When Does Less Information Translate into More Giving to Public Goods? *

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Abstract

Most donors make contributions to public goods without doing any research. Organizations that aim to increase cooperation can encourage more informed giving by providing more and detailed information to society. However, information provision is costly and organizations have limited resources. Thus, it is important for these organizations to consider the benefits of such provision. This paper investigates the capacity of information to increase public good contributions. We theoretically and experimentally examine the impact of information provision on voluntary contributions to a linear public good with an uncertain marginal per-capita return (MPCR). Uninformed subjects make contribution decisions based only on the expected MPCR (i.e. the prior distribution), while informed subjects observe the realized MPCR before contributing. Using a theoretical model of other-regarding preferences, we find that the impact of information on average contributions crucially depends on the generosity level of the population, modeled as a stochastic increase in the pro-social preferences. In particular, a less generous population substantially increases contributions in response to good news of higher than expected MPCR and reduces contributions relatively little in response to bad news of lower than expected MPCR. The opposite is true for a more generous population. Thus, the overall impact of information is to increase (reduce) average contributions when the population is less (more) generous. We find strong support for these theoretical predictions using a two-stage lab experiment. First, we measure subjects' levels of generosity in the public good game using an online experiment. Then using the data collected in the online experiment, we control for the level of generosity in the lab. Our findings are in line with the theoretical predictions, and suggest that a more targeted information provision may be a successful strategy to improve contributions to public goods.

JEL Classifications: H41, C72, C90.

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1 Introduction

Private voluntary contributions have been increasingly viewed as a vital source of funding for public goods. For example, DonorsChoose, a fundraising platform for public school projects, has quickly gained popularity since its inception in 2000 and has raised close to $640 million up-to-date.[1,2] Other crowdfunding platforms that fundraise for public projects include Public Good[3], Razoo[4], and Pledge Music[5]. Interestingly, while the non-profit sector is growing, with the number of non-profits surpassing 1.5 million, recent evidence suggests that individual donors are often poorly informed when making contributions. According to 2015 Camber Collective survey about private charitable giving in the U.S., "49% of donors don't know how nonprofits use their money".[6] Such lack of information may have a significant effect on contributions if donors care about the impact of their giving. Lab experiments find that this is indeed the case with subjects contributing higher amounts to more valuable projects (see Ledyard 1995, and Cooper and Kagel 2016). This suggests that donors would respond to more information by increasing contributions upon finding out good news of higher than expected value of the public project and decrease contributions upon observing bad news of lower than expected value. Thus, the overall impact of more information on expected giving depends crucially on the relative response to good and bad news.

In this paper, we investigate theoretically and experimentally the impact of more information on total contributions in the context of a linear public good game with an uncertain return. We restrict our attention to public goods whose provision is always desirable from a social standpoint but free-riding incentives are present at the individual level. The public good provided increases linearly with total contributions, and the magnitude of this increase depends on the marginal per-capita return (MPCR) of the public good. To determine the impact of information about the MPCR, we consider two information environments corresponding to informed and uninformed populations. With an uninformed population, subjects do not know the realized value of the MPCR, but only know its prior distribution when making a contribution decision. With an informed population, subjects observe the realized MPCR prior to contributing. This allows us to compare uninformed and informed giving by studying how subjects respond to good and bad news about the MPCR.

On the theory side, the linear structure of the public good implies that for any value of the MPCR, it is socially optimal to contribute all of the endowment, while it is individually payoff maximizing to contribute nothing. Since lab experiments reveal that most of the contributions are

[1] For more information, visit `https://www.donorschoose.org/about`.

[2] According to Charity Navigator, the overall contributions to education related causes in the US amounted to $59.77 billion in 2016. For more information, see `https://www.charitynavigator.org/index.cfm?bay=content.view&cpid=42`.

[3] `www.publicgood.com`

[4] `www.razoo.com`

[5] `https://www.pledgemusic.com/`

[6] See `http://www.cambercollective.com/moneyforgood/`

in-between the two extremes (Ledyard 1995; and Cooper and Kagel 2016), we incorporate other-regarding preferences into the agents' utility function in spirit of Arifovic and Ledyard (2012). In particular, agents are assumed to have pro-social motivations for giving, captured by agents' preference for higher average contributions to the public good. We refer to agents with stronger pro-social preferences as more generous since they have stronger propensity to contribute. In addition, agents exhibit fairness concerns, which are captured by a dis-utility from contributing a higher amount than the average contributions by others. In equilibrium, contributions increase with the MPCR and the generosity level of the agent.

Interestingly, we find that the impact of information on expected contributions crucially depends on the generosity level of the agent population, modeled as a stochastic increase in the pro-social preferences. While information has the potential of increasing average contributions for a less generous population, it may in fact reduce average contributions when the population is more generous. The reason for this is in the differential response to good and bad news in the two population types. For both types, the equilibrium contributions decrease upon observing bad news of lower than expected MPCR and increase upon observing good news of higher than expected MPCR. Moreover, the equilibrium contributions feature increasing returns to MPCR when the MPCR is low (i.e. contributions are a convex function of the MPCR for low values) and diminishing returns when the MPCR is high (i.e. contributions are a concave function of the MPCR for high values). This is because at low MPCR, an increase in the marginal return induces a large number of agents to contribute, generating a substantial increase in overall giving. In contrast, at high MPCR, a further increase induces a relatively small response since most agents are already contributing large amounts and thus are less willing to further increase their giving. However, a more generous population reaches diminishing returns faster since most of the agents are giving significant amounts even at lower values of the MPCR. As a result, a more generous population is less responsive to good news and more responsive to bad news and thus information has an overall negative effect on expected contributions. The opposite is true for a less generous population, which features increasing returns for a wider range of the MPCR and thus is more responsive to good news than bad news.

The novel findings of our model give rise to testable hypotheses, which we experimentally investigate in the lab. Since our theoretical model suggests that the generosity level of the population plays a vital role in how donors respond to information, a defining feature of our experimental design is controlling for the generosity level of the sessions. We accomplish this by running our experiment in two stages. First, we conduct an online experiment to elicit subjects' generosity levels in the public good game prior to the lab experiment. Using this data, we create more and less generous groups in the lab, and inform the subjects about the generosity level of their session by using a neutral language. Subjects play a linear public good game in groups of three with uncertain MPCR (either high (0.60) or low (0.40) with equal probability). There are two information treatments. In the informed treatment, subjects know the randomly chosen MPCR before they make their contribution decisions. In the uninformed treatment, they are only informed about the distribution of the MPCR, and asked to make their contributions without knowing which MPCR is chosen.

The experimental findings are in line with the theoretical predictions. In the sessions with more generous subjects, average contributions in the uninformed treatment are significantly higher than the ones in the informed treatment. Subjects' contribution level in the uninformed treatment is closer to the contribution level in the informed treatment under good news (MPCR of 0.60) than under bad news (MPCR of 0.40). Thus on average, information reduces contributions to the public good in the relatively more generous sessions. The opposite is true for the less generous sessions. Uninformed contributions to the public good are closer to the informed contributions under bad news than under good news. Thus, information is good for giving in the relatively less generous sessions.

The findings of this study have significant implications for fundraising. They suggest that targeted information provision may be a successful strategy that improves contributions to public goods. In particular, the model and experimental results reveal that less generous donors are more responsive to good news about the returns to public goods. Thus, focusing on better informing these donors, who are often overlooked in fundraising campaigns, may be a more fruitful strategy than uniform information provision.

2 Related Literature

This paper connects two research strands that investigate factors that impact public good provision and cooperation: 1) information, 2) social preference composition of groups. In the following section, we briefly review the related literature.

2.1 Information

Much of the earlier literature on public good provision assumes that donors operate under complete and perfect information (Ledyard 1995; Andreoni and Payne 2013; Vesterlund 2016). In reality, however, information is often limited, which has given rise to a more recent trend of studying public good provision under incomplete and imperfect information.

On the theoretical front, there is sparse literature that studies public good provision under incomplete information about the public good's value. In particular, in the context of discrete public goods, Menezes at. al. (2001), Laussel and Palfrey (2003), and Barbieri and Malueg (2008, 2010) introduce private information about donors' heterogeneous valuations of the public good, while Krasteva and Yildirim (2013) endogenize the choice of information acquisition and find that more information about one's own value improves giving. In contrast, our current setting features a public good with homogeneous returns and finds that more information about the return is not always beneficial.

Our paper is closer to the literature on continuous public goods under incomplete information, which has modeled the public good as having uncertain (but homogeneous) returns (e.g. Vesterlund 2003; Anderoni 2006; Lange et. al. 2017). This literature, however, has mainly focused on the information transmission about the quality of the public good to uninformed donors via leadership giving (Vesterlund 2003; Anderoni 2006)[7] or costly gift provision to donors (Lange et al. 2017). Instead, our focus here is on studying the impact of more information on average total provision.

Our model and experimental set-up is cast as a continuous linear public good with uncertain MPCR. In this respect, our paper is closest to the experimental literature that considers limited information about the returns. Although some of this literature focuses on information about others' valuation and/or endowment by incorporating heterogeneity in a non-linear public good environment (e.g. Marks and Croson 1999; Chan et al. 1999), most of the focus has been on the impact of *uncertainty* about the MPCR. In particular, Gangadharan and Nemes (2009), Levati et al. (2009), Fischbacher et al. (2014), Stoddard (2015), Boulu-Reshef et al. (2017), Butera and List (2017) and Théroude and Zylbersztejn (2017) study how increasing the *riskiness* of the returns, in terms of mean preserving spread, affects contributions. Although the findings are mixed, Levati and Morone (2013) and Stoddard (2017) show that the parameterization of the public good game can play an important role in determining the direction of this effect.

In contrast, we are interested in the impact of *information* about the MPCR on contributions. Because of that, we keep the distribution of the MPCR fixed and vary the amount of information that people receive, which more closely represents people's response to information. To the best of our knowledge, our paper is the first to investigate public good contributions in this environment.

It is worth highlighting that our work is also related to an emerging literature studying the role of information on charitable giving. Most of this literature studies the impact of variety of information (such as cost-to-donation ratio, recipients' or non-profits' characteristics, or other donors' giving and so on) on donations (e.g. Eckel et al. 2007; Shang and Croson 2009; Fong and Oberholzer-Gee 2011; Null 2011; Butera and Horn 2014; Karlan and Wood 2014; Metzger and Gunther 2015; Brown et al. 2017; Exley 2016, 2017; Portillo and Stinn 2018). In many of these studies, however, donors' beliefs in the absence of information are unobservable and outside the experimenter's control. In reality, donors may adopt different beliefs about non-profits' characteristics. Some may hold very optimistic beliefs, while others may hold very pessimistic beliefs in absence of sufficient information. Thus, donors' response to information is ambiguous and heavily influenced by their prior beliefs.

[7] Potters et al. (2005, 2007) experimentally investigate the information revelation through leadership giving.

