate the treatments as much as possible from each other.

Since pecuniary focused people will still choose refunds, the self-interested Nash equilibria in terms of contributions (zero and just meeting the threshold) are the same in this game as those in the universal refund and no-refund cases.

2.4. Social Preferences

While all of the scenarios described above have the same symmetric self-interested Nash equilibrium predictions (either zero contributions or contributions that just meet the threshold), other motivations could alter predictions across the board and, in some cases, differentially across the scenarios. In particular, a variety of social preferences could generally increase contributions and, in some cases, make people less likely to take refunds.

Altruism (pure or impure) could, for all scenarios, eliminate the zero-contribution equilibrium and could produce other equilibria, including with contributions above the level that would achieve the threshold. It could also make people in the optional refund scenario choose not to take a refund.

If people have reciprocal, conditionally cooperative, or inequity averse preferences, in all scenarios, they may increase their contributions when they expect others to contribute generously; if they expect others to be stingy, that may reduce their contributions. If the treatment affects their expectation of

others' contributions, then this is one way the treatment can affect people's own contributions. People may expect others' contributions to be highest in the universal refund treatment, and this could reinforce the incentive to contribute more in this treatment.

If taking a refund is seen as selfish, and if people value having a self-image as a generous person, then some people may contribute less in the universal refund scenario than the universal contribution retention (no refund) scenario because the contribution will provide less utility if the refund makes contributions seem less generous and more self-interested. This creates some theoretical ambiguity about whether the universal refund scenario would increase contributions, but our experimental results do not support this being a major factor.

In the optional refund scenarios, if taking a refund is seen as selfish, then shame or a concern for reputation could reduce refund-taking; if refund decisions are publicized before contributions are made, then a belief that others will contribute more if they see fewer group members taking refunds could make people choose not to take a refund.

If a person wants to adhere to social norms, the effect of those norms on contributions and refunds depends on what those norms are. In particular, norms of generosity would increase contributions and reduce refund-taking. Norms of fairness would typically imply symmetric behavior. As we show in Section 5, our survey-experiment suggests that people largely value the option to get a refund, but generally do not believe that they (or others) should avail themselves of the refund, implying that they see taking the refund as ungenerous. Additionally, the particular type of public good being provided seems to influence these preferences and perceptions, implying that different social norms may apply in different contexts. In other words, how selfishly a refund choice is perceived depends on what type of public good benefits the contributions are creating, and this should alter refund-taking behavior.

2.5. Risk Preferences

While the model we present above gives payoffs that are interpreted as utility, risk preferences and loss aversion could affect behavior.

First, past literature (Gangadharan and Nemes 2009) has shown that risk averse people view contributing to linear public goods as risky – the return is not naturally stochastic, but this may be because conditional cooperators see others' contribution to the public good as an uncertain return to their own contribution.

Next, if preferences are wholly self-interested, the equilibria themselves would not change because of risk aversion; however, the discontinuity of the public good return around the threshold could make the threshold-achieving equilibrium seem riskier, potentially encouraging higher contributions. On a similar note, if people have reference dependent preferences and the threshold is the reference point, then loss aversion could encourage people to contribute at or above the symmetric threshold-achieving equilibrium prediction out of a desire to not "lose out" by not achieving the threshold.

Risk and loss aversion can thus increase contributions, but in ways that differ across the treatments. The most intuitive expectation is that contributions are riskier when no refunds are possible than when they are possible. This would lead one to expect that risk averse people will reduce their contributions more

when no refund is possible than when refunds are possible if they see contributing as risky, or by the same token increase their contributions if they see missing the threshold as a risk. Therefore, this prediction could go in either direction, depending on expectations of others' contributions.

One might expect that optional refunds would operate similarly to universal refunds with regard to risk preferences; however, that depends on how people expect the refund system to affect others' contributions. If refund decisions are made and announced before contribution decisions (as in our optional ex ante treatment), then people have information that can help them predict others' behavior, so risk aversion should not affect contribution behavior as much. If refunds are chosen ex post, then that may increase a sense of riskiness in contributions, and this may cause a wider gap in contributions between risk averse and risk tolerant people. This gap could go in either direction, depending on what beliefs are and what action is therefore perceived as risky: in ex post, risk averse people would give more if they see missing the threshold as the riskier event, whereas risk tolerant people would give more if they see the public good return as riskier.

2.6. Hypotheses

To summarize, we first present hypotheses based on simple risk neutral pecuniary-focused preferences:

H1: Group contributions will be either 0 or *T*.

H2: In the optional refund treatments, everyone who is offered the option chooses to take a refund.

If people have social preferences, hypotheses H1 and H2 may be rejected. Since it is well known that people have social and risk preferences, that is what we expect. In the presence of social and risk preferences, our simplest hypotheses are:

H3: Contributions are higher in the universal refund treatment than the no refund treatment.

H4: In the optional refund treatments, contributions are similar to those in the universal refund treatment.

H5: Risk averse people contribute less than risk tolerant people.

Since risk preferences could interact with the refund institutions in complex ways, we don't propose a hypothesis about how the differences in behavior across refund institutions will vary with the risk preferences of the decision-maker.

More generally, patterns beyond those outlined in these hypotheses could occur depending on beliefs about others' actions and perceptions of the normativity and riskiness of these actions.

3. Lab Experiment

We study the combined linear-threshold public good game in a lab experiment. The lab provides us control and observability of more factors than we would have in a field experiment or observational study. This is particularly important given that many naturally occurring combined linear-threshold

public goods have significant uncertainty in the threshold levels or varying beliefs about public and private returns.

3.1. Experiment Design

We use groups of *N* = 4 in a one-shot game. While many public good games in the literature use repeated games, we use a one-shot game so that analysis can be performed at the individual level, since this precludes information feedbacks between participants causing observations to be non-independent. This structure is also consistent with many policy-relevant settings in which project fundraising is a one-shot occurrence. The game is presented as an abstract framing. Subjects are told they have the opportunity to contribute toward their group Project Fund, and the threshold is referred to as "fully funding" the Project; the project can instead be "partially funded" or "more than fully funded." The experiment is real stakes, in the sense that subject decisions affect their own, and their group members', earnings. We use a single anonymous protocol: subjects interact with group members through a computer interface but do not know which other individuals they are interacting with; however, at the end of the study session, experimenters do associate individuals with their payment amounts and therefore can infer who made which decisions.

We parameterize the model above in the experiment as follows. Endowments and contributions are presented in terms of dollars for easier comprehension. Subjects have endowments of $z = \$10$ and the threshold is $T = \$20$, so the symmetric Nash equilibria in contributions are \$0 and \$5 (50% of endowment). This ensures that no person can achieve the threshold alone and that there is plenty of scope for people to under-contribute or over-contribute relative to the threshold (though, unlike standard threshold public good games, neither insufficient contributions nor overcontributions are wasted). The linear public good return is $\alpha = 1.6$, so the MPCR is 0.4. The benefit of achieving the threshold is $\beta = 2.4$,[4] which gives an MPCR of 0.6. These parameters meet the criteria established in Section 2: they ensure that both the linear public good and the threshold are true public goods where zero contributions are a self-interested Nash equilibrium, though the nature of the threshold creates a second symmetric Nash equilibrium. Figure 1 shows per capita earnings from the public good for the range of total contribution levels.

[4] Our step return of 2.4 is in the middle of the step returns of the papers Croson and Marks (2000) discuss, and falls between the medium and high step returns that they use in their experiment.

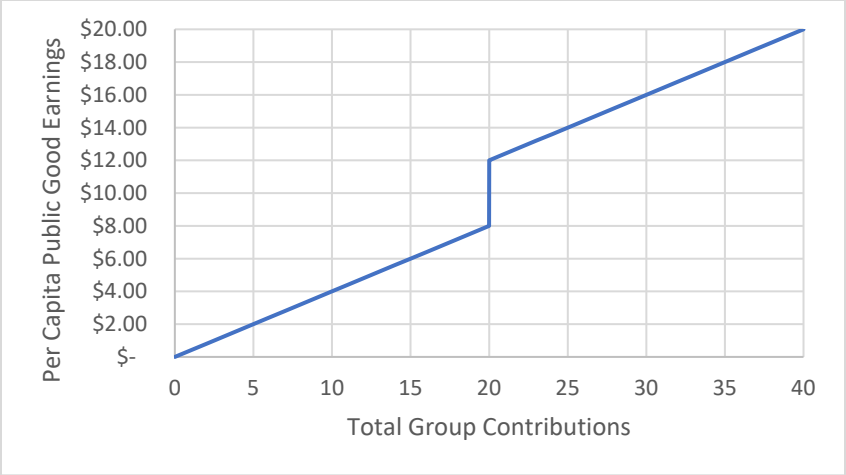


Figure 1: Per Capita Public Good Earnings as a Function of Total Group Contributions

With these parameters, the $0-contribution symmetric Nash yields earnings of $10 and the $5-contribution symmetric Nash yields earnings of $17; if everyone contributes their full endowment, everyone earns $20. The least a person can earn if they contribute their full endowment (and get no refund) and no-one else contributes anything is $4, and the most they can earn if they contribute nothing and everyone else contributes their full endowment is $26. This creates a strong incentive to free-ride: for example, if two subjects contribute 10 and two contribute zero, the payoffs would be $12 for contributors and $22 for non-contributors. Participants receive an additional $10 for their participation, on top of earnings from decision-making.

The flow of the experiment is shown in Figure 2.

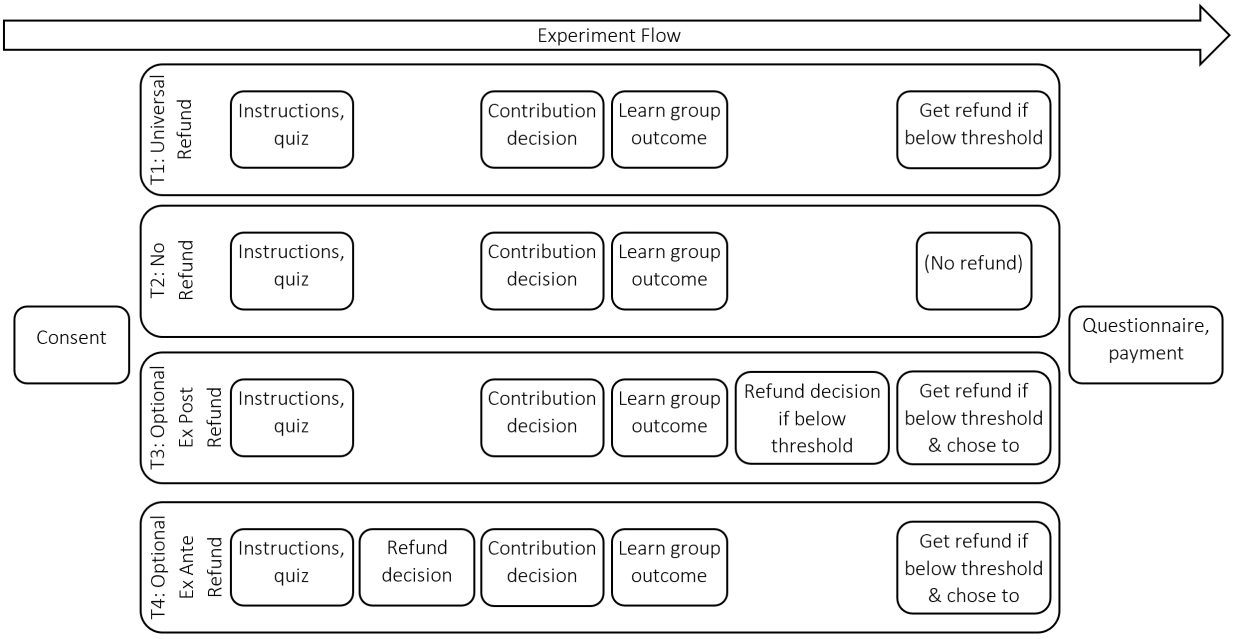


Figure 2: Experiment Flow

Subjects arrive at the experiment and sign the consent form. The experimenters provide instructions that are read aloud (see Appendix B for example instructions). The subjects then begin interacting with the software (see Appendix B for example screenshots), which the experimenters programmed in zTree (Fischbacher 2007). The subjects complete a quiz to ensure that they understood the decision environment and payoffs.

The treatments then diverge in structure. There is always a contribution decision, in which each subject decides independently how much to contribute (from $0 to $10), followed by learning the group outcome, and finally subjects complete a questionnaire on the computer and receive payment in person (but privately with regard to the other participants). The only differences between the Universal Refund and No Refund treatments are that when final outcomes are announced, contributions are in the former case automatically refunded to all participants if the total group contribution does not reach the $20 threshold, and in the latter case they are automatically retained in the Project Fund. In the Optional Ex Post Refund treatment, after contributions are made, on a screen in which participants learn whether the threshold was attained, each participant chooses independently whether to have their contribution refunded, and thereafter everyone learns how many group members took refunds and what the resulting final earnings are. In the Optional Ex Ante Refund treatment, subjects see a refund decision screen before their contribution decision screen. Then, the number of refunds requested by group members is presented on the contribution decision screen so that it is visible when everyone makes their contribution decisions.

3.2. Experiment Implementation

We ran the experiment in spring 2022 and spring 2023 at a large public university in the northeastern United States, using ORSEE for recruitment (Greiner 2015), with 4 sessions (64-68 participants) per treatment. Each session lasted less than an hour and a half, and participants earned $28.38 on average.