Without means of controlling for these beliefs, it is difficult to gain a deeper insight into the channels through which information impacts giving. Indeed, the findings of the existing studies are mixed, with donors sometimes using information to tailor their donations up or down.

To gain more insight into the impact of information on donors' giving, we control both for the information that donors receive and the interpretation of this information by donors. To accomplish this, we use the linear public good game, in which subjects are assigned their valuations for the public good by the experimenter and compensated based on these assigned values. By varying people's information about their induced values (Smith 1976), we are able to determine how they respond to information about the value and how the informed contributions compare to the uninformed contributions.

Finally, there is also charitable giving research studying how donors may strategically create a "moral wiggle room" (Dana et al., 2007) to justify selfish behavior. For example, research shows how donors use risk (Exley 2016), ambiguity (Haisley and Weber 2010), beliefs about others (Di Tella et al. 2015), and performance metrics (Exley 2017) as an excuse not to give. Unlike our public goods framework, most of these studies use a dictator game type of environment where subjects are given an endowment and asked to make a donation. In this respect, our study is more representative of cooperation rather than altruism. Additionally, in our study subjects are either *exogenously* informed or uninformed depending on the treatment. Thus, information avoidance as an excuse not to give is not a viable explanation for our findings. Granted, it is plausible that subjects in the uninformed treatment could use the lack of information as an excuse not to give despite knowing that each MPCR is equally likely. Although this could provide an alternative explanation for our findings in the less generous sessions, it fails to explain the behavior observed in more generous sessions.[8]

2.2 Social Preferences Composition of Groups

The second strand of related literature studies social preferences (i.e. other-regarding preferences) for giving. This literature has established that people have different motivations for giving and they can be classified into different types based on these motivations (see the following surveys: Camerer 2003; Fehr and Schmidt 2006; Cooper and Kagel 2016). While some people are selfish and do not give anything, others are conditional cooperators whose contributions depend on what others give (e.g. Brandts and Schram 2001; Fischbacher et al. 2001; Kurzban and Houser 2005).

Groups consist of individuals with different social preferences (i.e. types). The existing literature mainly focuses on how group composition changes the level of cooperation and finds that the composition of social preference types in groups matters in achieving and maintaining high

[8]If moral wiggle room is an explanation for our findings, it is not clear to us why it may yield different results across treatments. Potentially, it is possible that information may be changing the *social norms* differently in more and less generous sessions. Since this is beyond the scope of this paper, we leave this to future research.

levels of cooperation (e.g. Burlando and Guala 2005; Gächter and Thöni 2005; Page et al. 2005; Gunnthorsdottir et al. 2007; Gächter 2007; Ones and Putterman 2007; de Oliveira et al. 2015). One common finding in this literature is that contributions are higher in homogeneous groups with members who are more generous. Moreover, the existence of one selfish person in the group is enough to harm the groups' ability to cooperate (de Oliveira et al. 2015).

Our theoretical model suggests that people's reaction to information depends on the level of generosity of their group (more in Section 3.). We contribute to this research strand by studying the impact of information across two groups with different levels of generosity. Finally, it is important to note that our findings about the impact of group composition on response to information might also explain the mixed results regarding the impact of information on giving in the charitable giving literature.

The rest of the paper is organized as follows: Section 3 introduces the theoretical model, and derives the testable hypotheses; Section 4 describes the experimental design that we use to test these hypotheses; Section 5 presents the results from the laboratory experiment; and Section 6 concludes.

3 Theory and Hypotheses

The linear public good environment consists of groups of $N \geq 2$ agents. Each agent i is endowed with wealth W and chooses an amount g_i to allocate to a public good that benefits everyone equally in their groups. The monetary payoff of agent i is

$$M_i = W - g_i + v \sum_{k=1}^{N} g_k$$

where $v \in (\frac{1}{N}, 1)$ denotes the marginal per-capita return (MPCR) of the public good. Clearly, the payoff maximizing strategy is $g_i = 0$ and the socially optimal strategy is $g_i = W$. Therefore, in absence of other-regarding preferences all agents contribute zero in the unique Nash equilibrium.

Since the above equilibrium behavior is a drastic departure from the experimental evidence (see Ledyard 1995), the existing literature has considered the possibility of other-regarding preferences (e.g. Rabin, 1993; Fehr and Schmidt 1999; Bolton and Ockenfels 2000; Charness and Rabin 2002; Falk and Fischbacher 2006; Arifovic and Ledyard 2012). In particular, following the model of inequality aversion by Arifovic and Ledyard (2012)[9], agent i's utility function is given by

$$u_i(M_i, \overline{M}) = M_i + \beta_i \overline{M} - \gamma_i \max\{\overline{M} - M_i, 0\} \tag{1}$$

[9]We adopt the preference specification proposed by Arifovic and Ledyard (2012) since it most closely fits our public good framework. However, the utility function given by eq. (1) is closely related to alternative preference specifications proposed by the existing literature (e.g. Fehr and Schmidt 1999; Bolton and Ockenfels 2000; Charness and Rabin 2002), with utility representations that are equivalent up to linear transformations of one another. For further discussion of this equivalence, see Arifovic and Ledyard (2012).

where $\overline{M} = \frac{1}{N}\sum_{k=1}^{N} M_k$ is the average earnings in the game. The agent-specific parameter β_i captures the agent's preference for higher average earnings. In other words, β_i is the strength of i's pro-social motives for giving which we refer to as the individual i's generosity level[10]. The parameter γ_i captures her inequality aversion, which generates disutility if i's earnings fall below the average.

Letting $\overline{g}(v)$ denote the expected average giving in the public good game, i's best response function is given by

$$g_i = \begin{cases} 0 & \text{if} \quad \beta_i \leq \beta_1(v) \\ \overline{g}(v) & \text{if} \quad \beta_i \in [\beta_1(v), \beta_2(v, \gamma_i)] \\ W & \text{if} \quad \beta_i \geq \beta_2(v, \gamma_i) \end{cases} \tag{2}$$

where

$$\beta_1(v) = \frac{N(1-v)}{Nv-1}, \beta_2(v, \gamma_i) = \frac{N(1-v)}{Nv-1} + \gamma_i \frac{N-1}{Nv-1}.$$

The best response function reveals that selfish agents (low β_i) give 0, highly generous agents (high β_i) give all their endowment, and moderately generous agents (intermediate β_i) are conditional cooperators and match the expected average contributions by others.

Given this best response function, the expected equilibrium giving solves

$$\overline{g}(v) = \Pr(\beta_i \geq \beta_2(v, \gamma_i))W + \Pr(\beta \in [\beta_1(v), \beta_2(v, \gamma_i)])\overline{g}(v), \tag{3}$$

where the total expected giving is simply the weighted average giving of the highly generous agents, who give all their endowment, and the moderately generous agents, who match the expected average giving in the population. Rearranging terms, we can re-write eq. (3) as

$$\overline{g}(v) = \frac{1}{1 + \frac{\Pr(\beta \leq \beta_1(v))}{\Pr(\beta \geq \beta_2(v, \gamma_i))}} W \tag{4}$$

Thus, the expected equilibrium giving depends on the relative likelihood of the payoff maximizing (selfish) giving and socially optimum (generous) giving, i.e. $R(v) = \frac{\Pr(\beta \leq \beta_1(v))}{\Pr(\beta \geq \beta_2(v))}$. As expected, the average giving is decreasing in the relative likelihood of selfish giving (i.e., $R(v)$) since it causes the conditional contributors to adopt more pessimistic beliefs about the average giving in the population.

To determine how the expected equilibrium giving varies with the MPCR, v, we need to take into account the distribution of other-regarding preferences since it affects the relative likelihood of selfish giving, $R(v)$. In particular, in order to focus attention on the comparative statics with respect to the population's generosity level, we simplify the model by letting $\gamma_i = \gamma$ be identical

[10]In Arifovic and Ledyard's paper, this term is referred to as the level of altruism. Due to different definitions of altruism in the economics and psychology literature, we opt to avoid confusion by referring to β_i as the individual's generosity.

across the population.[11] Furthermore, we model the pro-social preferences in the population as distributed according to an exponential distribution $\beta_i \sim Exp(1/\lambda)$ where higher λ represents a (stochastically) more generous population.[12] This specification allows us to conduct comparative statics with respect to the generosity level of the population, captured succinctly by the parameter λ.

Given the expected equilibrium giving function and the distribution of pro-social preferences in the population, the following lemma describes how expected giving varies with the MPCR, v, and the population's generosity level λ.

Lemma 1 *$\overline{g}(v)$ is increasing in $v \in \left(\frac{1}{N}, 1\right)$ with $\lim_{v\to\frac{1}{N}} \overline{g}(v) = 0$ and $\lim_{v\to 1} \overline{g}(v) = W$. Moreover, there exists a unique $\tilde{v}(\lambda) \in \left(\frac{1}{N}, 1\right]$ with the following properties:*

1) $\overline{g}''(v) > 0$ for $v < \tilde{v}(\lambda)$ and $\overline{g}''(v) < 0$ for $v > \tilde{v}(\lambda)$;

2) $\tilde{v}(\lambda)$ is decreasing in λ with $\lim_{\lambda\to 0} \tilde{v}(\lambda) = 1$ and $\lim_{\lambda\to\infty} \tilde{v}(\lambda) = \frac{1}{N}$.

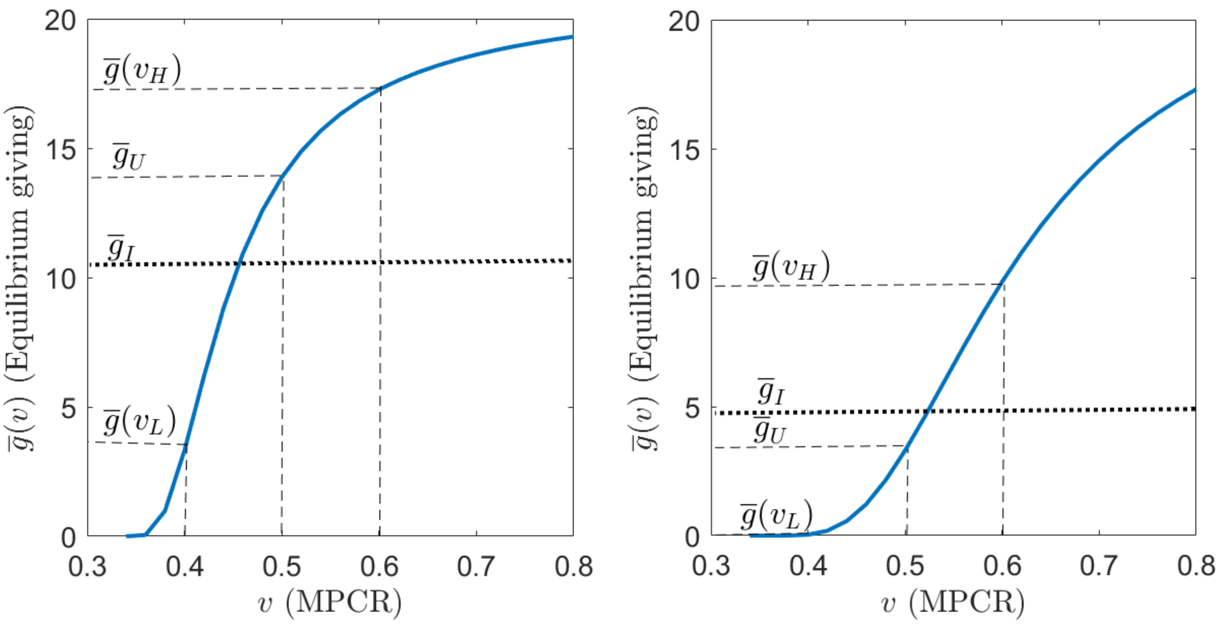
The formal proof of Lemma 1 is relegated to Appendix A. Intuitively, it reveals that the equilibrium giving is increasing in the MPCR since higher v increases the net social benefit of giving, captured by $Nv - 1$, and decreases the individual cost of giving, captured by $(1 - v)$. Moreover, expected giving approaches zero as the net social benefit of giving becomes negligible (i.e., $v \to \frac{1}{N}$) and it approaches W as the marginal cost of giving becomes negligible (i.e., $v \to 1$).

Interestingly, the first property reveals that the marginal benefit of increasing the MPCR is non-monotone and tends to diminish at higher values of the MPCR. In particular, the average giving $\overline{g}(v)$ exhibits increasing returns of higher MPCR for low values ($v < \tilde{v}(\lambda)$), but diminishing returns for high values ($v > \tilde{v}(\lambda)$). To grasp the intuition behind these dynamics, note that for low values (i.e. $v < \tilde{v}(\lambda)$), there is a significant number of agents who do not contribute. Thus, raising the MPCR in this case has an increasing marginal impact as it shifts a growing number of agents away from selfish to conditional and generous giving. However, this impact of increasing the MPCR eventually levels off as the number of selfish agents dwindles. Consequently, for high values of the MPCR ($v > \tilde{v}(\lambda)$), the marginal impact of further increasing the MPCR is diminishing as it induces a smaller number of agents to move away from selfish giving.

The second property further reveals that a more generous population, characterized by a larger λ, reaches diminishing returns of higher MPCR faster, i.e $\tilde{v}(\lambda)$ is decreasing in λ. The reason is that for a more generous population, composed of individuals with relatively high β_i, inducing most agents to give requires only a modest increase in the MPCR. The opposite is true for a less

[11] The results in this section readily generalize to a stochastic inequality aversion parameter γ_i as long as γ_i and β_i are independently distributed.

[12] The exponential distribution gives a convenient way of capturing heterogeneity in pro-social preferences as its domain covers all non-negative real numbers and the parameter λ allows us to stochastically change the pro-social preferences of the population in terms of first order stochastic dominance.



(a) High Generosity ($\lambda = 16$)

(b) Low Generosity ($\lambda = 6$)

Figure 1: Informed and uninformed giving for $\gamma = 4$, $v_L = 0.4$, $v_H = 0.6$, and $p_L = 0.5$

generous population, in which significant portion of agents require a large increase in the MPCR in order to contribute.

Figure 1 illustrates a numerical example for two different values of λ (low and high generosity levels) and provides visual support for Lemma 1. It is evident from Figure 1 that $\overline{g}(v)$ is increasing in v for both generosity levels. While $\overline{g}(v)$ is convex at low values of v, it is concave at high values. Moreover, a more generous population (Figure 1a)) reaches diminishing returns of higher MPCR faster as illustrated by the fact that it is concave for a wider region of v (i.e. $\tilde{v}(16) < \tilde{v}(6)$).

The shape of the giving function described by Lemma 1 has an important implication on the impact of information provision. To see this, suppose that, as in the experimental design in Section 4, the MPCR (v) is drawn from a discrete distribution with $v = \{v_L, v_H\}$, where $\frac{1}{N} < v_L < v_H < 1$, and $\Pr(v = v_r) = p_r$ for $r = \{L, H\}$.[13] In absence of information, the agent's giving ($\overline{g}_U$) is based on the expected MPCR, $E[v]$. In contrast, an informed agent gives based on the realized MPCR, v, and thus the expected informed giving ($\overline{g}_I$) is the weighed average contributions under high and low MPCR.

$$\overline{g}_U = \overline{g}(E[v]); \quad \overline{g}_I = p_L\overline{g}(v_L) + p_H\overline{g}(v_H) \tag{5}$$

Clearly, information can either decrease giving by revealing low value v_L (bad news), or increase giving by revealing high value v_H (good news). The relative magnitude of the response to good

[13] To ease the exposition, we present the theoretical results using a two-point distribution since it corresponds to our experimental design in Section 4, but the theoretical results extend to any arbitrary non-degenerate distribution.

and bad news depends of the shape of the giving function described by Lemma 1 and illustrated in Figure 1. In particular, Figure 1a) illustrates the case of generous population for which the giving function is mostly in the concave region. It is evident from the figure that expected equilibrium giving responds more to bad news than good news, i.e. $|\overline{g}_U - \overline{g}(v_L)| > |\overline{g}_U - \overline{g}(v_H)|$. Consequently, when the population is rather generous, information is on average bad for giving, i.e. $\overline{g}_U > \overline{g}_I$. The opposite is true for a more selfish population that is likely to feature a convex giving function for a wider range of v. Thus, as Figure 1b) illustrates, the response to good news in this case is larger than the response to bad news (i.e. $|\overline{g}_U - \overline{g}(v_H)| > |\overline{g}_U - \overline{g}(v_L)|$), causing information to be on average beneficial for giving (i.e. $\overline{g}_I > \overline{g}_U$). The following Proposition formalizes this dynamics.

Proposition 1 *There exist generosity levels* $0 < \lambda_1 \leq \lambda_2 < \infty$ *such that expected informed giving exceeds uninformed giving for* $\lambda \leq \lambda_1$*, while uninformed giving exceeds expected informed giving for* $\lambda \geq \lambda_2$.

The proof of Proposition 1 follows immediately from the Jensens' inequality and is relegated to Appendix A. The proposition states that while informed giving exceeds uninformed giving for a less generous population, information is detrimental for giving if the population is more generous. As discussed above, the key driver for these dynamics is that less generous population is more responsive to good news than bad news, while the opposite is true for more generous population.

Lemma 1 and Proposition 1 provide testable hypotheses that we investigate by using a lab experiment described in Section 4. In particular, our experimental design aims to test the following hypotheses.

Hypothesis 1 *In a less generous population, the agents' average response to good news is higher than their response to bad news.*

Hypothesis 2 *In a more generous population, the agents' average response to good news is lower than their response to bad news.*

The implication of Hypothesis 1 is that the average contributions are higher when agents are informed and thus information is good for giving. Hypothesis 2 implies just the opposite for a more generous population- average uninformed giving exceeds the informed one and information is bad for giving. In the next section, we describe the experimental design that we use to test these hypotheses in the lab.

4 Experimental Design

In order to test our hypotheses, we need to control for the level of generosity in each session. We do this by conducting the experiment in two stages.[14] In Stage 1, we measure subjects' generosity level in the public good game by using an online experiment. One to two weeks later, using the information obtained from Stage 1, we invite some of these participants to the lab to participate in the second stage of the experiment.

Our experiment is a 2x2 between subjects design[15]: *Selfish* vs. *Generous* and *Informed* vs. *Uninformed*. Using the data collected in Stage 1, we create relatively more and less selfish sessions in the lab. More specifically, we only invite subjects who were classified as relatively less generous to the *Selfish* treatment; and we only invite subjects who were classified as relatively more generous to the *Generous* treatment.

In Stage 2, subjects come to the lab to participate in a linear public good game described in Section 3. Subjects are placed in groups of three and play a one shot linear public good game with uncertain MPCR, which takes values of 0.4 or 0.6 with equal probability. They play the game for 10 rounds with random rematching. In the *Uninformed* treatment, subjects make a contribution decision without knowing which MPCR will be used for that round. However, subjects know that each outcome of the MPCR is equally likely. In the *Informed* treatment, subjects are informed about the realized MPCR for that round when they make their decisions. We pay subjects for one of the rounds picked at random at the end of the experiment. Finally, they fill out a survey. Below, we provide detailed information about each stage of the experimental design.

Stage 1: First, invitees receive an invitation email to participate in an incentivized online experiment with a possibility of being invited to an experiment in our lab. The online experiment, programmed in Qualtrics, consists of Fischbacher et al. (2001) (henceforth FGF) conditional contribution game.[16] In this game, each subject is endowed with 20 tokens (1 token=\$0.40), assigned to a group consisting of three other members, and asked to play a linear public good game with an MPCR of 0.50. Each subject makes two decisions: Decision 1 and Decision 2. In Decision 1, subjects state how many of their tokens, if any, they would like to contribute to a group project (unconditional contribution) that benefits everyone in their group equally. Next, in Decision 2, they fill out a conditional contribution table (see Figure 2). In this table, they indicate how many tokens they would like to contribute to the group project *conditional* on the other group members' average contribution in Decision 1. For example, they state how much they would like to contribute if the

[14]This aspect of our design is inspired by and similar to Burlando and Guala (2005), Gächter and Thöni (2005), and de Oliveira et al. (2015).

[15]We ran the Informed and Uninformed treatments within subjects. Although subjects knew that experiment had two parts, they did not know anything about the second part when they played the first part. We only report the data from the first treatment played, since the behavior in the first treatment contaminated the data from the second treatment (i.e. ordering effect).

[16]The instructions for the online experiment can be found in Appendix C.

Please indicate how many tokens (if any) you would like to contribute, for each possible average tokens contributed by other two group members:

	Your Contribution
if others' average contribution is 0 tokens	
if others' average contribution is 1 tokens	
if others' average contribution is 2 tokens	
⋮	
if others' average contribution is 20 tokens	

Figure 2: Conditional Contribution Table

other group members contributed 0 tokens on average in Decision 1, how much they would like to contribute if others contributed 1 token on average in Decision 1, and so on. Thus, in Decision 2, subjects make a total of 21 conditional contribution decisions.

After all subjects participate in the online experiment, we randomly construct groups of three. Next, for each group, we randomly pick two group members for which Decision 1 will be implemented. We implement Decision 2 for the other group member. In other words, we randomly determine which two group members' unconditional contribution decisions will be implemented. Depending on the average unconditional contribution made by these two group members, we implement the other group member's conditional contribution as indicated in her conditional contribution table. Then, we calculate the earnings accordingly. Payments for the online experiment are delivered by Venmo, Paypal or cash. In order to avoid any potential contamination that may be created by the outcome of this stage, the subjects are not informed about the outcome and receive their payments for the online experiment only after Stage 2 is conducted.