Table 1 shows summary statistics of the participants overall and by treatment. While the sample is relatively well balanced on observable characteristics across treatments (see balance tests in Appendix Table A-1), participants in the Universal Refund treatment are less risk averse on average than participants in other treatments. The risk preference measure is particularly important; its distribution pooled across treatments is shown in Appendix Figure A-1.[5] This speaks to the importance of controlling for covariates, especially risk aversion, in analyzing treatment differences.

[5] Our risk preference distribution has similarities to that in Dohmen et al. (2011), with both sharing fairly flat distributions, but theirs peaks at a modal response in the middle of the range and ours on the less-risk-averse side. This is congruent with our younger sample, as they show younger people are less risk averse.

Table 1: Participant Characteristics

	Pooled	Universal Refund	No Refund	Ex Post Refund	Ex Ante Refund
Woman*	57.3%	51.5%	56.7%	60.3%	60.6%
	(49.6)	(50.4)	(50.0)	(49.3)	(49.2)
Age	20.295	20.75	20.078	20.078	20.25
	(1.970)	(2.378)	(1.802)	(1.962)	(1.615)
Raised in US*	67.8%	60.3%	62.5%	71.9%	76.5%
	(46.8)	(49.3)	(48.8)	(45.3)	(42.7)
CRT score	1.352	1.206	1.500	1.281	1.426
	(1.147)	(1.073)	(1.272)	(1.091)	(1.150)
Very comfortable with numbers*	39.4%	44.1%	37.5%	32.8%	42.6%
	(49.0)	(50.0)	(48.8)	(47.3)	(49.8)
Risk aversion	3.708	3.235	4.047	4.016	3.574
	(2.227)	(2.110)	(2.484)	(2.149)	(2.104)
N	264	68	64	64	68

Means for continuous variables; percents for binary variables (marked with *). Standard deviations in parentheses. Nine people did not identify as, or solely as, "woman" or "man" so are marked missing for "woman." Raised in US is an indicator for whether the person chose that they were raised entirely in the US. "CRT score" is the score on the short version of the cognitive reflection test (Frederick 2005) and ranges from 0 (worst) to 3 (best); because of a software error we are missing this variable for 3 participants. "Very comfortable with numbers" is an indicator for answering "Very comfortable" to the question "Do you feel that you are a person who is very comfortable with numbers?" "Risk aversion" is a reverse coding of a stated preference risk tolerance question from Dohmen et al. (2011), ranging from 0 to 10, where a greater number indicates more risk averse.

4. **Lab Experiment Results**

Table 2 summarizes decisions and outcomes by treatment. It is notable that the contributions are quite high; indeed, they average well above the higher of the two symmetric self-interested Nash equilibria, so we can reject Hypothesis 1. These high contributions result in nearly universal achievement of the threshold. This would not be expected if agents are purely self-interested, risk neutral, and fully rational. Moreover, they differ substantially from results from previous threshold public good experiments with refunds, including the assurance game of Isaac, Schmidtz, and Walker (1989), which had a threshold with a linear public good benefit for contributions above but not below the threshold. In that study, in the treatment most like our No Refund, insufficient contributions are wasted, whereas in ours, they yield a positive return.

Table 2: Decisions by Treatment

Treatment	Mean contribution [Median contribution] (Standard deviation)	Percent of groups reaching threshold	Percent of subjects getting/requesting refund	Welfare (percent of maximum possible)
Universal Refund	0.822 [1] (0.240)	100%	100%	94.662%
No Refund	0.778 [0.8] (0.248)	100%	0%	93.344%
Ex Post Refund	0.716 [0.8] (0.303)	81.25%	15.625% of total 83.333% of eligible	86.078%
Ex Ante Refund	0.774 [0.9] (0.275)	100%	51.471%	93.206%

Contributions in percent of endowment. "Percent of subjects getting/requesting refund" is necessarily 100% in Universal Refund and 0% in No Refund based on the rules of those treatments; in Ex Post Refund, we present this figure as a percent of all subjects in this treatment as well as as a percent of subjects in groups that didn't reach the threshold, as in that treatment those were the only subjects who were presented with the decision of whether to get a refund; in Ex Ante Refund all participants declared in advance whether they would take a refund if the threshold was not achieved, and we use the percent of these decisions that choose the refund.

We first explore contributions decisions in section 4.1, then refund decisions in section 4.2. We conduct all analysis at the individual level because people do not observe any actions or characteristics of other participants except for cases where we control for what they do see (notably, in the Optional Ex Ante treatment, where we control for the refund decisions of others) and thus actions should be statistically independent.[6]

4.1. Contribution Decisions

We first look at unconditional differences across treatments, although these results do not give true treatment effects because, as we showed above, subjects in the Universal Refund treatment were more risk averse than subjects in the other treatments. We show later that taking risk aversion into account allows us to more clearly detect treatment differences. We present these unconditional results in the interest of transparency.

Table 3 shows that the refund institution has little statistically detectable impact on contribution decisions on average, before we control for the heterogeneity in our subject pool. Indeed, the two most conceptually different treatments, Universal Refund and No Refund, are statistically indistinguishable. It is also notable that the Ex Ante Refund treatment has highly similar performance to both of those even though it differs in multiple ways: the refund is optional, it is committed to in advance, and that decision

[6] Where possible we calculate clustered standard errors at the session level for our regressions, to account for variability between sessions.

is publicly announced to group members. The only detectable difference in raw contributions between treatments is between the Universal Refund treatment, in which Table 2 shows contributions are highest, and the Optional Ex Post Refund treatment, which Table 2 shows has the lowest mean and median contribution point estimates and the only cases in which groups do not meet the threshold (3 out of 16 groups).

Table 3: Bivariate Tests of Treatment Effects

	No Refund	Ex Post Refund	Ex Ante Refund
Universal Refund	0.245	0.038	0.319
No Refund		0.309	0.964
Ex Post Refund			0.323

Cells show exact *p*-values of Wilcoxon ranksum tests comparing contributions across the treatments.

Figure 3 shows the cumulative distribution of contribution amounts, by treatment.

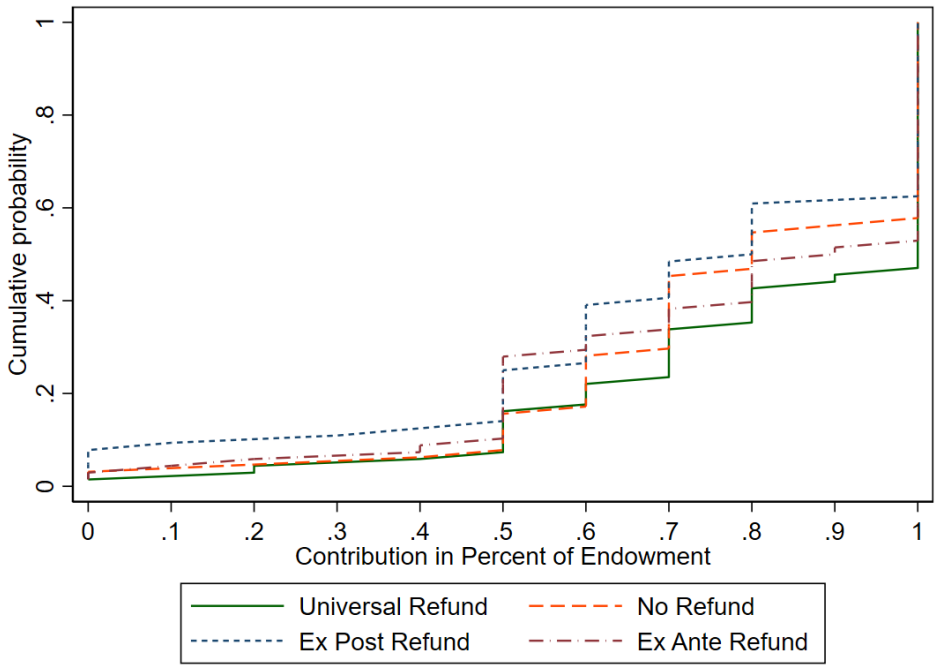


Figure 3: Cumulative Distribution of Contributions by Treatment

We observe many contributions at 100% of endowment, especially in the Universal Refund treatment, and a nontrivial mass at the self-interested symmetric Nash prediction of 50%, especially in the Optional Ex Ante treatment, with very few contributions at the 0% Nash equilibrium, though more of those in Optional Ex Post. Kolmogorov-Smirnov tests of differences in distributions are not significant across any treatment pairs. However, we test for differences at specific points in the distribution in Table 4.

Table 4: Bivariate Tests of Contributions at Minimum, Nash, and Maximum Contribution Levels

Panel A	**Contributed Zero**	**Contributed 50%**	**Contributed 100%**
Universal Refund	1.471%	10.294%	54.412%
No Refund	3.125%	9.375%	43.75%
Ex Post Refund	7.813%	12.5%	39.063%
Ex Ante Refund	2.941%	19.118%	48.529%
Panel B	**Contributed Zero**	**Contributed 50%**	**Contributed 100%**
Universal = No	0.611	1.000	0.229
Universal = Ex Post	0.107	0.787	0.084
Universal = Ex Ante	1.000	0.226	0.607
No = Ex Post	0.440	0.778	0.720
No = Ex Ante	1.000	0.139	0.604
Ex Post = Ex Ante	0.264	0.347	0.297

Percents contributing the given amounts in Panel A. Panel B presents exact *p*-values from Fisher exact tests comparing the treatments for this contribution level.

Table 4 shows that few of the differences at any of the key points in the distribution are statistically significant or near significant. The difference between Universal and Optional Ex Post in 100% contributions is marginally significant, and that difference for 0% contributions is almost significant. Similarly, the Optional Ex Ante treatment shows a relatively large number of contributions at 50% of endowment, and this is almost statistically significantly more common than 50% contributions in the No Refund treatment. Thus, the optional refund treatments may be drawing contributions down from 100% and toward the self-interested Nash predictions.

We further test treatment effects in Tobit regressions of contribution amount on treatment dummies and control variables at the individual level, as shown in Table 5. This is our preferred analysis, since we can control for risk preferences, which we have shown are unbalanced across treatments. Specification 1 is not our preferred specification because it looks at raw differences across treatments without controlling for risk preferences; it shows that the Universal Refund treatment yields higher contributions on average as compared to the No Refund treatment, the omitted category, and they are also higher than the Optional Refund treatments. Specification 2, which does control for risk preferences, shows that conditioning on risk preferences and other controls, the Universal Refund treatment has higher contributions than all three of the other treatments. The difference we find between Universal and No Refund treatments, again, are consistent in sign with the findings of Isaac, Schmidtz, and Walker (1989), although the difference in that study is much more dramatic.

Specification 2 also shows that more risk averse people contribute less, which is sensible, as contribution is risky (having an uncertain return) whereas keeping one's endowment is safe. This result supports Hypothesis 5.

Table 5: Effects of Treatments and Covariates on Contributions

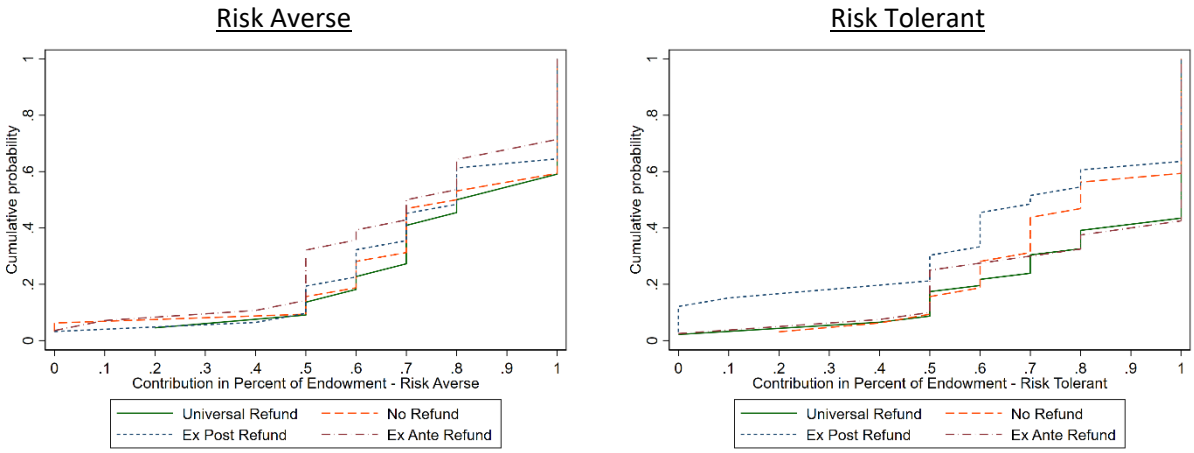
	(1)	(2)	(3)
Universal Refund	0.105**	0.129***	0.333***
	(0.044)	(0.048)	(0.113)
Ex Post Refund	-0.101	-0.108	-0.121
	(0.063)	(0.069)	(0.140)
Ex Ante Refund	0.015	-0.008	0.131
	(0.079)	(0.068)	(0.175)
Risk aversion		-0.035**	-0.015
		(0.014)	(0.018)
Universal Refund x Risk aversion			-0.055***
			(0.020)
Ex Post x Risk aversion			0.004
			(0.026)
Ex Ante x Risk aversion			-0.035
			(0.032)
CRT score		0.004	0.002
		(0.040)	(0.038)
Very comfortable with numbers		-0.057	-0.062
		(0.058)	(0.056)
Woman		0.143**	0.135**
		(0.062)	(0.061)
Age		-0.028	-0.030*
		(0.017)	(0.018)
Raised in US		0.136**	0.137**
		(0.067)	(0.066)
First wave of sessions		0.033	0.028
		(0.056)	(0.056)
Constant	0.928***	1.438***	1.410***
	(0.034)	(0.386)	(0.390)
Pseudo R2	0.0132	0.0601	0.0673
Number left censored	10	10	10
Number right censored	123	119	119
N	264	255	255

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered on session. Tobit subject-level regressions of contribution in percent of endowment. “Risk aversion” is a reverse coding of a stated preference risk tolerance question from Dohmen et al. (2011), ranging from 0 to 10, where a greater number indicates more risk averse. Nine people did not identify as, or solely as, “woman” or “man” so are marked missing for “woman.” “Raised in US” is an indicator for whether the person said that they were raised entirely in the US. “CRT score” is the score on the short version of the cognitive reflection test (Frederick 2005) and ranges from 0 (worst) to 3 (best); because of a software error we are missing this variable for three participants. “Very comfortable with numbers” is an indicator for answering “Very comfortable” to the question "Do you feel that you are a person who is very comfortable with numbers?" “First wave of sessions” is an indicator for the sessions run in 2022.