The FGF conditional contribution game described above is a good way to measure the generosity level (β_i) of the subjects in the public good game. It is commonly used in the literature (with over 2,000 citations) to classify subjects into types in the public good game: selfish (or free-riders who contribute zero), conditional cooperator (subjects whose contributions depend on the others' average contribution) and pro-social (or full cooperators who contribute everything).[17] As described in Section 3, each subject's type is determined by their level of generosity, β_i. Those with a relatively low β_i are selfish, those with a high β_i are pro-social and others with a β_i somewhere in between are conditional cooperators. Since one of our goals is to create more and less generous groups in the lab, we calculate a measure for each subject by using the data collected from the conditional contribution game in Stage 1. More specifically, we calculate the following parameter, that works as a proxy for the subject's level of generosity (i.e., β_i), for each subject:

[17] Boosey et al. (2018) shows the validity of this procedure to explain behavior in public goods games. Also see Thöni and Volk (Forthcoming) that review 17 replication studies of FGF and show that FGF findings are stable.

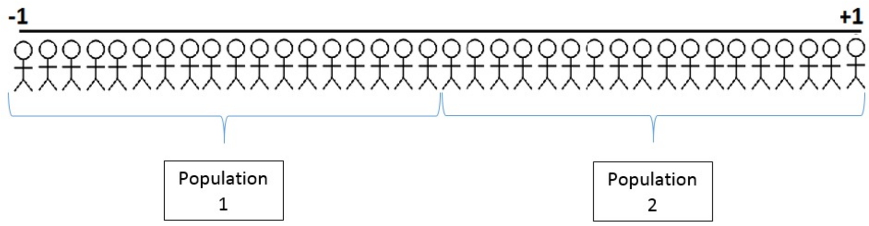


Figure 3: Providing Info About the Session's Generosity Level

$$\hat{\beta}_i = \frac{\sum_{j=0}^{20}(g_j^i - j)}{\sum_{j=0}^{20} j} \tag{6}$$

where g_j^i is subject i's stated conditional contribution in Decision 2 for an average contribution by others, $j = 0, 1..., 20$. If a subject is selfish, whose contribution is always zero independent of others' giving, then her $\hat{\beta}_i$ is equal to -1. If a subject is pro-social, who always contributes all of her endowment independent of others' giving, her $\hat{\beta}_i$ is equal to $+1$. If a subject is a perfect conditional cooperator, whose giving perfectly matches others' average contribution, then her $\hat{\beta}_i$ is equal to 0. In general, if a subject is more generous, she tends to contribute higher amounts for any average contribution level of the other group members resulting in a larger $\hat{\beta}_i$.

Next, we rank all the subjects based on their $\hat{\beta}_i$ and divide them into two equally populated samples using the median. This gives us two samples, one below the median and one above the median. The first sample includes selfish subjects as well as conditional cooperators, thus it is relatively more selfish. The second sample is relatively more generous since it includes pro-social subjects who contributed everything as well as conditional cooperators. More information on the distribution of types in our experiment is provided in Section 5. Next, we use these two samples to control for the generosity level in the public good game in the lab as explained below.

Stage 2: After dividing the subjects into two equally populated samples, we invite them to participate in the second stage in the Economic Research Lab at Texas A&M University.

Subjects play a one shot linear public good game in groups of three for ten rounds in the lab. The groups in each round are constructed randomly (stranger matching design). In each round, subjects start out with 20 tokens (1 token =\$0.50) in their individual accounts and are asked to decide how many of these 20 tokens, if any, they would like to contribute to a group project (g_i). The monetary payoff function for this game is as follows:

$$M_i = 20 - g_i + v \sum_{k=1}^{3} g_k$$

The MPCR (v) of the public good is either 0.40 with 0.5 probability or 0.60 with 0.5 probability, which is determined randomly and independently for each group in each round.[18] In the *Uninformed*

[18] The independent draw of the MPCR on the round and the group level eliminates any potential effect coming

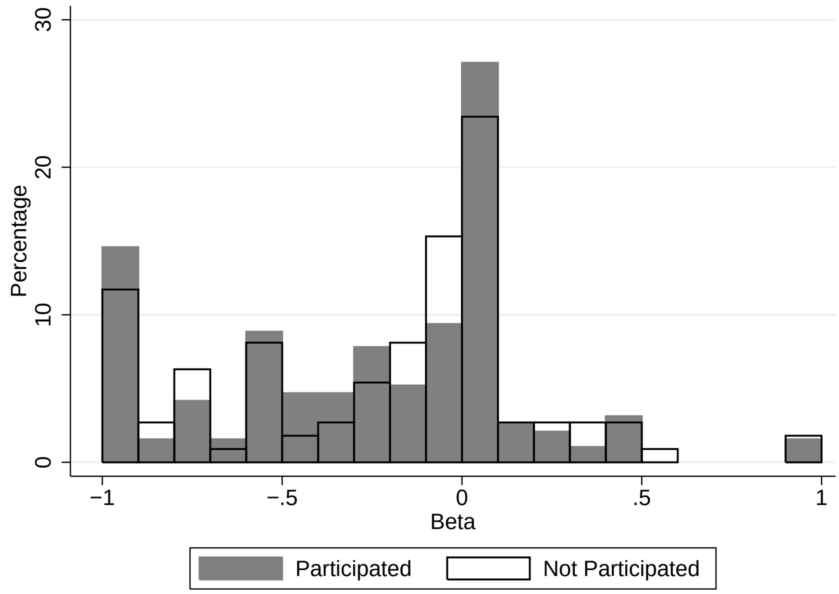


Figure 4: Distribution of $\hat{\beta}_i$

treatment, subjects make their contribution decision about the public good without knowing which MPCR is selected for that round, but they know that it is either 0.40 or 0.60 with equal probability. In the *Informed* treatment, subjects are informed about the randomly chosen MPCR for that round and then are asked to make their contribution decisions about the public good. In both treatments, at the end of each round subjects receive feedback about their earnings, other group members' average contribution, and the randomly determined MPCR in the round.

In the *Selfish* (*Generous*) treatment, we only invite subjects whose $\hat{\beta}_i$ was below (above) the median. This is how we control for the level of generosity in each session. At the end of the instructions[19], before the experiment starts, we remind subjects about their participation in the online experiment and provide them with information about the level of generosity in their session. More specifically, using a neutral language, we explain how we have created a measure (i.e. $\hat{\beta}_i$) using their responses in the online experiment and ranked everyone based on their measure as shown in Figure 3. In the *Selfish* (*Generous*) treatment, we tell subjects that participants from Population 1 (2) were invited for that session.

5 Results

Six experimental sessions were conducted in the Economic Research Lab at Texas A&M University in April 2017. Subjects were recruited through ORSEE (Greiner 2004), and the lab experiment

from the order of the MPCR.

[19]Instructions used in the lab experiment can be found in Appendix B.

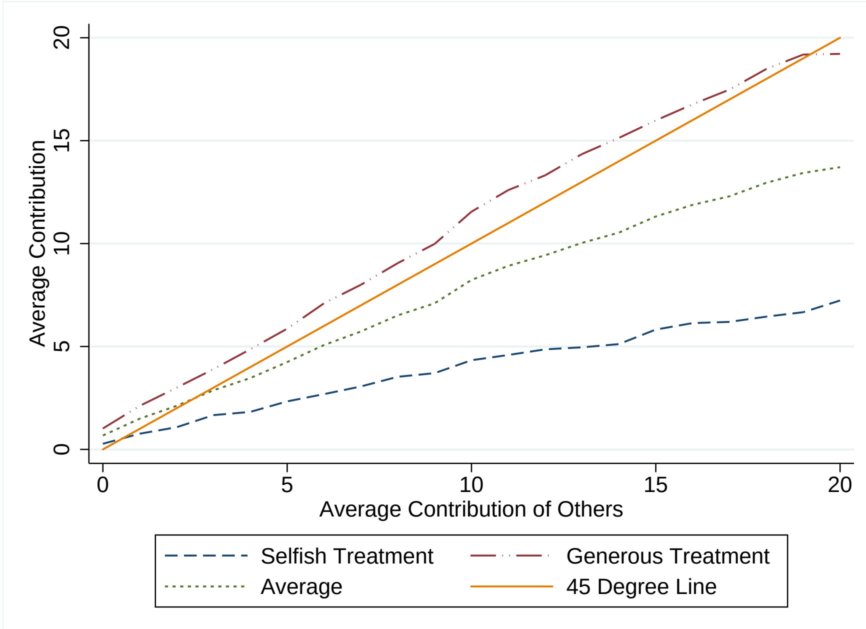


Figure 5: Average Contributions in Stage 1 for Each Possible Average Contribution of Others

was coded in z-Tree (Fischbacher 2007). Average earnings were \$9.85 in the first stage and \$21 in the second stage (including a show up fee of \$8 in the second stage).

A total of 360 subjects participated in the online experiment and 44 of these preferred not to be invited to the lab experiment. From the remaining group, we excluded 13 as their behavior in the online experiment seemed to be random. The final pool of subjects for Stage 2 was 303 and 111 of those participated in the second stage.

5.1 Stage 1 Findings

The attrition rate from Stage 1 to Stage 2 is high since when recruiting for the online experiment, it was impossible to predict whether a subject would be assigned to the *Selfish* or *Generous* treatment sessions. This made it difficult to schedule session times that would be convenient for a large number of subjects. Nevertheless, it is important to confirm that there is no systematic difference in the generosity level of the subjects who participated in both stages versus the ones who participated in the first stage only. For this purpose, we look at Figure 4 that presents the percentage distribution of $\hat{\beta}_i$, as computed using (6), for the 303 participants who were invited to Stage 2 in our experiment. The darker color represents the participants who participated in both stages (111 subjects), whereas the lighter color- the participants who only participated in the first stage (192 subjects). Using the Kolmogorov-Smirnov equality of distributions test, we confirm that the difference between the distribution of $\hat{\beta}_i$ across these two samples is not statistically significant (*p-value* is 0.536).

The mean and median of $\hat{\beta}_i$ from the online experiment are -0.25 and -0.11 respectively. The

Table 1: Average Contributions Across Treatments

	Uninformed	**Informed**	
		High MPCR	**Low MPCR**
Selfish	3.56 (n=18)	6.67 (n=33)	4.37 (n=33)
Generous	12.41 (n=24)	12.14 (n=36)	9.24 (n=35)

median is the cut-off point for the *Generous* and *Selfish* sessions. The subjects whose $\hat{\beta}_i$ is below (above) the median are invited to the *Selfish (Generous)* treatment sessions. This is the only difference between these two treatments.

Figure 5 illustrates the conditional contribution decisions made in Stage 1 by those who also participated in Stage 2. A perfect conditional cooperator who always matches the others' average contribution would be located on the 45 degree line. If a subject is located above this 45 degree line, it indicates that the subject contributed more than others for all possible average contributions made by other group members. On the contrary, a subject who contributed less than the average would be located below this line. The average conditional contributions made for each possible contribution level of others looks almost identical to FGF data. Figure 5 also illustrates the average conditional contributions made by the subjects in *Generous* and *Selfish* treatments separately.

5.2 Stage 2 Findings

First, we compare the average contributions made across treatments. We do this by taking the average amount of tokens contributed across all ten periods by each subject and compare them using bootstrap t-test.[20] Table 1 presents these average contributions made across treatments. First of all, it is not surprising to see that average contributions in *Generous* treatment is always higher than the *Selfish* treatment (*p-value* < 0.000 for all three conditions). Next, in the *Selfish* treatment we find that *Uniformed* average contributions are not different than *Informed* contributions with low MPCR (*p-value* is 0.333). However, *Uninformed* contributions are significantly different than *Informed* contributions with high MPCR (*p-value* is 0.015). Subjects in the *Selfish* treatment do not respond to information when they receive bad news (MPCR of 0.40), but they significantly increase their contributions when they receive good news (MPCR of 0.60). This is line with Hypothesis 1. In the *Generous* treatment, we see the opposite as stated in Hypothesis 2. Average *Uninformed* contributions are not statistically different from the *Informed* contributions with high MPCR (*p-value* is 0.838), but they are different from the *Informed* contributions with low MPCR (*p-value* is 0.039). Contrary to the *Selfish* treatment findings, subjects in the *Generous* treatment do not respond to good news, but they significantly decrease their contributions upon obtaining bad news.

This is also evident in Figure 6. Figure 6 shows the average contributions in all ten periods

[20]Mann-Whitney U test also yield very similar p-values.

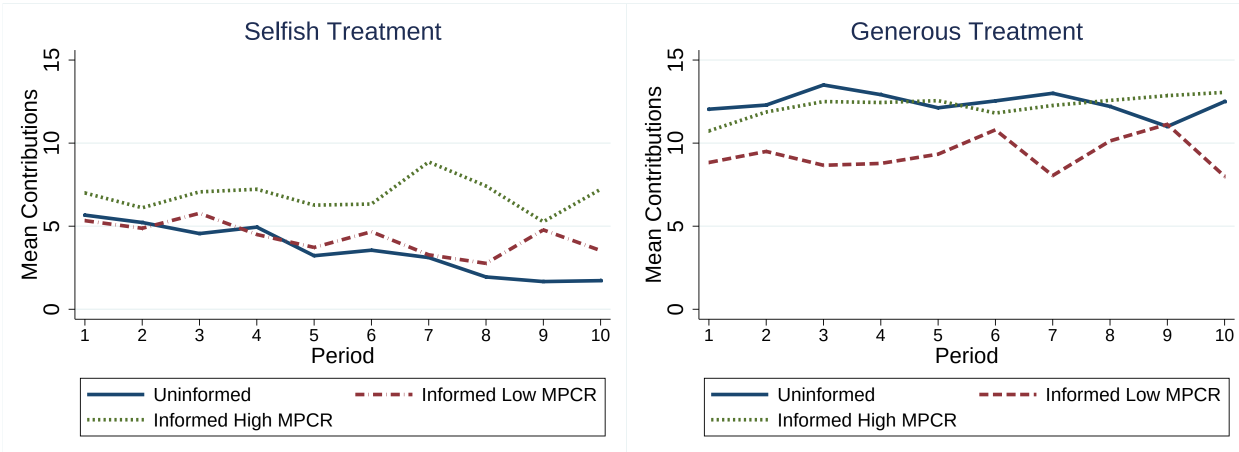


Figure 6: Mean Contributions

in both *Selfish* (left) and *Generous* (right) treatments. As you can see in Figure 6, in the *Selfish* treatment, uninformed contributions follow a similar path as the informed contributions for the low MPCR over time. However, there is a jump in the level of average informed contributions for the high MPCR. On the other hand, in the *Generous* treatment, while the average uninformed contributions follow a similar path as the informed average contributions for the high MPCR, there is a decrease in average informed contributions for the low MPCR relative to the uninformed contributions. Finally, as expected, average informed contributions are always higher for the high MPCR for both *Selfish* and *Generous* treatments.

To check the robustness of our findings, we next present the regression results. Since the lowest possible contribution amount is zero tokens and the highest possible contribution amount is 20 tokens, we need to control for potential censuring. Although Tobit model is useful in order to account for censoring, it restricts the data by not allowing different motives behind the contribution of zero.[21] In other words, Tobit model does not differentiate between the subjects who are selfish and would always contribute zero no matter what, and those who contribute zero due to treatment (for example due to receiving bad news). Following Moffatt (2015, Ch 11.), we use a double hurdle model (also see Brown et al., 2017 for another example of using hurdle model in experimental data).

The double hurdle model treats the probability of being a contributor and the extent of contribution separately. Thus, by using this model, we can examine the impact of information on the extensive and intensive margin. The results are reported in Table 2. We first run a Probit model regression using the cross section of all 111 subjects to analyze the factors that impact whether subjects contribute or not (i.e. being a potential contributor or not). The dependent variable in this probit model is Contributed which takes the value of one if the subject contributed a positive

[21]A similar reasoning can also apply to subjects who contribute everything. Since we have only one subject who contributed everything in all periods, we restrict our attention to only selfish types.

Table 2: Double Hurdle Model Regression Results

	Probit	Selfish Treatment Tobit		Generous Treatment Tobit	
	(1)	(2)	(3)	(4)	(5)
Selfish	-0.836*				
	(0.470)				
Informed	0.00403	2.332**	0.865	-2.559*	-4.675***
	(0.431)	(1.144)	(1.009)	(1.379)	(1.179)
Informed*High MPCR			3.211***		3.555***
			(0.773)		(0.580)
Lagged Others' Average		0.258***	0.275***	0.149***	0.148***
		(0.0741)	(0.0705)	(0.0460)	(0.0536)
Beta		-0.976	-0.816	9.695***	9.709***
		(2.365)	(2.082)	(2.367)	(2.126)
Period		-0.253**	-0.288***	-0.0822	-0.0203
		(0.111)	(0.102)	(0.118)	(0.116)
Constant	2.126***	2.891*	3.150*	11.91***	11.51***
	(0.458)	(1.704)	(1.612)	(1.692)	(1.393)
Observations	111	414	414	531	531

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The robust standard errors clustered at the individual level are in parentheses.
The dependent variable for the Probit model is Contributed which takes the value of 1 if the subject contributed at least once, and otherwise zero. The dependent variable for the panel data Tobit models is Contributions. The number of observations in column 1 is the total number of subjects participated in this study. The numbers of observations in the remaining four columns are the number of decisions made in 9 periods by subjects who contributed at least once across all 10 periods.

amount in any of the ten periods; and zero otherwise. The estimates of the first hurdle are presented in the first column of Table 2. There are a total of six subjects who contributed zero in all ten periods. Being in *Informed* treatment does not affect the *probability* of contributing to the public good. This means that information does not impact contributions on the extensive margin. However, being in the *Selfish* treatment significantly decreases the probability of contributing. This is not surprising given that we created the *Selfish* vs. *Generous* treatments based on the subjects' level of generosity measured in Stage 1.

Next, we run a Tobit model for *Selfish* and *Generous* treatments separately to study the factors that impact contributions *conditional* on contributing at least once (i.e. conditional on being a potential contributor). Thus, we exclude the subjects who failed the first hurdle. In columns (2)-(5), we report the marginal effects of the coefficients on the uncensored latent variable. The second and the third columns are created using the data collected in the *Selfish* treatment and the last two columns are created using the data collected in the *Generous* treatment. The dependent variable for all four columns is the contributions to the public good in each round.

The first model in columns 2 and 4 shows the average impact of information on contributions. The variable *Informed* is a dummy variable for *Informed* treatment sessions. Thus, it takes the value of 1 if the subjects were informed about the realized MPCR for that round before they made their decisions. The model also controls for the following variables: *Lagged Others' Average* which is the average contributions made by other group members in the previous round, *Beta* which is $\hat{\beta}_i$ that was computed using the data from the online experiment (i.e. Stage 1), finally *Period* which is simply the time trend. It is evident from these columns that, in *Selfish* treatment, information has a positive and significant impact on contributions for those who are potential contributors. On the other hand, in *Generous* treatment, information hurts the average contributions.

The second model in columns 3 and 5 studies the impact of information separately for good and bad news. The variable *Informed*High MPCR* is the interaction term between *Informed* and *High MPCR*. The baseline in columns 3 and 5 is the *Uninformed* treatment. Thus, the coefficient of *Informed* shows the impact of receiving bad news. And, the coefficient of *Informed*High MPCR* shows the impact of receiving good news *relative* to receiving bad news. Thus, the impact of receiving good news relative to the *Uninformed* treatment is the summation of the coefficients of *Informed* and *Informed*High MPCR*.

In the *Selfish* treatment, we see that when subjects are informed and if they find out that the MPCR is low, then they do not significantly change their giving behavior relative to being uninformed. In other words, they do not respond to bad news. However, when they are informed and receive good news, then they respond to information by increasing their contributions. As suggested by Hypothesis 1, the relative response to good news is larger than bad news, thus information is good for contributions.

On the other hand, in *Generous* treatment, when subjects are informed and if they receive bad news, they significantly decrease their contributions relative to the contribution levels when uninformed. When they receive good news, they respond to it by significantly increasing their contributions relative to receiving bad news. Furthermore, as suggested by Hypothesis 2, the negative response to bad news is stronger than the positive response to good news. Thus, on average, information hurts contributions significantly on the intensive margin.

6 Conclusion

In this paper, we investigate the impact of information about the MPCR of a linear public good on contributions. The theoretical model predicts that information provision has differential impact on less and more generous groups. While information increases average contributions by less generous subject groups, it reduces average contributions by more generous subject groups. We experimentally test these hypotheses in the lab and the findings are in line with the theoretical expectations. We find that information does not impact public good contribution on the extensive margin. However, information impacts public good contributions on the intensive margin and the sign of this impact depends on the generosity level of the sessions. In the relatively selfish sessions, subjects who contributed at least once contribute more on average when they are informed compared to when they are uninformed of the value of the public good. However, just the opposite is true for the relatively generous sessions. In these sessions, subjects who are potential contributors contribute less to the public good when they are informed. This is because their relative response to bad news is greater than their response to good news.

The findings of this study have significant implications for fundraising. In particular, they suggest that targeted information provision may be a more fruitful strategy of increasing public good contributions than uniform information provision. Since donors themselves may be able to acquire information by conducting research about non-profits prior to contributing, an important direction for future research includes endogenizing the choice of information acquisition by donors. This would allow us to glean further insight about the impact of information on public good provision by studying how information acquisition incentives differ across donors.

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Appendix A

Proof of Lemma 1.