Specification 3 interacts risk aversion with the treatment dummies, since making (and withholding) contributions is differentially risky in the different treatments. In Table A-2, we show p-values for post-estimation tests comparing the treatments for people with different degrees of risk-aversion. We find, first, that participants who are not risk averse at all (0 on a 0 to 10 scale) contribute significantly more in the Universal Refund treatment than the No Refund and Ex Post Refund treatments, but otherwise

behave similarly across all four treatments. Next, we find that increasing degrees of risk aversion causes participants to contribute less on average in the Universal Refund treatment, while risk aversion does not seem to otherwise affect contributions. One way of understanding this is that the contribution increase that the Universal Refund treatment brings about is larger for risk tolerant people than for risk averse people. Another way of thinking about it is that risk aversion mutes the only meaningful treatment different that exists, which is the increase in contributions associated with the Universal Refund treatment.[7, 8]

In Figure 4, we show cumulative distributions of contributions by treatment separately for people who are relatively risk averse (*N* = 113) and those who are risk tolerant (*N* = 151). While the sample sizes in this split sample are too small to perform meaningful tests at points in the distribution, the graphs suggest that in the Ex Post Refund treatment, risk tolerant people appear to contribute zero more often than do risk averse people, while in Universal Refund and Ex Ante Refund, risk tolerant people appear to contribute their full endowment more often than do risk averse people.



Note: "Risk averse" is defined as having risk aversion of 4 or more, using a reverse coding of a question from Dohmen et al. (2011), whereas risk tolerant people have risk aversion of 3 or less; 3 is on the risk tolerant side of the empirical median.

Figure 4: Cumulative Distribution of Contributions by Treatment

In summary, these results provide mixed support for our hypotheses. Hypothesis 1 is rejected, as group contributions well exceed both 0 and T, indicating a likely role for social preferences and risk aversion. Hypothesis 3 is supported, as our Universal Refund treatment did result in the highest level of

[7] When Table 5 specification 3 analysis is performed without clustered standard errors, the interaction term between Universal Refund and Risk aversion ceases to be statistically significant, dropping to p = 0.180, and the uninteracted Universal Refund dummy drops from p = 0.004 to p = 0.067 but remains significant. All treatment differences in Table A-2 cease to be significant except for the comparison between Universal and Ex Post Refund for highly risk tolerant and relatively risk averse people.

[8] An alternative way of looking at the risk preference interaction result is that, starting from a highly risk tolerant baseline in which people contribute less when either there is no refund or when a refund can't be pre-committed to, risk aversion causes people to reduce their contributions when the refund is automatic or can be pre-committed to (though the impact of a one-unit increase in risk aversion is only marginally significant in the latter case) but has no impact when there is no refund or when refunds can be exercised ex post.

contributions. Hypothesis 4 is not supported, as contributions in the No Refund treatment were higher than in the Optional Refund treatments. Hypothesis 5, that risk averse individuals will contribute more than risk tolerant individuals, is supported. We now turn to Hypothesis 2, which concerns whether the subjects always choose the refund in the optional refund treatments.

4.2. Refund Decisions and their Ramifications

We focus our analysis of refund decisions on the Optional Ex Ante Refund treatment, where all participants had a refund decision to make. In the Optional Ex Post Refund treatment, only 12 people (3 groups) were in a position to make a refund decision. The refund rate in this treatment (83%, as shown in Table 2) happens to be larger than the refund rate in Ex Ante Refund (51%), but the small sample defies statistical analysis. Nevertheless, it does seem clear that this evidence does not support Hypothesis 3, which asserted that in when refunds are optional subjects always choose to get a refund.

Table 6: Logit Regression of Refund Decision in Ex Ante Refund on Control Variables

	(1)	(2)	(3)
Very comfortable with numbers	0.226	0.243*	0.119
	(0.143)	(0.146)	(0.170)
Risk aversion	0.051	0.053	0.048
	(0.033)	(0.034)	(0.038)
Woman	0.272*	0.306*	0.277
	(0.161)	(0.161)	(0.171)
Age	0.008	0.005	-0.037
	(0.043)	(0.043)	(0.048)
Raised in US	-0.111	-0.097	-0.174
	(0.156)	(0.163)	(0.163)
First wave of sessions	0.070	0.035	0.017
	(0.148)	(0.153)	(0.158)
Said would choose no refund in hypothetical charity situation		-0.255*	-0.196
		(0.130)	(0.140)
CRT score			0.182**
			(0.074)
Pseudo R2	0.0876	0.1275	0.1996
N	66	66	66

* p<0.1; ** p<0.05; *** p<0.01. Logit subject-level regression with binary refund decision as outcome; marginal effects reported. “Risk aversion” is a reverse coding of a stated preference risk tolerance question from Dohmen et al. (2011), ranging from 0 to 10, where a greater number indicates more risk averse. Nine people did not identify as, or solely as, “woman” or “man” so are marked missing for “woman.” “Raised in US” is an indicator for whether the person said that they were raised entirely in the US. “CRT score” is the score on the short version of the cognitive reflection test (Frederick 2005) and ranges from 0 (worst) to 3 (best); because of a software error we are missing this variable for three participants. “Very comfortable with numbers” is an indicator for answering “Very comfortable” to the question "Do you feel that you are a person who is very comfortable with numbers?" “First wave of sessions” is an indicator for the sessions run in 2022.

Regressions of the refund decision in the Optional Ex Ante Refund treatment are reported in Table 6.[9] We find that very few personal characteristics affect the refund decision, as shown in Specification 1: women are marginally more likely to choose a refund, but no other variables are predictive. In Specification 2, we add in a control for a hypothetical question we asked to gauge how people said they would behave if a charity offered a refund in a threshold-type situation. Specifically, in the post-experiment questionnaire, we ask subjects "If you were contributing to a charity that was fundraising for a specific project, if they didn't raise enough money to do that project, would you want them to refund the money to you?" In response, 48.67% of participants said no, and 38.4% said it depends. This response is only weakly related to subjects' propensity to choose a refund in the Optional Ex Ante treatment: the correlation is -0.2389, and Table 6 shows the relationship is sensitive to specification, though the sign is intuitive. The response to this question is significantly predicted by cognitive reflection test score (Frederick 2005), so it loses significance when that variable is included in the regression, as participants with higher cognitive reflection test scores are more likely to request refunds. While the question about refunds in the charity context is only hypothetical, it is surprising that the relationship to refund decisions in our lab study is so weak. Therefore, we use a survey experiment, presented in Section 5, to study whether the context in which this sort of decision is made changes participants' preferences and perceptions.

Participants' refund decisions in the Optional Ex Ante Refund treatment are pre-announced to their group members while they are making contribution decisions; therefore, group members' refund choices could influence a participant's contribution decision. Table 7 shows regressions of contribution decisions in the Optional Ex Ante Refund treatment on people's own refund decisions and the number of group members choosing a refund. Because of the small sample size given the focus on only those in the Optional Ex Ante treatment, the feasible analysis is limited; notably, it is not possible to interact risk aversion with number of refunds requested in the group because the F statistic cannot be calculated in such a regression, and we do not add control variables. Nevertheless, the results suggest that the more refunds one observes those in one's group committing to, the *more* one is likely to contribute. This implies that people do not see choosing to take a refund as a selfish decision, but perhaps see it as insurance that may enable higher contributions. Indeed, once risk aversion is controlled for, those who request refunds do contribute higher amounts.[10]

[9] For this analysis, standard errors are not clustered because the sample size is insufficient. When this analysis is run as a linear probability model regression, results are similar except that "Very comfortable with numbers" ceases to be significant in specification 2 and "Woman" ceases to be significant in specification 1.

[10] In specifications without clustering, having requested a refund and the number of refunds requested both cease to be statistically significant.

Table 7: Effect of Refund Decisions on Contribution Decisions in Ex Ante

	(1)	(2)
Requested a refund	0.060	0.108**
	(0.074)	(0.051)
Number of refunds requested in group	0.110**	0.115**
	(0.051)	(0.048)
Risk aversion		-0.059*
		(0.032)
Constant	0.692***	0.868***
	(0.118)	(0.216)
Pseudo R2	0.0253	0.0577
Number left censored	2	2
Number right censored	33	32
N	68	66

* p<0.1; ** p<0.05; *** p<0.01. Standard errors clustered on session. Tobit subject-level regressions of contribution decision for Ex Ante treatment only. "Risk aversion" is a reverse coding of a stated preference risk tolerance question from Dohmen et al. (2011), ranging from 0 to 10, where a greater number indicates more risk averse.

Clearly, subjects' decisions regarding refunds are more nuanced than theory would suggest. Therefore, in the next section, we next discuss the results of an online survey which was designed to improve our understanding of this decision.

5. **Online Survey-Experiment**

We supplement our lab experiment with an online survey-experiment conducted on Prolific. Participants are each presented with one (randomly-chosen) fictional scenario out of three: one regarding a common type of charity (an animal shelter), one with an environmental theme (ecosystem conservation), and one neutrally framed (a group of people). In each, there is a group fundraising toward a goal, where hitting that goal would unlock significant benefits (building a new building, buying a piece of land big enough to let an endangered species thrive, and reaching a goal that would provide large benefits, respectively). In each case, if the goal is not met, donated money will still provide some lesser benefits, but donors can choose whether to have that money refunded. Participants received a fixed $1.25 for participating and the median completion time was 6 minutes and 34 seconds. See Appendix C for screen shots.

Table 8 shows responses to the questions in the different scenarios of the survey-experiment.[11]

[11] While risk tolerance and cognitive reflection predicted behavior in the lab experiment, those factors were not correlated with perceptions expressed in the online survey-experiment. The only personal characteristics that predict normative beliefs in the online survey-experiment are that women and people who feel they are more comfortable with numbers hold lower descriptive and injunctive norms (feel people are less likely to ask for refunds and are less likely to recommend a refund to a friend); results available on request.

Table 8: Online Survey Experiment Responses

	Animal shelter	Ecosystem	Neutral
Refund option increases desire to donate[1]	0.750	0.750	0.553
	(0.437)	(0.437)	(0.503)
Prefers a charity that offers a refund option over one that does not[1]	0.750	0.827	0.809
	(0.437)	(0.382)	(0.398)
Thinks a charity that offers a refund will get more donations than one that does not[3]	0.922	0.827	0.872
	(0.272)	(0.382)	(0.337)
How responsible is charity with donation option?[2]	7.731	7.654	6.830
	(2.040)	(2.018)	(2.389)
How effective is charity with donation option?[2]	7.423	6.558	6.447
	(2.287)	(2.363)	(2.385)
How trustworthy is charity with donation option?[2]	7.961	7.000	6.553
	(2.053)	(2.343)	(2.339)
Percent of donors expected to get refund (descriptive norm)	36.31	41.88	57.34
	(22.53)	(24.65)	(24.87)
Friend should get refund (injunctive norm)[1]	0.212	0.481	0.681
	(0.412)	(0.505)	(0.471)
Donor getting refund is generous[2]	6.346	6.692	6.106
	(2.257)	(2.322)	(2.199)
Donor getting refund is responsible[2]	6.846	7.212	7.128
	(2.081)	(2.278)	(2.133)
Donor getting refund makes good decisions[2]	6.538	6.981	7.277
	(2.062)	(2.330)	(2.204)
Would trust donor getting refund[2]	6.077	6.673	6.745
	(2.222)	(2.357)	(2.100)
Donor not getting refund is generous[2]	8.846	8.692	8.404
	(1.258)	(1.675)	(1.765)
Donor not getting refund is responsible[2]	7.769	7.269	6.936
	(2.219)	(2.235)	(2.151)
Donor not getting refund makes good decisions[2]	7.788	7.135	6.553
	(2.090)	(2.241)	(2.348)
Would trust donor not getting refund[2]	7.846	7.615	7.128
	(2.033)	(1.962)	(2.299)
N	52	52	47

Means reported with standard deviations in parentheses. Variables marked with [1] are binary variables defined as 1 if the underlying 5-point-scale variable is positive: "increase a lot" or "increase a little" (versus "neither increase or decrease" or decrease a little or a lot); prefer "a lot" or "a little" (as opposed to "it doesn't matter" or prefer the opposite a little or a lot); "definitely yes" or "maybe yes" (versus "not sure" or maybe or definitely no). Variables marked with [2] are measured on a 0 to 10 scale. Variable marked with a [3] is a binary variable defined as 1 if the charity offering the refund is chosen as the one that will get more donations (versus the other getting more or both getting the same).