To show that $\overline{g}(v)$ is increasing in v, note by eq. (4) that

$$\overline{g}'(v) = -\overline{g}(v)\frac{R'(v)}{1+R(v)} \tag{A-1}$$

Moreover, since $\beta_i \sim Exp(1/\lambda)$, $R(v) = \frac{1-e^{-\beta_1(v)/\lambda}}{e^{-\beta_2(v)/\lambda}}$. Therefore, differentiating $R(v)$ with respect to v yields

$$\begin{aligned} R'(v) &= \frac{1}{\lambda}\beta_2'(v)e^{\beta_2(v)/\lambda} - \frac{1}{\lambda}\left[\beta_2'(v) - \beta_1'(v)\right]e^{(\beta_2(v)-\beta_1(v))/\lambda} = \\ &= -\frac{N(N-1)}{(Nv-1)^2}\frac{1}{\lambda}\left[e^{\beta_2(v)/\lambda} + \gamma R(v)\right] < 0 \end{aligned} \tag{A-2}$$

where the last equality takes into account that $\beta_1'(v) = -\frac{N(N-1)}{(Nv-1)^2} < 0$ and $\beta_2'(v) = -\frac{N(N-1)}{(Nv-1)^2}(1+\gamma) < 0$. Given $R'(v) < 0$, eq. (A-1) implies that $\overline{g}'(v) > 0$.

To show that $\lim_{v \to \frac{1}{N}} \overline{g}(v) = 0$, we need to show that $\lim_{v \to \frac{1}{N}} R(v) = \infty$. Note that $\lim_{v \to \frac{1}{N}} \beta_1(v) = \lim_{v \to \frac{1}{N}} \beta_2(v) = \infty$. Therefore, $\lim_{v \to \frac{1}{N}} e^{-\beta_2(v)/\lambda} = \lim_{v \to \frac{1}{N}} e^{-\beta_1(v)/\lambda} = 0$, resulting in $\lim_{v \to \frac{1}{N}} R(v) = \infty$. To see that $\lim_{v \to 1} \overline{g}(v) = W$ note that $\lim_{v \to 1} \beta_1(v) = 0$ and $\lim_{v \to 1} \beta_2(v) = \gamma$. This implies that $\lim_{v \to 1} R(v) = 0$ and $\lim_{v \to 1} \overline{g}(v) = W$.

To establish the existence and uniqueness of $\tilde{v}(\lambda)$ and its corresponding properties, we first derive $\overline{g}''(v)$ by differentiating $\overline{g}'(v)$ with respect to v, yielding

$$\overline{g}''(v) = \frac{\overline{g}(v)}{(1+R(v))}\left[2\frac{[R'(v)]^2}{1+R(v)} - R''(v)\right] \tag{A-3}$$

Differentiating eq. (A-2) with respect to v and simplifying yields

$$R''(v) = \frac{N^2(N-1)^2}{\lambda^2(Nv-1)^4}\left[(e^{\beta_2(v)/\lambda} + \gamma R(v))\left(\frac{2\lambda(Nv-1)}{(N-1)} + \gamma\right) + (1+\gamma)e^{\beta_2(v)/\lambda}\right] \tag{A-4}$$

Subsituting for $R'(v)$ and $R''(v)$ in eq. (A-3) and simplifying results in

$$\begin{aligned} \overline{g}''(v) &= \frac{\overline{g}(v)}{(1+R(v))}\frac{N^2(N-1)^2}{\lambda^2(Nv-1)^4}[e^{\beta_2(v)/\lambda} + \gamma R(v)] \times \\ &\left[2\frac{e^{\beta_2(v)/\lambda} + \gamma R(v)}{1+R(v)} - \frac{(1+\gamma)e^{\beta_2(v)/\lambda}}{e^{\beta_2(v)/\lambda} + \gamma R(v)} - \frac{2\lambda(Nv-1)}{(N-1)} - \gamma\right] \end{aligned}$$

Note that

$$g''(v) \overset{sign}{=} \left[2\frac{e^{\beta_2(v)/\lambda} + \gamma R(v)}{1+R(v)} - \frac{(1+\gamma)e^{\beta_2(v)/\lambda}}{e^{\beta_2(v)/\lambda} + \gamma R(v)} - \frac{2\lambda(Nv-1)}{(N-1)} - \gamma\right] = \Omega(v,\lambda).$$

To show the uniqueness of $\tilde{v}(\lambda)$, we first show that $\Omega(v,\lambda)$ is strictly decreasing in v, implying that there is at most one solution to $\overline{g}''(v) = 0$. Substituting for $R(v)$ in the above expression and further simplifying yields

$$\Omega(v,\lambda) = 2\frac{1+\gamma(1-e^{-\beta_1(v)/\lambda})}{1+e^{-[\beta_1(v)+\beta_2(v)]/\lambda}} - \frac{1+\gamma}{1+\gamma(1-e^{-\beta_1(v)/\lambda})} - \frac{2\lambda(Nv-1)}{(N-1)} - \gamma \tag{A-5}$$

It is immediately evident that $\Omega(v,\lambda)$ is strictly decreasing in v since $\beta_1'(v) < 0$ and $\beta_2'(v) < 0$. Thus, there is at most one solution to $\Omega(v,\lambda) = 0$.

To establish the existence of $\tilde{v}(\lambda)$, note that

$$\lim_{v\to\frac{1}{N}} \Omega(v,\lambda) = 1+\gamma > 0, \tag{A-6}$$

since $\lim_{v\to\frac{1}{N}} \beta_1(v) = \lim_{v\to\frac{1}{N}} \beta_2(v) = \infty$, and

$$\lim_{v\to 1} \Omega(v,\lambda) = \frac{2}{1+e^{-\lambda/\gamma}} - 2/\lambda - 1, \tag{A-7}$$

since $\lim_{v\to 1} \beta_1(v) = 0$ and $\lim_{v\to 1} \beta_2(v) = \gamma$. It is straightforward to verify that $\lim_{v\to 1} \Omega(v,\lambda)$ is strictly decreasing in λ and takes negative values for all $\lambda > \tilde{\lambda}$ where $\tilde{\lambda} \in (0,\infty)$ solves

$$\lim_{v\to 1} \Omega(v,\tilde{\lambda}) = 0.$$

Thus, for $\lambda > \tilde{\lambda}$, $\tilde{v}(\lambda)$ uniquely solves $\Omega(\tilde{v}(\lambda),\lambda) = 0$ and $\tilde{v}(\lambda) \in (\frac{1}{N}, 1)$, while for $\lambda < \tilde{\lambda}$, $\Omega(v,\lambda) > 0$ for all $v \in (\frac{1}{N}, 1)$ and thus $\tilde{v}(\lambda) = 1$. This establishes the existence of a unique $\tilde{v}(\lambda) \in \left(\frac{1}{N}, 1\right]$ with $g''(v) > 0$ for $v < \tilde{v}(\lambda)$ and $g''(v) < 0$ for $v > \tilde{v}$, proving property 1).

To establish property 2, note first that for $\lambda < \tilde{\lambda}$ $\tilde{v}(\lambda) = 1$. For $\lambda > \tilde{\lambda}$ implicit differentiation of $\Omega(\tilde{v}(\lambda),\lambda) = 0$ results in

$$\tilde{v}'(\lambda) = -\frac{\partial\Omega(v,\lambda)/\partial\lambda}{\partial\Omega(v,\lambda)/\partial v}$$

Recall that $\partial\Omega(v,\lambda)/\partial v < 0$. Moreover, straighforward differentiation reveals that $\partial\Omega(v,\lambda)/\partial\lambda < 0$. Therefore, it follows immediately that $\tilde{v}'(\lambda) < 0$.

The property $\lim_{\lambda\to 0} \tilde{v}(\lambda) = 1$ follow immediately from the fact that $\tilde{v}(\lambda) = 1$ for $\lambda < \tilde{\lambda} \in (0,\infty)$.

Finally, to establish that $\lim_{\lambda\to\infty} \tilde{v}(\lambda) = \frac{1}{N}$, note that

$$\lim_{\lambda\to\infty} \Omega(v,\lambda) = \lim_{\lambda\to\infty} -2\frac{Nv-1}{N-1}\lambda$$

By definition, $\Omega(\tilde{v}(\lambda),\lambda) = 0$ for $\lambda > \tilde{\lambda}$. Therefore,

$$\lim_{\lambda\to\infty} \Omega(\tilde{v}(\lambda),\lambda) = \lim_{\lambda\to\infty} -2\frac{N\tilde{v}(\lambda)-1}{N-1}\lambda = 0 \Longrightarrow \lim_{\lambda\to\infty} \tilde{v}(\lambda) = \frac{1}{N}$$

■

Proof of Proposition 1.

Given $\frac{1}{N} < v_L < v_H < 1$, by Lemma 1, there exist $\lambda_1 > 0$ be such that $\tilde{v}(\lambda_1) = v_H$ and $\lambda_2 > \lambda_1$ such that $\tilde{v}(\lambda_2) = v_L$. Furthermore, by Lemma 1, $\overline{g}(v)$ is convex for all $v < v_H$ if $\lambda \leq \lambda_1$. Thus, by definition of convexity,

$$p_L\overline{g}(v_L) + p_H\overline{g}(v_H) > \overline{g}(p_Lv_L + p_Hv_H)$$

Analogously, for $\lambda \geq \lambda_2$, $\overline{g}(v)$ is concave for all $v \geq v_L$, implying the reverse inequality.

■

Appendix B Instructions for Stage 2

Thank you for participating in our study.

This is an experiment in decision-making. You will earn money based on the decisions that you and others make during this study. Since you could earn a significant amount of money from this study, please pay attention to the instructions.

It is very important that you remain silent and **do not** talk to others. If you have any questions or need assistance, please raise your hand and an experimenter will come to you.

Today, I will be reading the instructions for you. Please follow the instructions as I read them and please **do not** click "NEXT" until I instruct you to do so. We appreciate your cooperation.

Please turn off your electronic devices and put them away. You are **not** allowed to use your electronic devices until the end of the experiment. Please feel free to use the calculator that is provided for you.

You will be paid a show-up fee of $8 for participating in our study today; this will be yours to keep. You will have the opportunity to make more money during the experiment. All of your earnings will be paid to you in cash and in private at the end of the experiment.

The currency used in this experiment is tokens. At the end of the experiment, all of the tokens you have earned will be converted to money at the following rate:

1 **Token=$0.50 (1 Token = 50 cents)**

Please click NEXT when you are ready.

Next

Instructions

You will be randomly assigned to a group consisting of **three** people. The identity of your group members in this experiment will be kept anonymous and confidential to all participants. Neither before nor after the experimental session will you learn who are/were in your group.

This experiment consists of two sets of 10 rounds, and you will be paid for one round picked at random at the end of the experiment. Right now, nobody knows which round is the paying round. Thus, it is in your best interest to pay equal attention to all rounds.

In each round, each group member has to decide on the allocation of 20 tokens. Each group member starts out with 20 tokens in his/her **private account** in each and every round.

You can leave these 20 tokens in your **private account** or you can contribute them *fully* or *partially* to a **group project** . Each token you do not contribute to the **group project** will automatically remain in your **private account.**

In each round, you will face the same decision. In each round, you will be randomly re-matched with two other participants.

Are there any questions so far?

Please click NEXT when you are ready.