Table 8 shows that people like the opportunity to get a refund and it makes them feel more positively about the charity and its chances of success. Strong (usually very strong) majorities of people say that the option to get a refund increases their desire to donate to the cause, say they prefer a cause that offers a refund to a similar organization that does not, and state a belief that a charity offering a refund will get more donations than a similar one not offering a refund. These are true regardless of the

framing, although the effect on one's own desire to donate is less in the neutral framing than in the charity and ecosystem framings (Wilcoxon ranksum p=0.064 in each case).

Second, despite this enthusiasm about charities offering refunds, people feel more positively about donors who, given the option, choose to refuse a refund. Refusing a refund is seen as the more generous option as compared to getting a refund across all treatments (p<0.001 in all cases). One might think that taking a refund is seen as self-interested but practical, but there is only modest evidence supporting that interpretation: only in the animal shelter case is the donor who refuses a refund seen as more responsible (p<0.001 in that treatment, but p=0.663 and p=0.843 in the others) and more of a maker of good decisions (p<0.001 as compared to p=0.890 and p=0.231). Further, for both of the non-neutral framings, the donor who does not choose a refund is seen as more trustworthy (p<0.001 for the animal shelter and p=0.006 for the ecosystem), while this difference is not statistically significant for the neutral framing (p=0.291).

Third, people perceive the refund as far more normative in the neutral framing, which is most like the lab experiment case, and as the least normative in the animal shelter setting, with the ecosystem context lying in between the two; we have several pieces of evidence for this. The descriptive norm (the expectation of what percent of people would get refunds) and the injunctive norm (whether they would tell a friend who was donating that they should get a refund) show significant differences between each treatment in the orderings noted (except the descriptive norm for the animal shelter as compared to the ecosystem is not quite significant, Wilcoxon ranksum test p=0.173, with p<0.01 in each case otherwise, except p=0.070 for the injunctive norm compared between the ecosystem and the neutral framing). The injunctive norm shows a greater sensitivity to framing than the descriptive norm does: perceptions of how people will actually behave are not as quantitatively different across the treatments as are stated beliefs about how people should behave.

Together, the survey-experiment results show people have complicated feelings about the offering and take-up of refund options with regard to real charities. They express positive feelings about the offering of those options but seem to prefer that they not be exercised; further, a neutral framing weakens normative perceptions about the refund option. This weakening could be because getting a refund in the neutral framed case only "hurts" other group members who may be perceived as relatively stingy, whereas in the other framings it could be seen as harming a sympathetic cause. This weakened normativity around the refund in the neutral frame may explain the weak relationship in our lab experiment between subjects' refund decisions and their declared preference for getting a refund from a charity. In that way, our online study is a bridge to the lab experiment results. Of course, naturally occurring scenarios with payoff structures like that studied in this paper have contexts that vary widely, including charities, crowdfunding, and ecological settings. Still, our online experiment shows that in many (though perhaps not all) of them, the taking of a refund may be frowned upon more than it is by participants in our lab study. Many of the public good field experiments that have incorporated thresholds and refunds (e.g., Li, Liu, and Swallow 2021) have been set in the context of ecosystem preservation; our results imply that the same payoff structures used in those studies may not generalize to other contexts.

6. **Conclusion**

In many situations of interest, ranging from ecosystem protection to charity provision, public goods have both important thresholds but valuable continuous uses of contributions below or above those thresholds. Our study models this as a new institution we call the combined linear-threshold public good game, and we examine behavior in this institution. We find that subjects in a lab experiment facing a neutrally framed game of this type are quite generous regardless of what happens to contributions if the threshold is not met. Contributions vary minimally even between the two most extreme rules for under-contributions (universal refunds and no refunds), in stark contrast to results such as those summarized in Croson and Marks (2000), though different parameterizations and design elements may explain those differences. In particular, contributions with universal refunds are congruent with the high contributions of the assurance game studied by Isaac, Schmidtz, and Walker (1989), though in their study, unlike ours, contributions are much lower when contributions cannot be refunded. Perhaps surprisingly, the worst performance in our study occurs when donors can choose to have their contributions refunded after the fact if the threshold is not met, though this difference is also small.

This generosity features most participants contributing well above even the cooperative Nash equilibrium, showing that this institution has some special properties, perhaps because of the way it invokes both coordination and cooperation. We do find that institutions that do not offer refunds or have an optional refund do get significantly lower contributions than institutions with universal refunds. This "shading down" of contributions seems to be driven in part by risk tolerant people who are willing to risk the threshold not being met by the contributions of others – for risk averse participants, the differences in behavior between treatments are even smaller. We also find that refunds chosen in advance are, and are seen as, positive correlates of willingness to contribute, showing that they may serve as a form of insurance.

Further, we show that context matters to people's perceptions about the causes that do and don't offer refunds and the people who do and don't take advantage of them. While people say they like causes that offer refunds in case thresholds are not met and believe they will be more successful, they judge more positively people who refuse a refund that was offered as compared to people who accept such a refund. However, these judgments are weaker, as are normative judgments in general, in a neutrally framed setting like our lab experiment as compared to true charities. Thus, charities should be cautious in offering refunds, especially in contexts in which generosity norms are strong.

The institution investigated in this paper, the combined linear-threshold public good game, is a good model of some scenarios in which cooperation and coordination are both at play. More research is needed to understand how people perceive different contexts with this payoff configuration, heterogeneity in behavior in the game, and precisely why behavior in the game differs so significantly from that in the standard threshold public good game.

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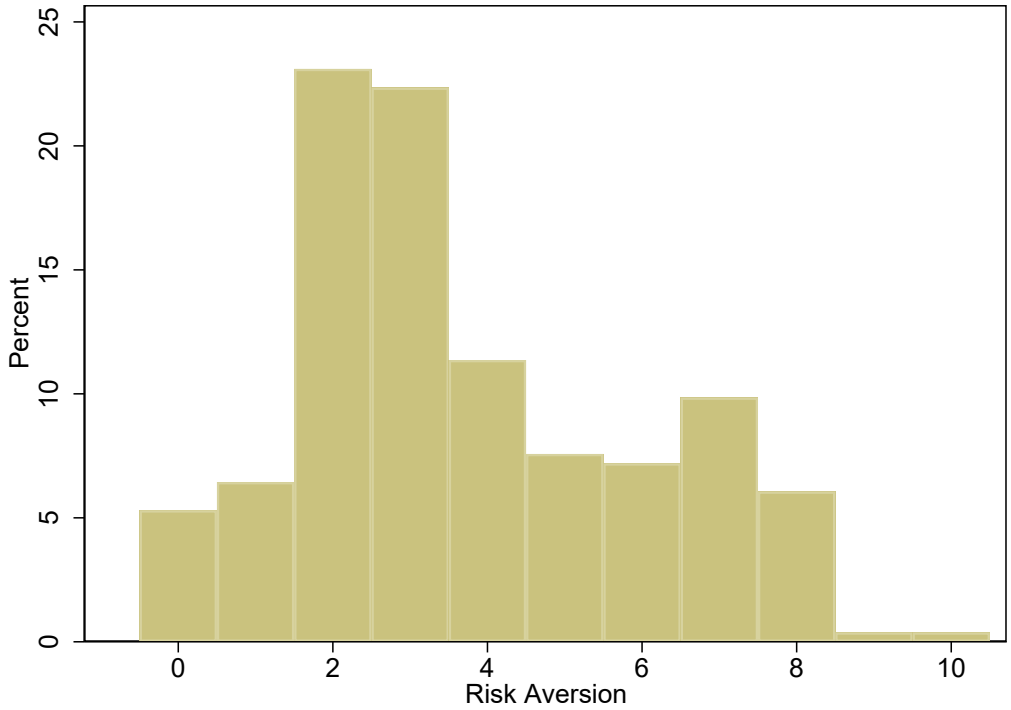
Appendix A: Additional Figures and Tables



Note: Risk aversion is measured on a 0-10 scale based on a reverse coding of a stated preference scale of risk preference, using a question from Dohmen et al. (2011).

Figure A-1: Histogram of Risk Aversion Measure

Table A-1: Balance Tests of Risk Aversion by Treatment

	Universal Refund	No Refund	Ex Post Refund
No Refund	0.0593		
Ex Post Refund	0.0354	0.9626	
Ex Ante Refund	0.3976	0.2702	0.1987

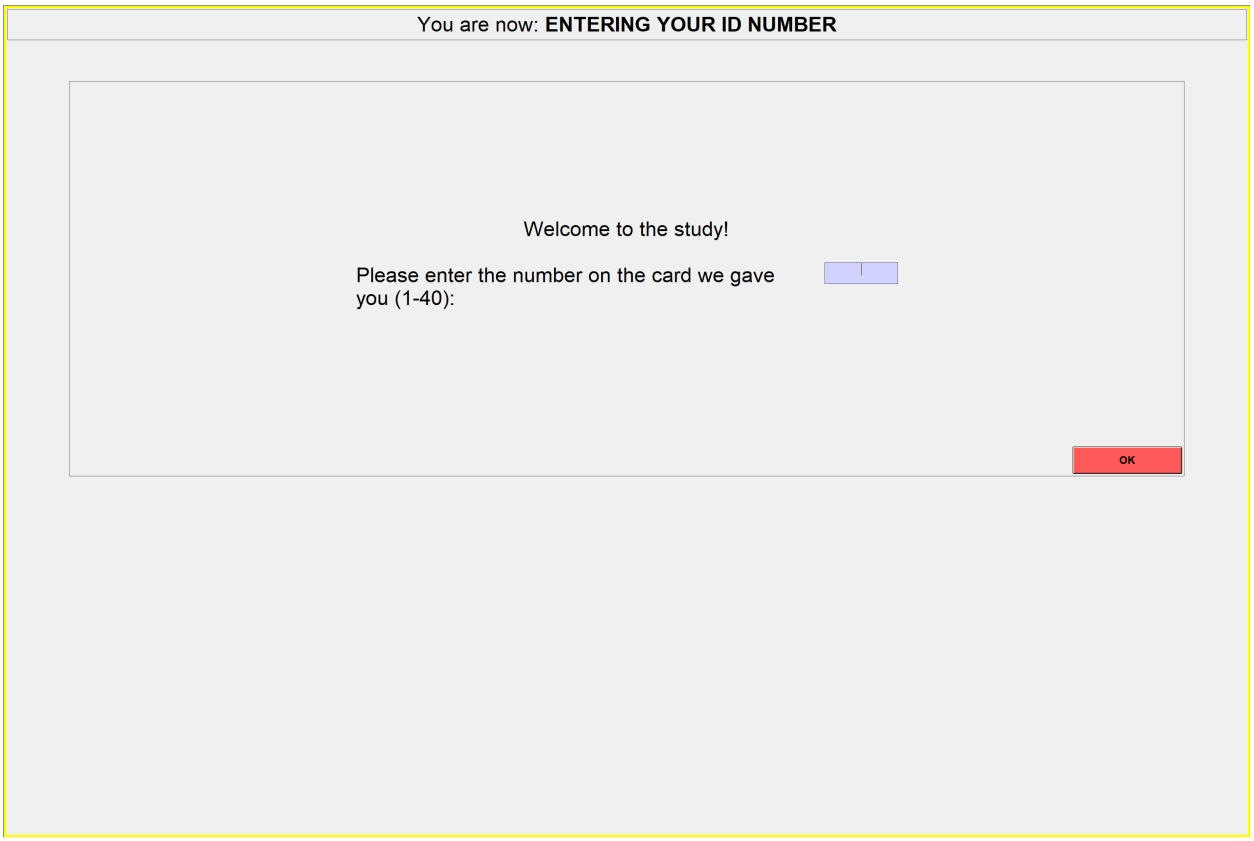
Table A-2: Variation in Treatment Effect on Contribution by Risk Aversion

Highly risk tolerant people			
	No Refund	Universal Refund	Ex Post Refund
Universal Refund	0.004***		
Ex Post Refund	0.390	<0.001***	
Ex Ante Refund	0.451	0.209	0.169
Relatively risk averse people			
	No Refund	Universal Refund	Ex Post Refund
Universal Refund	0.033**		
Ex Post Refund	0.129	0.002***	
Ex Ante Refund	0.901	0.042**	0.196
Maximally risk averse people			
	No Refund	Universal Refund	Ex Post Refund
Universal Refund	0.043**		
Ex Post Refund	0.575	0.252	
Ex Ante Refund	0.169	0.997	0.457

Cell contents are p-values from post-estimation tests run after Specification 3 of Table 5. "Risk aversion" is a reverse coding of a stated preference risk tolerance question from Dohmen et al. (2011), ranging from 0 to 10, where a greater number indicates more risk averse. Tests of treatment effects for highly risk tolerant use a risk aversion of 0, those for relatively risk averse people use risk aversion of 4 (on the risk averse side of the empirical median), and for maximally risk averse use a risk aversion of 10.