Next

YOUR EARNINGS FROM THE PRIVATE ACCOUNT

You will earn one token for each token you leave in your private account.

Earnings from your private account = 20 - *your contribution to the group project*

For example, if you leave 20 tokens in your private account (and therefore do not contribute to the group project), your earnings from your private account will be 20 tokens. If you leave 6 tokens in your private account (and therefore you contribute 14 tokens to the group project), your earnings from your private account will be 6 tokens.

Only you will earn tokens from *your* private account.

Are there any questions so far?

Please click NEXT when you are ready.

Next

YOUR EARNINGS FROM THE GROUP PROJECT

You as well as your group members can contribute to the group project. The earnings for the group members from the group project will be determined by either of these two formulas:

Formula 1: Earnings from the group project = (Sum of Contributions X **1.2**) / 3

Formula 2: Earnings from the group project = (Sum of Contributions X **1.8**) / 3

There is a 50% chance that the earnings from the group project will be calculated by Formula 1. In this case, you and your group members will each earn **(Sum of Contributions X 1.2) / 3** from the project.

There is a 50% chance that the earnings from the group project will be calculated by Formula 2. In this case, you and your group members will each earn **(Sum of Contributions X 1.8) / 3** from the project.

In each round, the computer will randomly determine whether the earnings from the group project will be calculated according to Formula 1 or Formula 2. Right now, nobody knows which formula is going to be used.

We will give you two examples in the following screen. These examples are designed to help you better understand the instructions. They should not be used as a guide for your decisions in the experiment.

Are there any questions so far?

Please click NEXT when you are ready.

Next

EXAMPLES

Example 1:

Suppose that the sum of contributions to the group project made by you and your group members is **27** tokens.

Also, suppose that **Formula 1** is randomly selected.

Then, you and your group members will each earn (27 x **1.2**) / 3 = 32.4 / 3 = 10.8 tokens from the group project.

Are there any questions so far?

Example 2:

Suppose that the sum of contributions to the group project made by you and your group members is **11** tokens.

Also, suppose that **Formula 2** is randomly selected.

Then, you and your group members will each earn (11 x **1.8**) / 3 = 19.8 / 3 = 6.6 tokens from the group project.

Are there any questions so far?

Please click NEXT when you are ready.

Next

TOTAL EARNINGS

Again, there are three participants in each group. This means that you will be matched with two other participants in this sessions. Your total earnings are the **sum** of your earnings from your private account and from the group project:

Total Earnings	=	Earnings From Your Private Account	+	Earnings From the Group Project
		(20 - your contribution to the group project)		With 50% chance: (Sum of Contributions x 1.2) / 3
				With 50% chance: (Sum of Contributions x 1.8) / 3

Are there any questions so far?

Please click NEXT when you are ready.

Next

UNDERSTANDINGS TASK

Before you start making your decisions, we would like you to answer a few questions. These questions are **<u>not</u>** designed to test you; but to help you better understand the experiment. They should **<u>not</u>** be used as a guide for your decisions in the experiment. If you need any help with the questions, please raise your hand and the experimenter will come and help you. You have to answer the questions correctly in order to proceed.

Please click NEXT when you are ready.

Next

QUESTION 1

If you need assistance at any point, please raise your hand.

1. Each group member has 20 tokens in their private accounts. Suppose that nobody contributes anything to the group project.

a. How many tokens will you earn from your private account ? 20

b. How many tokens will you and your group members each earn from the group project ? 0

c. How many tokens will your total earnings be? 20

When you are finished answering the questions, please click NEXT.

Next

QUESTION 2

If you need assistance at any point, please raise your hand.

2. Each group member has 20 tokens. Suppose that you contribute 5 tokens to the group project. Your other group members contribute 2 and 9 tokens each to the group project. Also, suppose that the earnings from the group project will be calculated according to **Formula 2** (sum of all contributions x **1.8**) / 3.

Please notice that the answers for some questions may not be whole numbers.

a. How many tokens will you earn from your private account ? 15

b. How many tokens will you and your group members each earn from the group project ? 9.6

c. How many tokens will your total earnings be? 24.6

When you are finished answering the questions, please click NEXT.

Next

QUESTION 3

If you need assistance at any point, please raise your hand.

3. Each group member has 20 tokens. Suppose that you contribute 5 tokens to the group project. Your other group members contribute 2 and 9 tokens each to the group project. Also, suppose that the earnings from the group project will be calculated according to **Formula 1** (sum of all contributions x **1.2**) / 3.

Please notice that the answers for some questions may not be whole numbers.

a. How many tokens will you earn from private account ? 15

b. How many tokens will you and your group members each earn from the group project ? 6.4

c. How many tokens will total earnings be? 21.4

When you are finished answering the questions, please click NEXT.

Next

Treatment 1 (Selfish Groups – Informed):

Periode

1 von 1

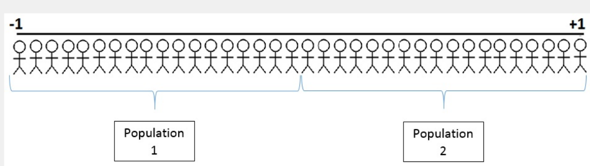
Verbleibende Zeit [sec]: 30

Information about Today's Session

Recently, all of you participated in our online experiment. During this online experiment, you filled out a conditional contribution table and made contribution decisions to a group project that benefited everyone in your group equally.

Using your decisions made in this online experiment, we calculated a measure for each of the participants. This measure ranges between -1 and +1. If a participant's measure is -1, this means that this participant did not contribute anything to the group project no matter what other group members contributed. If a participant's measure is +1, this means that this participant contributed all of their tokens to the group project no matter what other group members contributed. The higher this measure is for one participant, the higher that participant's contributions were.

After we calculated this measure for each of the participants, we ranked everyone based on their measure as shown in the figure below. Then, we divided the participants into two equally sized populations.



For today's session, we only invited participants from Population 1.

Are there any questions so far?

Please click NEXT when you are ready.

Next

Periode

1 von 1

Verbleibende Zeit [sec]: 29

FIRST SET OF 10 ROUNDS

The first set of the experiment will last for 10 rounds.

In each round, you will have 20 tokens in your private account and will be asked to make a contribution decision to the group project.

Your total earnings are the **sum** of your earnings from your private account and from the group project:

You will earn 1 token for each token you keep in your private account.

Your earnings from the group project will be:

- Either (Sum of Contributions x 1.2) / 3 with 50% chance (Formula 1)
- Or (Sum of Contributions x 1.8) / 3 with 50% chance (Formula 2)

In each round, **only one** of these Formulas will be randomly selected. The randomly selected Formula will be used to calculate the earnings from the group project for that round.

In the first 10 rounds of the experiment, when you make your contribution decision, you will know which formula is going to be used for that round. In other words, when you make your contribution decision, you will know whether Formula 1 or Formula 2 is randomly selected to be used in that round.

In each round, you will be randomly re-matched with two other participants in this session and you will face the same decision. At the end of each round, you will be provided a Round Summary page. On this page, you will receive feedback on your earnings, the formula that was chosen, and your group member's contributions in that round.

Are there any questions so far?

Please click NEXT when you are ready.

Next

INFORMED decision Screen

ROUND 11

You have 20 tokens in your private account. Below, we ask you to make your contribution decision to the group project. Your contribution can be any whole number from 0 to 20.

Please remember that you will be randomly **re-matched** with two other participants in each round.

The randomly selected formula to be used in this round is: **(Sum of Contributions X 1.8) / 3**

How many tokens would you like to contribute to the project?

Please make your decision now and click NEXT when you are ready.

Next

Remaining Time [sec]: 1

ROUND SUMMARY

Earnings from Private Account: 17 tokens.

Earnings from Group project: 2.80 tokens.

Other's Average Contribution (rounded up): 2 tokens.

Sum of Contribution: 7 tokens.

Formula used: (Sum of Contributions X 1.2) / 3

Your Total Earnings This Round: 19.80 tokens.

Please click NEXT when you are ready.

Next

Periode

1 von 1

Verbleibende Zeit [sec]: 30

SECOND SET OF 10 ROUNDS

Again, in each round, you will have 20 tokens in your private account, and you will be asked to make a contribution decision to the group project.

Your total earnings are the **sum** of your earnings from your private account and from the group project:

You will earn 1 token for each token you keep in your private account.

Your earnings from the group project will be:

- Either (Sum of Contributions x 1.2) / 3 with 50% chance (Formula 1)
- Or (Sum of Contributions x 1.8) / 3 with 50% chance (Formula 2)

In each round, **only one** of these Formulas will be randomly selected. The randomly selected Formula will be used to calculate the earnings from the group project for that round.

Different from the previous set of 10 rounds, in this second set of 10 rounds, you will make your contribution decision without knowing which formula is selected for that round. This is the only difference.

Again, in each round, you will face the same decision. Also, in each round, you will be randomly re-matched with two other participants in this session.

Are there any questions so far?

Please click NEXT when you are ready.

Next

Uninformed Decision Screen

ROUND 1

You have 20 tokens in your private account. Below, we ask you to make your contribution decision to the group project. Your contribution can be any whole number from 0 to 20.

Please remember that you will be randomly **re-matched** with two other participants in each round.

How many tokens would you like to contribute to the project?

Please make your decision now and click NEXT when you are ready.

Next

Remaining Time [sec]: 1

ROUND SUMMARY

Earnings from Private Account: 14 tokens.

Earnings from Group project: 10.40 tokens.

Other's Average Contribution (rounded up): 10 tokens.

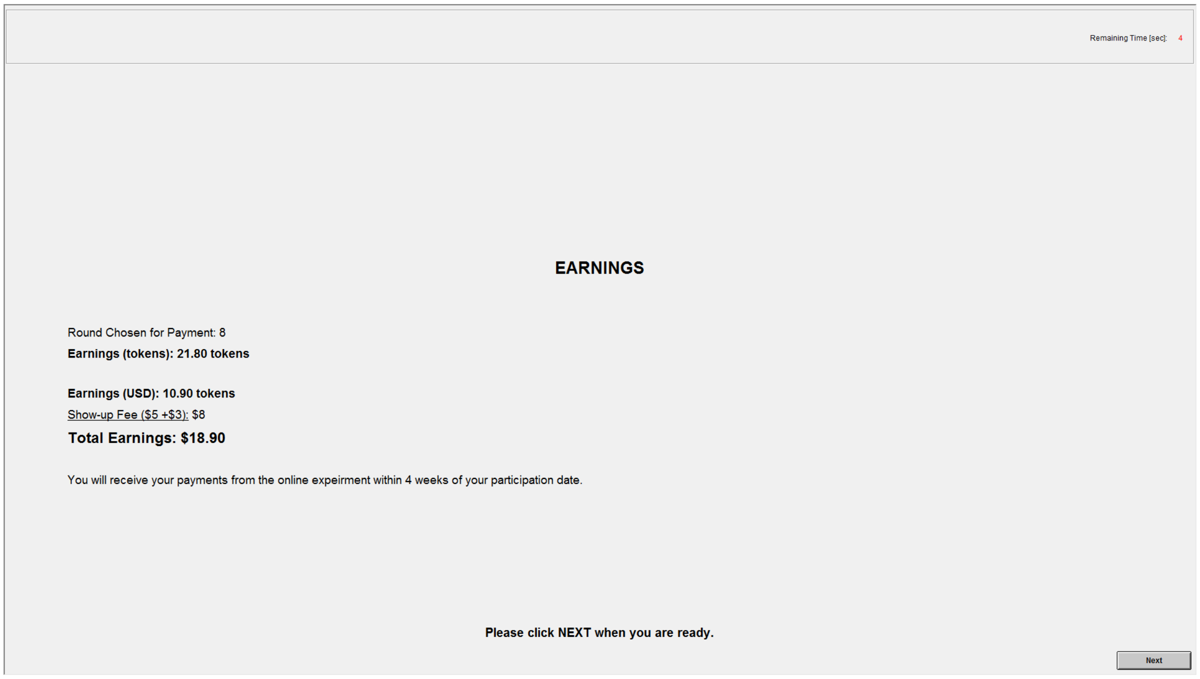
Sum of Contribution: 26 tokens.