Appendix B: Lab Experiment Screen Shots and Instructions

Here we present screen shots from the Optional Ex Ante Refund treatment; the other treatments are similar. Similarly, we will present instructions from that treatment after the screen shots. The full set of instructions and screen shots from all treatments is available on the corresponding author's website.[12]



[12] Direct link to screenshot file: https://github.com/saj2/website/raw/master/jacobson%20spraggon%20tpgoor%20screenshots%20lab%20and%20online.zip

You are now: **VERIFYING YOUR ID NUMBER**

Please check this against your card - is 2 the right number?
If it's not, please enter the correct number here: 2

OK

You are now: **VERIFYING YOUR UNDERSTANDING**

INSTRUCTIONS SUMMARY

You are in a group with 3 other study participants. You each start with $10. You can each contribute any amount from $0 to $10 to the Project Fund. The total amount in the Project Fund is the Project Total.

If the Project Total exactly equals $20, the project is FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member.

If the Project Total is above $20, the project is MORE THAN FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member plus $0.40 for each dollar above $20 in the Project Fund; for example, if there is $30 in the Project Fund, every group member gets $30 - $20 = $10 times $0.40 = $4.00 in addition to their $12.

If the Project Total is less than $20, the project is PARTIALLY FUNDED. In this case, each group member's contribution will stay in the Project Fund unless they choose to take it out; each dollar left in the Project Fund pays each group member $0.40. Each group member will decide what to do in this case in advance: before the contribution decisions, you will each commit either to leaving your contribution in the Project Fund or to taking it out if the Project Total doesn't reach $20, and everyone will learn what all of the others have decided for this case before they make their contribution decision.

Everyone's total earnings are the amount they did not contribute plus what they earn from the Project Fund.

SCENARIO 1

Imagine that you contributed $1 and the total contribution of all of the other members of your group is $4.

Let's say that you and two other group members choose to get a refund so that the amount remaining in the Project Fund is $2.

1a. How much is in the Project Fund?

1b. Was the project fully funded, more than fully funded, or partially funded?
- Fully funded
- More than fully funded
- Partially funded

1c. How much do you earn?

Let's say instead that you do not choose to get a refund, and one other group member does choose to get a refund, so that the amount remaining in the Project Fund is $3.

1d. How much is in the Project Fund?

1e. Was the project fully funded, more than fully funded, or partially funded?
- Fully funded
- More than fully funded
- Partially funded

1f. How much do you earn?

Submit

You are now: **VERIFYING YOUR UNDERSTANDING**

INSTRUCTIONS SUMMARY

You are in a group with 3 other study participants. You each start with $10. You can each contribute any amount from $0 to $10 to the Project Fund. The total amount in the Project Fund is the Project Total.

If the Project Total exactly equals $20, the project is FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member.

If the Project Total is above $20, the project is MORE THAN FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member plus $0.40 for each dollar above $20 in the Project Fund; for example, if there is $30 in the Project Fund, every group member gets $30 - $20 = $10 times $0.40 = $4.00 in addition to their $12.

If the Project Total is less than $20, the project is PARTIALLY FUNDED. In this case, each group member's contribution will stay in the Project Fund unless they choose to take it out; each dollar left in the Project Fund pays each group member $0.40. Each group member will decide what to do in this case in advance: before the contribution decisions, you will each commit either to leaving your contribution in the Project Fund or to taking it out if the Project Total doesn't reach $20, and everyone will learn what all of the others have decided for this case before they make their contribution decision.

Everyone's total earnings are the amount they did not contribute plus what they earn from the Project Fund.

SCENARIO 2

Imagine that you contributed $10 and the total contribution of all of the other members of your group is $30.

2a. How much is in the Project Fund? [ ]

2b. Was the project fully funded, more than fully funded, or partially funded?
- ○ Fully funded
- ○ More than fully funded
- ○ Partially funded

2c. How much do you earn? [ ]

2d. Can you choose to get a refund?
- ○ No
- ○ Yes

Submit

You are now: **DECIDING WHETHER YOU WILL TAKE A REFUND IF THE PROJECT IS NOT FULLY FUNDED**

INSTRUCTIONS SUMMARY

You are in a group with 3 other study participants. You each start with $10. You can each contribute any amount from $0 to $10 to the Project Fund. The total amount in the Project Fund is the Project Total.

If the Project Total exactly equals $20, the project is FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member.

If the Project Total is above $20, the project is MORE THAN FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member plus $0.40 for each dollar above $20 in the Project Fund; for example, if there is $30 in the Project Fund, every group member gets $30 - $20 = $10 times $0.40 = $4.00 in addition to their $12.

If the Project Total is less than $20, the project is PARTIALLY FUNDED. In this case, each group member's contribution will stay in the Project Fund unless they choose to take it out; each dollar left in the Project Fund pays each group member $0.40. Each group member will decide what to do in this case in advance: before the contribution decisions, you will each commit either to leaving your contribution in the Project Fund or to taking it out if the Project Total doesn't reach $20, and everyone will learn what all of the others have decided for this case before they make their contribution decision.

Everyone's total earnings are the amount they did not contribute plus what they earn from the Project Fund.

YOUR REFUND DECISION

Before everyone makes their contribution decision, everyone will see what all group members chose here. That is, the decision you make about a refund will be shared with all of your group members before they make their decisions, and you'll see theirs.

If your group's contributions do not fully fund the project, your contribution will stay in the Project Fund unless you choose to take it back from the Project Fund.

Which do you prefer?
- ○ Return contribution to me
- ○ Leave in Project Fund

Submit

You are now: **MAKING YOUR CONTRIBUTION DECISION**

INSTRUCTIONS SUMMARY

You are in a group with 3 other study participants. You each start with $10. You can each contribute any amount from $0 to $10 to the Project Fund. The total amount in the Project Fund is the Project Total.

If the Project Total exactly equals $20, the project is FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member.

If the Project Total is above $20, the project is MORE THAN FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member plus $0.40 for each dollar above $20 in the Project Fund; for example, if there is $30 in the Project Fund, every group member gets $30 - $20 = $10 times $0.40 = $4.00 in addition to their $12.

If the Project Total is less than $20, the project is PARTIALLY FUNDED. In this case, each group member's contribution will stay in the Project Fund unless they choose to take it out; each dollar left in the Project Fund pays each group member $0.40. Each group member will decide what to do in this case in advance: before the contribution decisions, you will each commit either to leaving your contribution in the Project Fund or to taking it out if the Project Total doesn't reach $20, and everyone will learn what all of the others have decided for this case before they make their contribution decision.

Everyone's total earnings are the amount they did not contribute plus what they earn from the Project Fund.

YOUR CONTRIBUTION DECISION

Of the other 3 members of your group, 2 has/have chosen to leave their contribution in the Project Fund if the project is only partially funded.

You have decided not to have your contribution refunded back to you if the project is only partially funded.

How much would you like to contribute to the Project Fund?

Submit

You are now: **LEARNING WHAT YOUR GROUP CONTRIBUTED**

INSTRUCTIONS SUMMARY

You are in a group with 3 other study participants. You each start with $10. You can each contribute any amount from $0 to $10 to the Project Fund. The total amount in the Project Fund is the Project Total.

If the Project Total exactly equals $20, the project is FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member.

If the Project Total is above $20, the project is MORE THAN FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member plus $0.40 for each dollar above $20 in the Project Fund; for example, if there is $30 in the Project Fund, every group member gets $30 - $20 = $10 times $0.40 = $4.00 in addition to their $12.

If the Project Total is less than $20, the project is PARTIALLY FUNDED. In this case, each group member's contribution will stay in the Project Fund unless they choose to take it out; each dollar left in the Project Fund pays each group member $0.40. Each group member will decide what to do in this case in advance: before the contribution decisions, you will each commit either to leaving your contribution in the Project Fund or to taking it out if the Project Total doesn't reach $20, and everyone will learn what all of the others have decided for this case before they make their contribution decision.

Everyone's total earnings are the amount they did not contribute plus what they earn from the Project Fund.

YOUR GROUP'S CONTRIBUTION SUMMARY

You contributed $6 to the group project.
The total contributed by your group members was $18.
The total group contribution needed to be $20 for the project to be fully funded.
The project was partially funded.

OK

You are now: **REVIEWING YOUR GROUP'S OUTCOME AND YOUR EARNINGS**

You contributed $6 to the Project Fund.
Your group contributed $18 in total.
The total contribution needed to be $20 for the project to be fully funded.
The project was partially funded.

Your contribution was not refunded.

In the end, after any refunds were made if applicable, the Project Fund had $14 in it.
Therefore you earned:
$4.00 from money you did not contribute
$5.60 from the Project Fund
= $9.60

You will also receive an additional $10 for participating and for the questionnaire that you are about to complete, so your total earnings are $19.60.

OK

Thank you for your participation! Please complete this short survey.

Please enter the number on the card we gave you (1-40)

Continue

We are interested in what you thought about the decision(s) that you made in this study. Please tell us what kind of situation this problem reminds you of, and briefly explain your thought process.

OK

What is your gender identity? (Select all that apply)

- [ ] Man
- [ ] Woman
- [ ] Trans
- [ ] Other
- [ ] Prefer not to say

What is your age?

Were you raised in the United States?

- ○ Yes, entirely
- ○ Yes, partly
- ○ No
- ○ Prefer not to say

What race do you identify with: (Select all that apply)

- [ ] American Indian or Alaska Native
- [ ] Asian or Asian American
- [ ] Black or African American
- [ ] Middle Eastern or North African
- [ ] Native Hawaiian or Other Pacific Islander
- [ ] White
- [ ] Other
- [ ] Prefer not to say

Do you consider yourself Hispanic / Latina/o/x?

- ○ Hispanic / Latina/o/x
- ○ Not Hispanic / Latina/o/x
- ○ Prefer not to say

Do you observe any religion?

- ○ Yes
- ○ No
- ○ Prefer not to say

Relative to other students at University of Massachusetts, would you say your family income is:

- ○ Much below average
- ○ Somewhat below average
- ○ About average
- ○ Somewhat above average
- ○ Much above average
- ○ Prefer not to say

OK

I am working:
- Part time (less than 32 hours a week)
- Full time (32 hours or more a week)
- Not working, just a student
- Other

My student status is:
- A part time student
- A full time student
- Not currently a student

How many economics classes have you taken in college?

Have you been in an economics experiment before?
- Yes
- No
- Not sure

Do you feel that you are a person who is very comfortable with numbers?
- Not at all comfortable
- A little comfortable
- Somewhat comfortable
- Very comfortable

How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means "unwilling to take risk" and the value 10 means "fully prepared to take risk."

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

OK

If you were contributing to a charity that was fundraising for a specific project, if they didn't raise enough money to do that project, would you want them to refund the money to you?
- Yes
- No
- It depends

If you answered "It depends" to the last question, what would it depend on?

During the past 12 months, about how much money (tax deductible donations) did you give to charities and nonprofits?

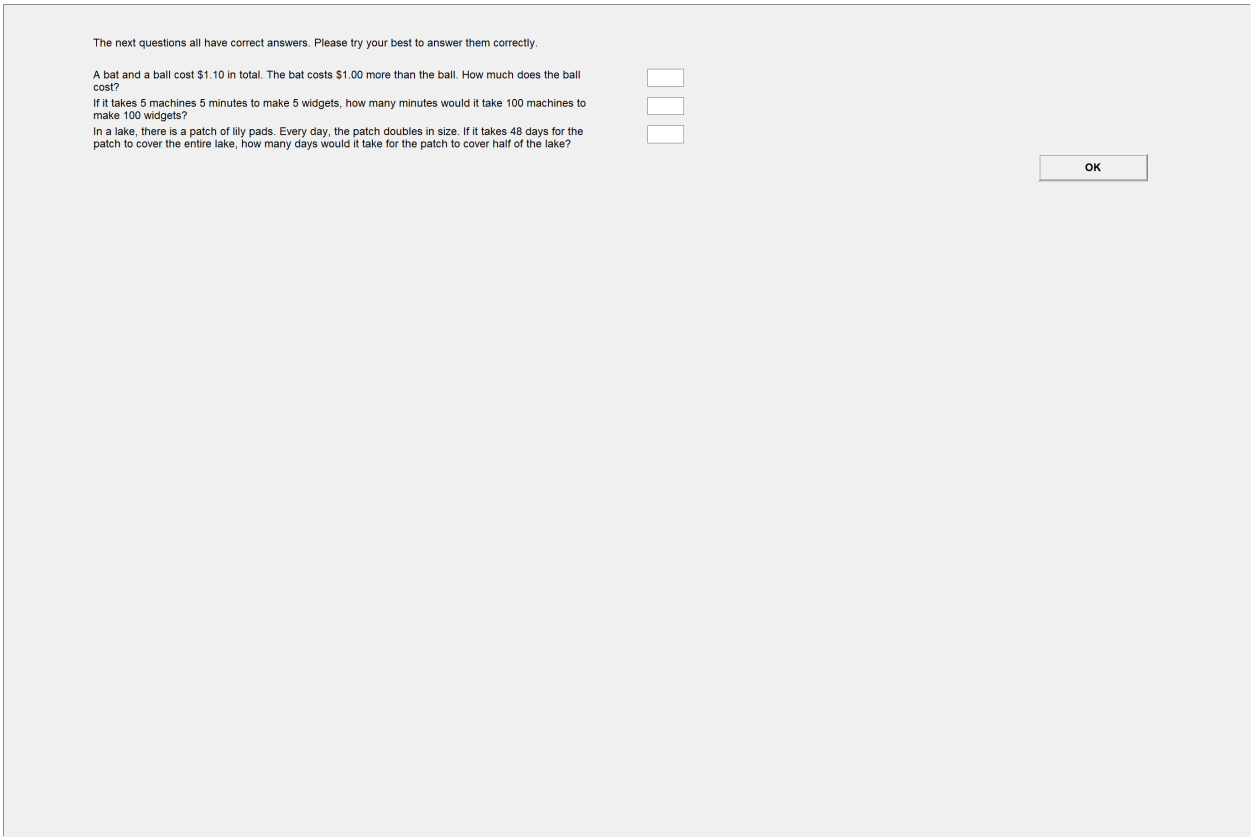
During the past 12 months, how many times have you donated money to a charity?
- Never
- 1-2 times
- 3-6 times
- 7-12 times
- More than 12 times

During the past 12 months, how many times have you done volunteer work for a charity?
- Never
- 1-2 times
- 3-6 times
- 7-12 times
- More than 12 times

During the past 12 months, how many times have you donated goods (e.g. clothes, books, food) to charities?
- Never
- 1-2 times
- 3-6 times
- 7-12 times
- More than 12 times

How much confidence do you have in charities in general?
- A great deal
- Quite a lot
- Not very much
- None at all

OK



Here we present instructions from the Optional Ex Ante Refund treatment:

Experiment Instructions

Introduction

This is a study of decision making. Your decisions will affect the amount of money you earn, so you should read these instructions carefully. You'll receive the money you earn privately, in cash, at the end of the study.

In this study, you will be in a group of four people (you and three others). The people in your group are other participants who are in this room. However, you will never learn which other participants are your group members. In this study, you will each make decisions privately and without consulting other group members. Please do not communicate with other participants during the study. If you have a question at any time, raise your hand and an experimenter will come to help.

Overview

You will start with $10 to use in decision-making. (You will get an additional $10 for your participation on top of your earnings from decision-making, but for now we will discuss what you can do with the $10 you have for decision-making.)

Your group has a Project Fund. You and the other members of your group each decide on your own whether you want to contribute money toward the Project Fund, and if so how much. The money in the Project Fund will benefit you and the other three members of your group.

How the Project Fund Works

Every dollar any member of your group puts into the Project Fund goes toward the group's Project Total.

- If the Project Total exactly equals $20, the project is FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member.
- If the Project Total is above $20, the project is MORE THAN FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member plus $0.40 for each dollar above $20 in the Project Fund. For example, if $30 is in the Project Fund, every group member gets $12 plus $30 - $20 = $10 times $0.40 = $4.00 from the Project Fund; they earn this $12 + $4 = $16 in addition to any amount they didn't contribute.
- If the Project Total is less than $20, the project is PARTIALLY FUNDED. In this case, each group member's contribution will stay in the Project Fund unless they choose to take it out. Each dollar left in the Project Fund pays each group member $0.40. Each group member will choose in advance (before anyone makes their contribution decision) what happens to their contribution in this case. When making contribution decisions, everyone can see how many group members' contributions will stay in the Project Fund if it is partially funded, and how many group members will take their contributions back.

We will give some examples below after we explain a little more about the study.

How the Study Will Proceed

You will make decisions on the computer. You have entered the ID number we gave you into the software. Later, we will prepare your payment using this ID number, and in our data files your decisions will be linked to these ID numbers rather than personal information.

The next step in the software is a short quiz in which you will answer questions about a couple of scenarios to make sure you understand how the study works.

If you have any questions during the quiz or any other time, remember to raise your hand to ask an experimenter.

Once everyone has completed the quiz, everyone will move forward to start making decisions at the same time.

Before you make your contribution decision, you will decide what you will do if the project is partially funded. You will see a screen like the one below. By default, your contribution will stay in the Project Fund in this case, but you can choose to have it returned to you instead.

You are now: **DECIDING WHETHER YOU WILL TAKE A REFUND IF THE PROJECT IS NOT FULLY FUNDED**

INSTRUCTIONS SUMMARY

You are in a group with 3 other study participants. You each start with $10. You can each contribute any amount from $0 to $10 to the Project Fund. The total amount in the Project Fund is the Project Total.

If the Project Total exactly equals $20, the project is FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member.

If the Project Total is above $20, the project is MORE THAN FULLY FUNDED. In this case, the Project Fund pays out $12 to each group member plus $0.40 for each dollar above $20 in the Project Fund; for example, if there is $30 in the Project Fund, every group member gets $30 - $20 = $10 times $0.40 = $4.00 in addition to their $12.

If the Project Total is less than $20, the project is PARTIALLY FUNDED. In this case, each group member's contribution will stay in the Project Fund unless they choose to take it out; each dollar left in the Project Fund pays each group member $0.40. Each group member will decide what to do in this case in advance: before the contribution decisions, you will each commit either to leaving your contribution in the Project Fund or to taking it out if the Project Total doesn't reach $20, and everyone will learn what all of the others have decided for this case before they make their contribution decision.

Everyone's total earnings are the amount they did not contribute plus what they earn from the Project Fund.

YOUR REFUND DECISION

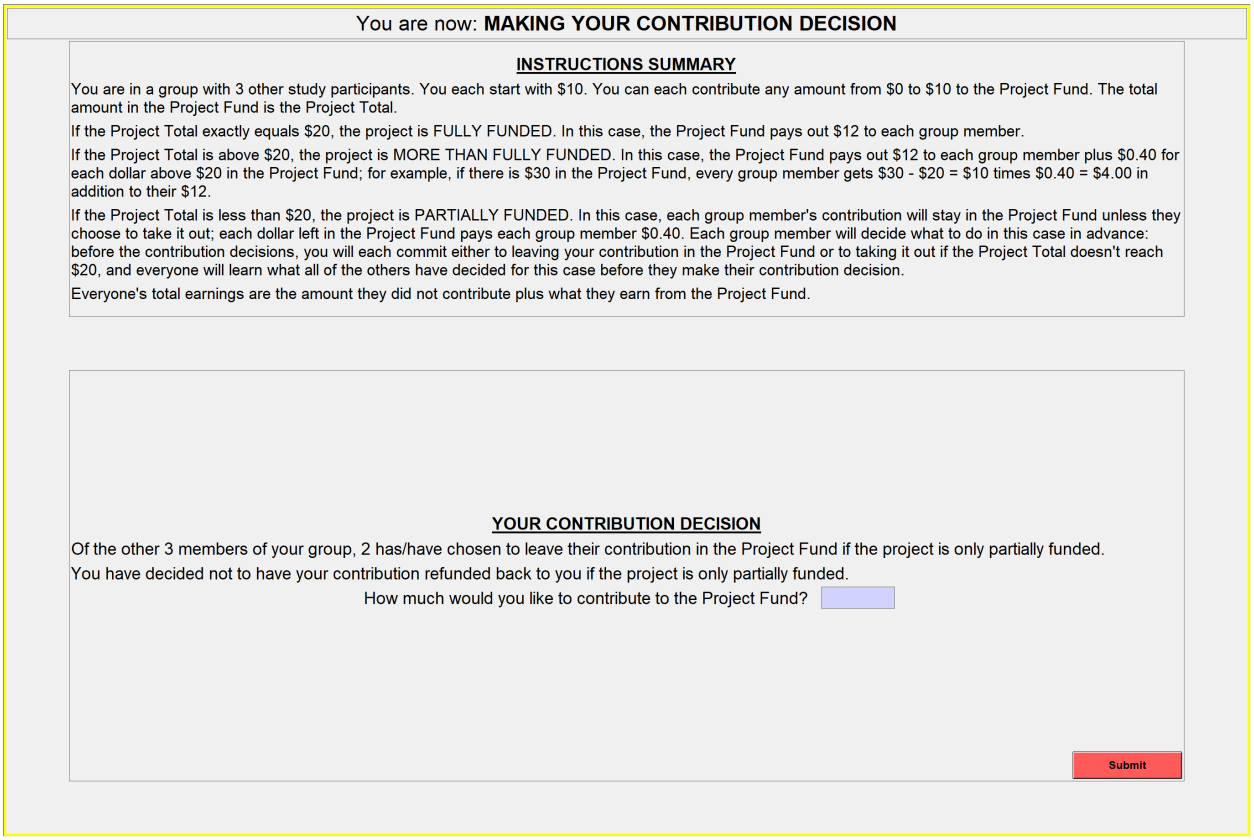
Before everyone makes their contribution decision, everyone will see what all group members chose here. That is, the decision you make about a refund will be shared with all of your group members before they make their decisions, and you'll see theirs.

If your group's contributions do not fully fund the project, your contribution will stay in the Project Fund unless you choose to take it back from the Project Fund.

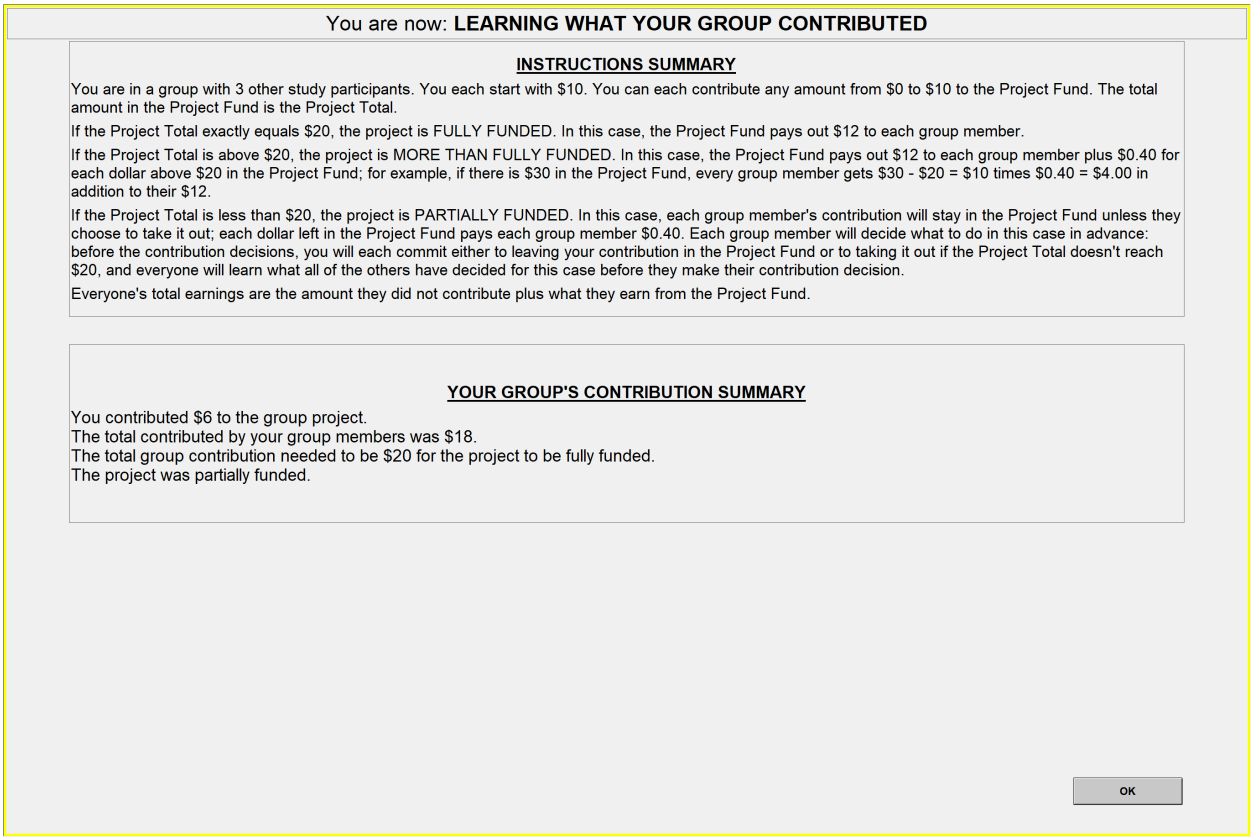
Which do you prefer?
- ○ Return contribution to me
- ○ Leave in Project Fund

Submit

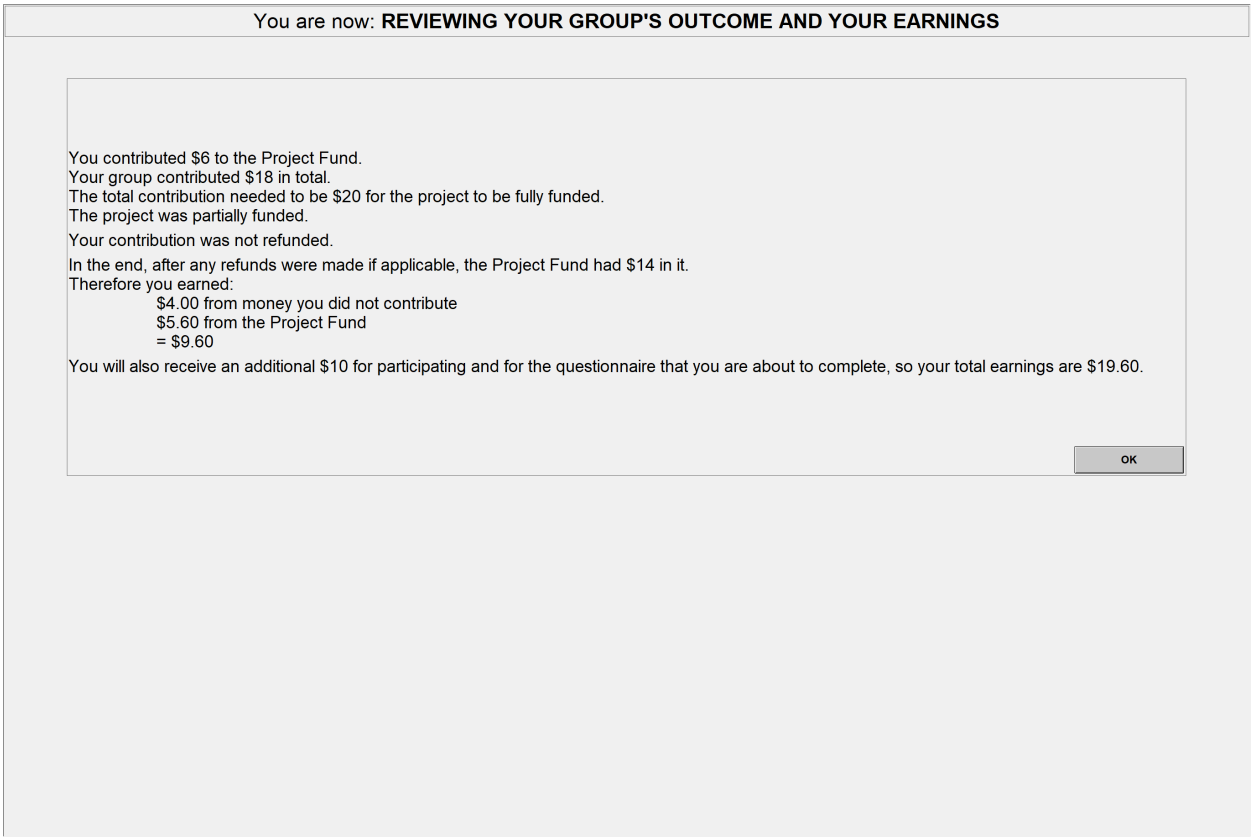
After all members of your group have made refund decisions, you will each learn what everyone in the group chose. That information will appear on the next screen, where you will also make your contribution decision.



After everyone has made their contribution decision, in a screen like the one below you will each learn how much was contributed to the Project Fund and therefore whether the project was fully funded or not.



Finally, you will see a summary screen like the one below, showing how much you and your group contributed to the Project Fund, whether the project was fully funded, and what your earnings will be.



You will then be done with your decision-making in the study! You will fill out a short survey while we prepare your payments. When we are ready, we will invite you to the control room where we will pay you in cash privately. You will get an additional $10 for your participation on top of your earnings from decision-making.

Example Scenarios

Example 1: If everyone contributes $0, everyone earns the $10 dollars they all started with.

Example 2: If everyone contributes $3, the Project Total is $12 and the project is partially funded. Everyone's contributions stay in the Project Fund unless they choose to have it refunded. If you and one other member of your group leave your contributions in the Project Fund, then $6 remains in the Project Fund. You earn $0.40 times the $6 in the Project Fund, which is $2.40, plus the $7 you kept, and therefore you earn $2.40 + $7 = $9.40.

Example 3: If everyone contributes $5, the Project Total is $20 and the project is exactly fully funded. Everyone earns $12 from the project in addition to the $5 they kept, for a total of $17.

Example 4: If everyone contributes all $10 they start with, the Project Total is $40 and the project is more than fully funded. Everyone earns $12 for fully funding the project plus $0.40 times the additional $20 in the Project Fund, for an additional $8. This means everyone earns $12 + $8 = $20.

Example 5: If you contribute $8 and the rest of your group contributes $20 in total, the Project Total is $28, and the project is more than fully funded. Everyone earns $12 for fully funding the project plus $0.40 times the additional $8 in the Project Fund, for an additional $3.20. This means you earn $12 + $3.20 plus the $2 you did not contribute, for a total of $17.20.

Appendix C: Online Survey-Experiment Screen Shots

Online Survey Consent Form

You are invited to participate in a research study being conducted by Dr. John Spraggon from the University of Massachusetts Amherst and Dr. Sarah Jacobson from Williams College. You were selected to participate in this study because you are an adult user of Prolific, where you have identified yourself as age 18 or over and living in the United States.

The purpose of this research study is to learn people's choices in and perceptions about particular situations. If you agree to take part in this study, you will be asked to complete an online survey. This survey will ask what you think about some situations and it will take you less than 5 minutes to complete.

You may not directly benefit from this research; however, we hope that your participation in the study may help us understand why people make the choices they make in these situations.

We believe there are no risks associated with this research study; however, as with any online activity a breach of confidentiality is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by not asking you for any information that can identify you.

Your participation in this study is completely voluntary and you can withdraw at any time.

If you have questions about this project or if you have a research-related problem, you may contact the researcher, Sarah Jacobson, at 413-597-4766 or saj2@williams.edu. If you have any questions concerning your rights as a research subject, you may contact the Williams College Institutional Review Board Chair, Ken Savitsky, at Kenneth.K.Savitsky@williams.edu.

By clicking "I agree" below you are indicating that you are at least 18 years old, have read and understood this consent form, and agree to participate in this research study. If desired, please print a copy of this page for your records.

Consent Do you agree to continue with the study? I agree (continue with the study) (1) , I do not agree (exit the study) (2)

[ANIMAL SHELTER VERSION:]

Q1 Imagine that an animal shelter, Fur Pals of Springfield, is asking people to give money toward the construction of a new building. The building will cost $750,000. They are letting donors choose what happens to their donations if the $750,000 goal is not met. They have two options: donors can choose to

have their money returned to them, or let Fur Pals keep the money to pay for other expenses (which are important but less transformative than the new building).

CharityRefundPercT1 The next questions ask how this refund option makes you feel about Fur Pals of Springfield.

	Not at all									Extremely
	0	1	2	3	4	5	6	7	8	9	10
How responsible do you see them as? ()											
How effective do you see them as? ()											
How trustworthy do you see them as? ()											

CharityDonDesireT1 Does this refund option increase or decrease your desire to make a donation to Fur Pals? Increase a lot (1) , Increase a little (2) , Neither increase nor decrease (3) , Decrease a little (4) , Decrease a lot (5)

CharityRefndWrdT1 What are the first two words that this refund option brings to mind?

PercentRefundGuessT1 What percent of donors do you think will ask for their donation to be refunded?

	0	10	20	30	40	50	60	70	80	90	100
()											

FriendShldRefundT1 Your friend is about to donate to Fur Pals. They ask you whether you think they should **opt for the refund**. What do you say? Definitely yes (1) , Maybe yes (2) , Not sure (3) , Maybe no (4) , Definitely no (5)

DonorRefundPercepT1 Imagine that a donor named Chris donates $500 and chooses the option to **have their money refunded** to them if Fur Pals doesn't raise enough money to construct the building. The next questions ask how this choice makes you see Chris.

	Not at all									Extremely
	0	1	2	3	4	5	6	7	8	9	10

How generous is Chris? ()	
How responsible is Chris? ()	
To what extent do you think that Chris makes good decisions? ()	
How much would you trust Chris? ()	

DonorRefundWordsT1 What are the first two words that come to mind when you think of someone like Chris?

DonorNoRefundPercpT1 Imagine that a donor named Pat donates $500 and chooses the option to **let Fur Pals keep their donation** for other expenses if Fur Pals doesn't raise enough money to construct the building. The next questions ask how this choice makes you see Pat.

Not at all Extremely

0 1 2 3 4 5 6 7 8 9 10

How generous is Pat? ()	
How responsible is Pat? ()	
To what extent do you think that Pat makes good decisions? ()	
How much would you trust Pat? ()	

DonorNoRefundWordsT1 What are the first two words that come to mind when you think of someone like Pat?

ChrtyVsAltrntvWhchT1 Imagine there's another charity that is very similar to Fur Pals. This other charity is also trying to raise $750,000 to construct a building, but it is different from Fur Pals in that it does **not** give donors an option to have their donation refunded if the goal is not met. How does that difference make you feel about the two charities?, It makes me prefer Fur Pals (with the refund option) a lot (1) , It makes me prefer Fur Pals (with the refund option) a little (2) , It doesn't matter (3) , It makes me prefer the other charity (with no refund option) a little (4) , It makes me prefer the other charity (with no refund option) a lot (5)

ChrtyVsAltrntvDntnT1 Which charity do you think will get more donations?, Fur Pals (with the refund option) (1) , The other charity (with no refund option) (2) , They will both get about the same amount of donations (4)

[ECOSYSTEM VERSION:]

Q96 Imagine that a charity, Nature Pals of Springfield, is asking people to give money to conserve a plot of land that is big enough to support an endangered bird. The land will cost $750,000. They are letting donors choose what happens to their donations if the $750,000 goal is not met. They have two options: donors can choose to have their money returned to them, or let Nature Pals keep the money to buy a smaller plot of land, which will have less ecological value.

CharityRefundPercT2 The next questions ask how this refund option makes you feel about Nature Pals of Springfield.

	Not at all									Extremely
	0	1	2	3	4	5	6	7	8	9	10
How responsible do you see them as? ()											
How effective do you see them as? ()											
How trustworthy do you see them as? ()											

CharityDonDesireT2 Does this refund option increase or decrease your desire to make a donation to Nature Pals? Increase a lot (1) , Increase a little (2) , Neither increase nor decrease (3) , Decrease a little (4) , Decrease a lot (5)

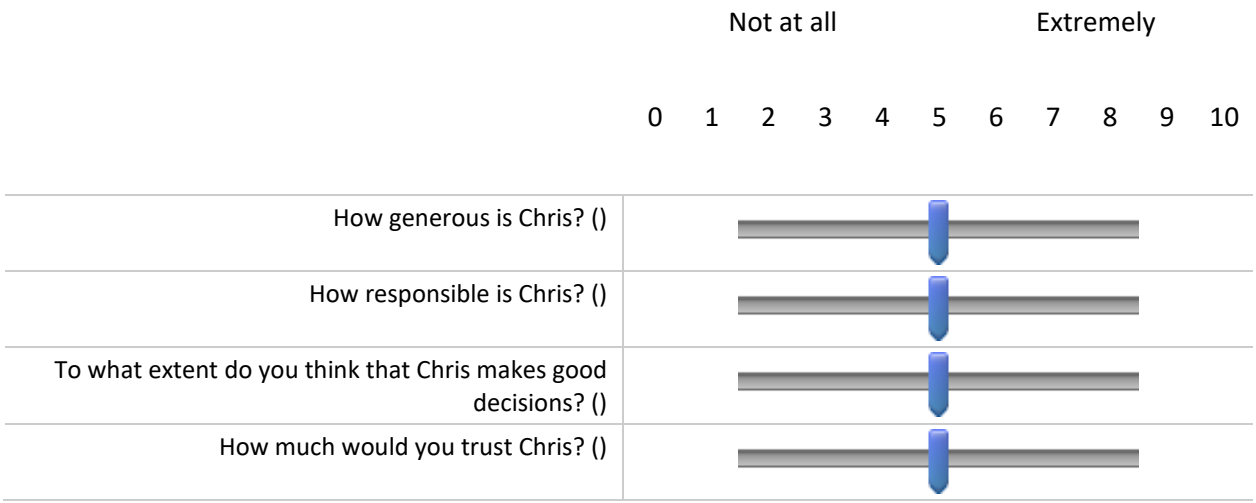
CharityRefndWrdT2 What are the first two words that this refund option brings to mind?

PercentRefundGuessT2 What percent of donors do you think will ask for their donation to be refunded?

	0	10	20	30	40	50	60	70	80	90	100
()											

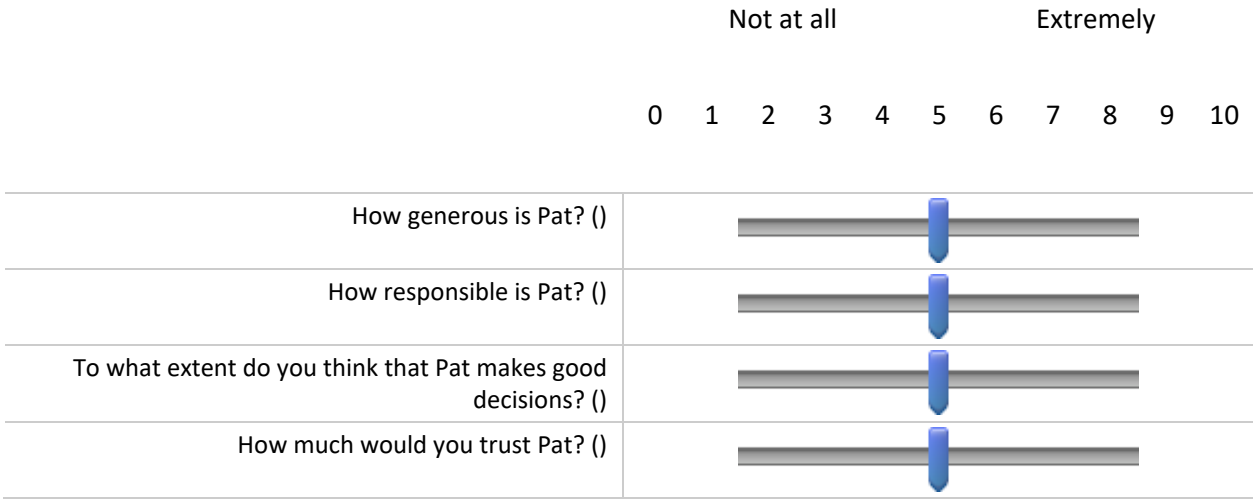
FriendShldRefundT2 Your friend is about to donate to Nature Pals. They ask you whether you think they should **opt for the refund**. What do you say? Definitely yes (1) , Maybe yes (2) , Not sure (3) , Maybe no (4) , Definitely no (5)

DonorRefundPercepT2 Imagine that a donor named Chris donates $500 and chooses the option to **have their money refunded** to them if Nature Pals doesn't raise enough money to buy the larger plot of land. The next questions ask how this choice makes you see Chris.



DonorRefundWordsT2 What are the first two words that come to mind when you think of someone like Chris?

DonorNoRefundPercpT2 Imagine that a donor named Pat donates $500 and chooses the option to **let Nature Pals keep their donation** to buy other land if Nature Pals doesn't raise enough money to buy the larger plot of land. The next questions ask how this choice makes you see Pat.



DonorNoRefundWordsT2 What are the first two words that come to mind when you think of someone like Pat?

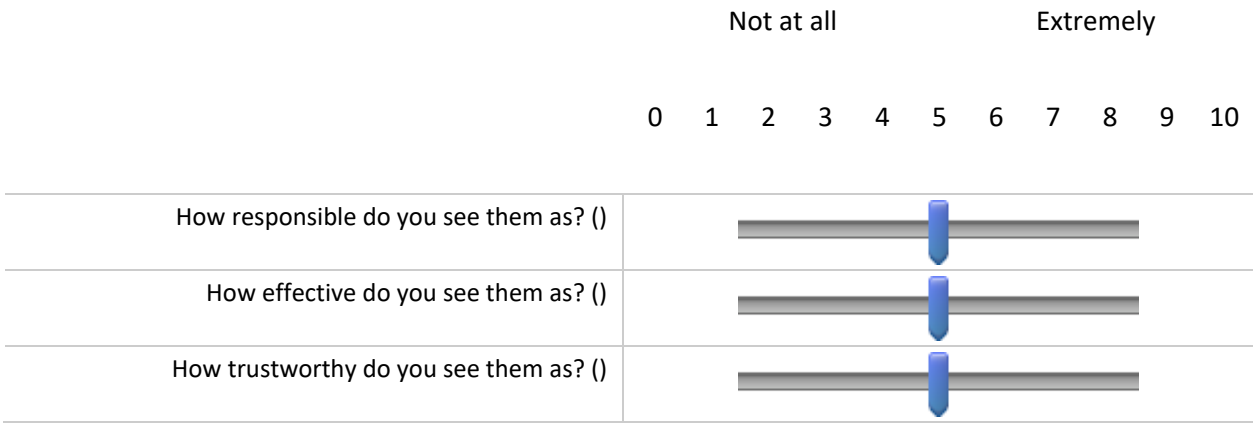
ChrtyVsAltrntvWhchT2 Imagine there's another charity that is very similar to Nature Pals. This other charity is also trying to raise $750,000 to buy a special plot of land, but it is different from Nature Pals in that it does **not** give donors an option to have their donation refunded if the goal is not met. How does that difference make you feel about the two charities? It makes me prefer Nature Pals (with the refund option) a lot (1) , It makes me prefer Nature Pals (with the refund option) a little (2) , It doesn't matter (3) , It makes me prefer the other charity (with no refund option) a little (4) , It makes me prefer the other charity (with no refund option) a lot (5)

ChrtyVsAltrntvDntnT2 Which charity do you think will get more donations? Nature Pals (with the refund option) (1) , The other charity (with no refund option) (2) , They will both get about the same amount of donations (4)

[NEUTRAL FRAME VERSION:]

Q36 Imagine that a group of people is trying to achieve a common goal that would benefit everyone in the group quite a lot. Achieving this goal will cost $750,000. The group is letting each member who gives toward the goal choose what happens to the money they gave if the $750,000 goal is not met. They have two options: they can choose to have their money returned to them, or let the group keep the money. If they let the group keep the money, it will be used to benefit everyone in the group (although not as much as achieving the goal would).

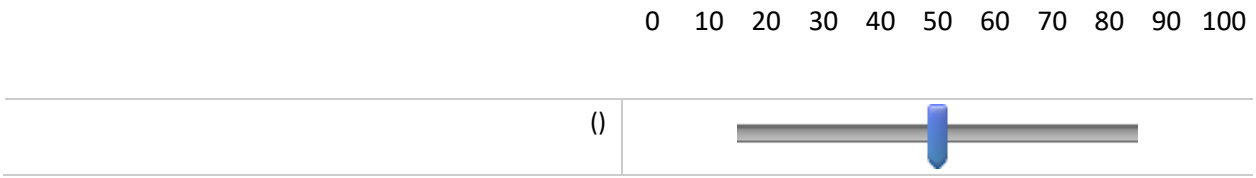
CharityRefundPercT3 The next questions ask how this refund option makes you feel about this group.



CharityDonDesireT3 If you were in this group, would this refund option increase or decrease your desire to make a donation toward the goal? Increase a lot (1) , Increase a little (2) , Neither increase nor decrease (3) , Decrease a little (4) , Decrease a lot (5)

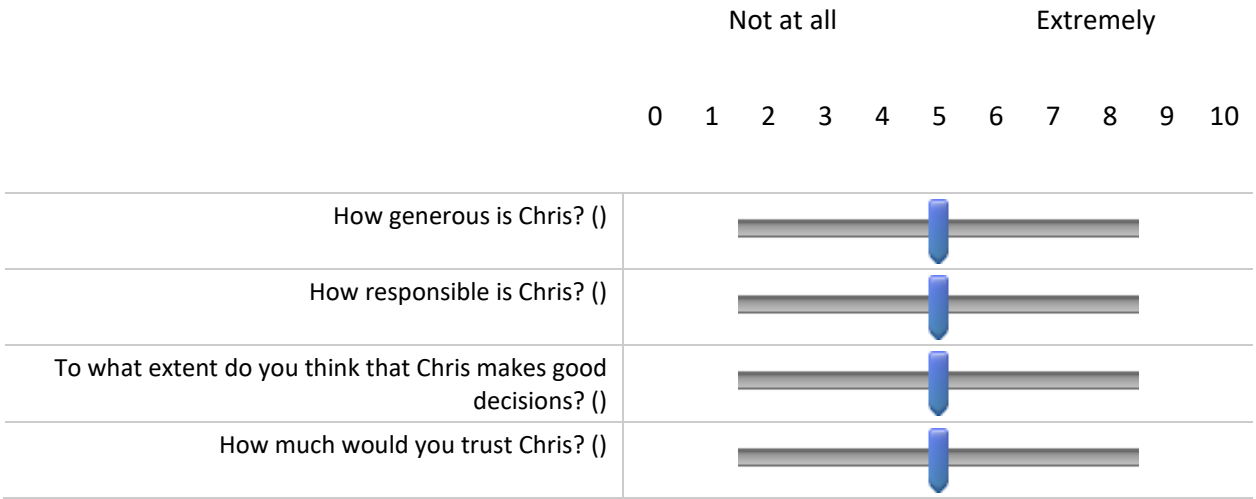
CharityRefndWrdT3 What are the first two words that this refund option brings to mind?

PercentRefundGuessT3 What percent of donors do you think will ask for their donation to be refunded?



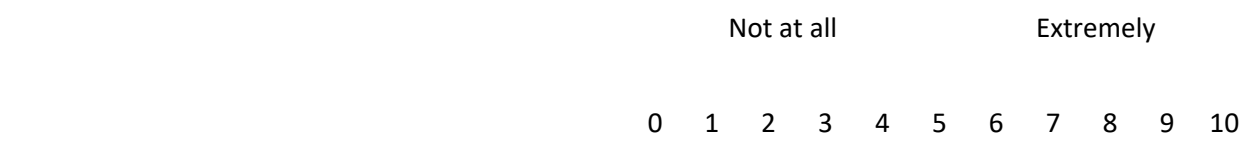
FriendShldRefundT3 Your friend is about to donate toward this group goal. They ask you whether you think they should **opt for the refund**. What do you say? Definitely yes (1) , Maybe yes (2) , Not sure (3) , Maybe no (4) , Definitely no (5)

DonorRefundPercepT3 Imagine that a donor named Chris donates $500 and chooses the option to **have their money refunded** to them if the group doesn't raise enough money to meet the goal. The next questions ask how this choice makes you see Chris.



DonorRefundWordsT3 What are the first two words that come to mind when you think of someone like Chris?

DonorNoRefundPercpT3 Imagine that a donor named Pat donates $500 and chooses the option to **let the group keep their donation** to benefit the group if the group doesn't raise enough money to meet the goal. The next questions ask how this choice makes you see Pat.



How generous is Pat? ()	
How responsible is Pat? ()	
To what extent do you think that Pat makes good decisions? ()	
How much would you trust Pat? ()	

DonorNoRefundWordsT3 What are the first two words that come to mind when you think of someone like Pat?

ChrtyVsAltrntvWhchT3 Imagine there's another group that is very similar to this group. This other group is also trying to raise $750,000 to achieve a common goal, but it is different from this group in that it does **not** give donors an option to have their donation refunded if the goal is not met. How does that difference make you feel about the two groups? It makes me prefer the first group (with the refund option) a lot (1) , It makes me prefer the first group (with the refund option) a little (2) , It doesn't matter (3) , It makes me prefer the other group (with no refund option) a little (4) , It makes me prefer the other group (with no refund option) a lot (5)

ChrtyVsAltrntvDntnT3 Which group do you think will get more donations? The first group (with the refund option) (1) , The other group (with no refund option) (2) , They will both get about the same amount of donations (4)

[QUESTIONNAIRE]

Q66 Please answer these questions about yourself.

Gender What is your gender identity? (Select all that apply), Man (1) , Woman (2) , Trans (3) , Other (4) , Prefer not to say (5)

Age What is your age? (Enter a number)

UsRaised Were you raised in the United States? Yes, entirely (1) , Yes, partly (2) , No (3) , Prefer not to say (4)

Race What race do you identify with? (Select all that apply) American Indian or Alaska Native (1) , Asian or Asian American (2) , Black or African American (3) , Middle Eastern or North African (4) , Native Hawaiian or Other Pacific Islander (5) , White (6) , Other (7) , Prefer not ot say (8)

Latinx Do you consider yourself Hispanic / Latina/o/x? Hispanic / Latina/o/x (1) , Not Hispanic / Latina/o/x (2) , Prefer not to say (3)

Religion Do you observe any religion? Yes (1) , No (2) , Prefer not to say (3)

Display This Question:

If Do you observe any religion? = Yes

ReligFreq How often do you attend religious services? More than once a week (1) , Once a week (2) , At least once a month (3) , Less than once a month (4) , Never (5) , Prefer not to say (6)

IncomeRelative Relative to others in the US, would you say your family income is: Much below average (1) , Somewhat below average (2) , About average (3) , Somewhat above average (4) , Much above average (5) , Prefer not to say (6)

Working Are you working? Not for pay (1) , Part time (less than 32 hours per week) (2) , Full time (at least 32 hours per week) (3) , Student (4) , Prefer not to say (5)

NumbersComfort Do you feel that you are a person who is very comfortable with numbers? Not at all comfortable (1) , A little comfortable (2) , Somewhat comfortable (3) , Very comfortable (4)

RiskTolerance How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please choose a point on the scale, where the value 0 means: “unwilling to take risks” and the value 10 means: “fully prepared to take risks.”

	Unwilling to take risks									Fully prepared to take risks
	0	1	2	3	4	5	6	7	8	9	10
How prepared are you to take risks? ()											

HypotheticalWantRefu If you were contributing to a charity that was fundraising for a specific project, if they didn't raise enough money to do that project, would you want them to refund the money to you? Yes (1) , No (2) , It depends (3)

Display This Question:

If If you were contributing to a charity that was fundraising for a specific project, if they didn't... = It depends

HypoWantRefundDepend You said that if you were contributing to a charity that was fundraising for a specific project, if they didn't raise enough money to do that project, whether you would want them to refund the money to you "depends." On what does it depend?

DonateMoneyPastYear During the past 12 months, about how much money (tax deductible donations) did you give to charities and nonprofits?, $0 (none) (4) , $1 to $100 (5) , $101 to $1,000 (6) , $1,001 to $5,000 (7) , Over $5,000 (8) , Prefer not to say (9)

DonateMoneyNumTimes During the past 12 months, how many times have you donated money to charities?, Never (1) , 1-2 times (2) , 3-6 times (3) , 7-12 times (4) , More than 12 times (5) , Prefer not to say (6)

VolunteerNumTimes During the past 12 months, how many times have you done volunteer work for charities? Never (1) , 1-2 times (2) , 3-6 times (3) , 7-12 times (4) , More than 12 times (5) , Prefer not to say (6)

DonateGoodsNumTimes During the past 12 months, how many times have you donated goods (e.g. clothes, books, food) to charities? Never (1) , 1-2 times (2) , 3-6 times (3) , 7-12 times (4) , More than 12 times (5) , Prefer not to say (6)

CharityConfidence How much confidence do you have in charities in general? A great deal (1) , Quite a lot (2) , Not very much (3) , None at all (4)

CRTBat A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?

If it takes 5 machines 5 minutes to make 5 widgets, how many minutes would it take 100 machines to make 100 widgets?

CRTLilypads In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how many days would it take for the patch to cover half of the lake?

Q7 Thank you for your participation! Please click forward and follow the link on the next screen to register your completion in Prolific.