Formula used: (Sum of Contributions X 1.2) / 3

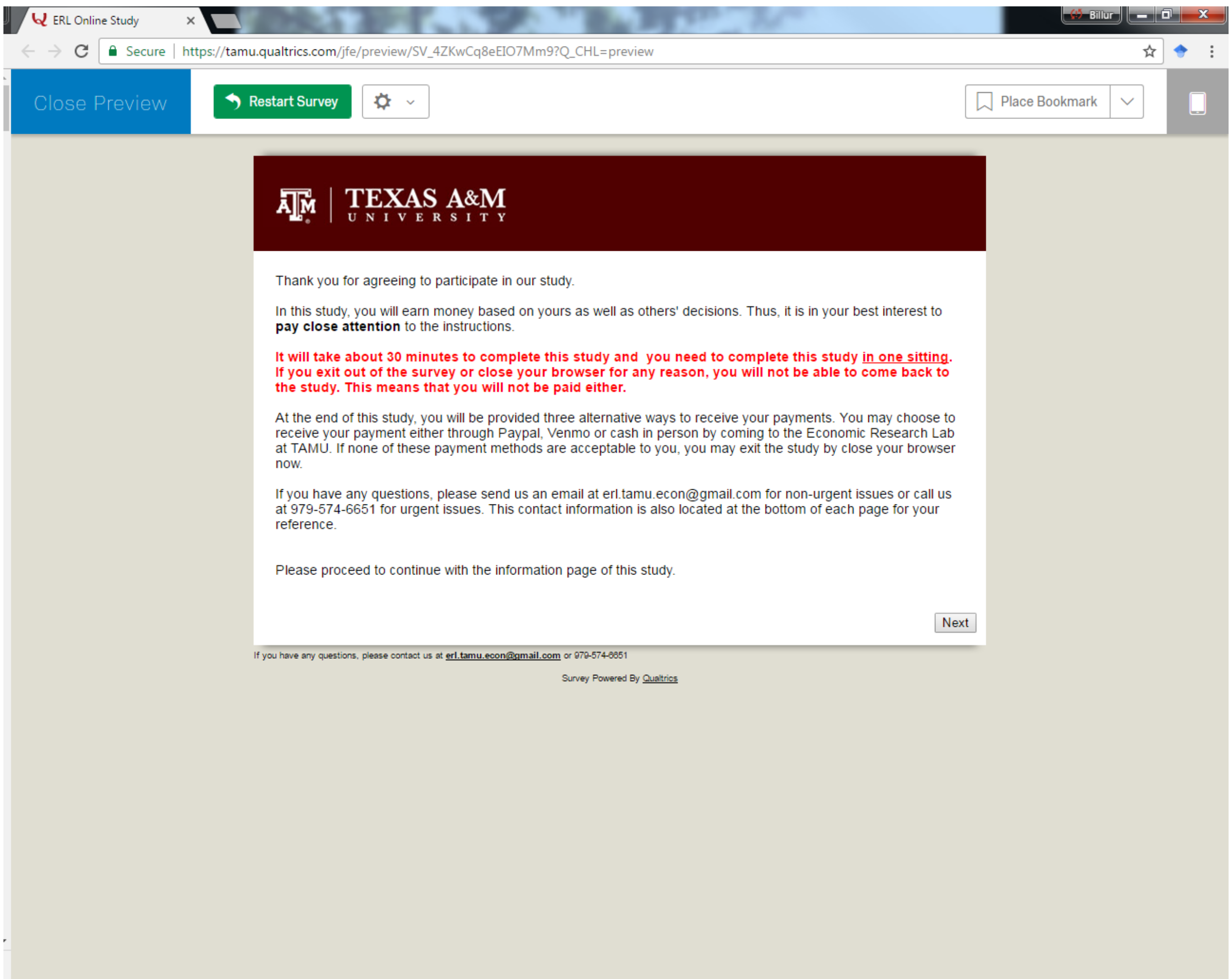
Your Total Earnings This Round: 24.40 tokens.

Please click NEXT when you are ready.

Next


Remaining Time [sec]: 4
EARNINGS
Round Chosen for Payment: 8
Earnings (tokens): 21.80 tokens
Earnings (USD): 10.90 tokens
Show-up Fee ($5 +$3): $8
Total Earnings: $18.90
You will receive your payments from the online expeirment within 4 weeks of your participation date.
Please click NEXT when you are ready.
Next

Appendix C Instructions for Stage 1



ERL Online Study

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Close Preview

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Place Bookmark

TEXAS A&M UNIVERSITY

Thank you for agreeing to participate in our study.

In this study, you will earn money based on yours as well as others' decisions. Thus, it is in your best interest to **pay close attention** to the instructions.

It will take about 30 minutes to complete this study and you need to complete this study in one sitting. If you exit out of the survey or close your browser for any reason, you will not be able to come back to the study. This means that you will not be paid either.

At the end of this study, you will be provided three alternative ways to receive your payments. You may choose to receive your payment either through Paypal, Venmo or cash in person by coming to the Economic Research Lab at TAMU. If none of these payment methods are acceptable to you, you may exit the study by close your browser now.

If you have any questions, please send us an email at erl.tamu.econ@gmail.com for non-urgent issues or call us at 979-574-6651 for urgent issues. This contact information is also located at the bottom of each page for your reference.

Please proceed to continue with the information page of this study.

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-6651

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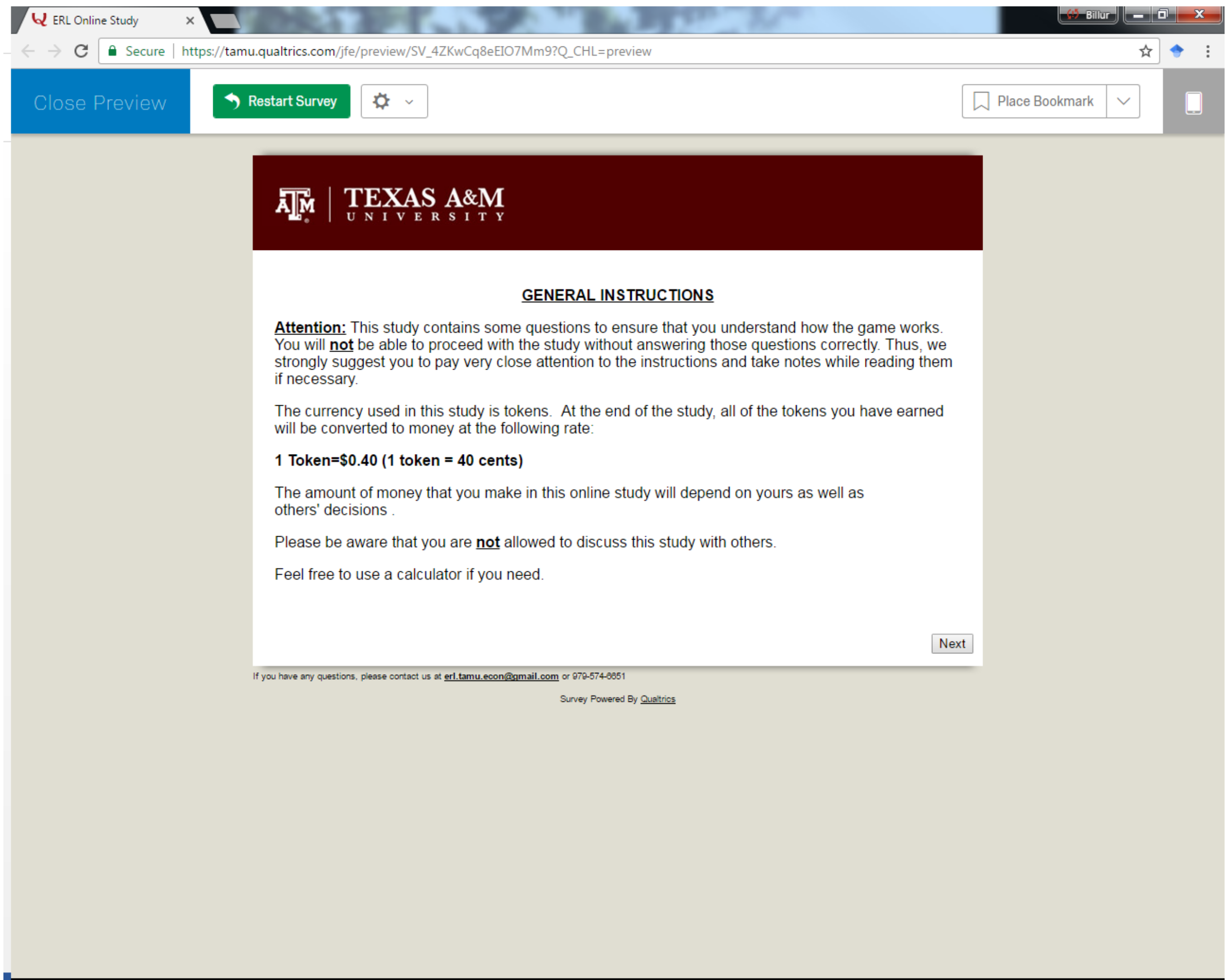

ERL Online Study

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Close Preview | Restart Survey | Place Bookmark

TEXAS A&M UNIVERSITY

GENERAL INSTRUCTIONS

Attention: This study contains some questions to ensure that you understand how the game works. You will **not** be able to proceed with the study without answering those questions correctly. Thus, we strongly suggest you to pay very close attention to the instructions and take notes while reading them if necessary.

The currency used in this study is tokens. At the end of the study, all of the tokens you have earned will be converted to money at the following rate:

1 Token=$0.40 (1 token = 40 cents)

The amount of money that you make in this online study will depend on yours as well as others' decisions .

Please be aware that you are **not** allowed to discuss this study with others.

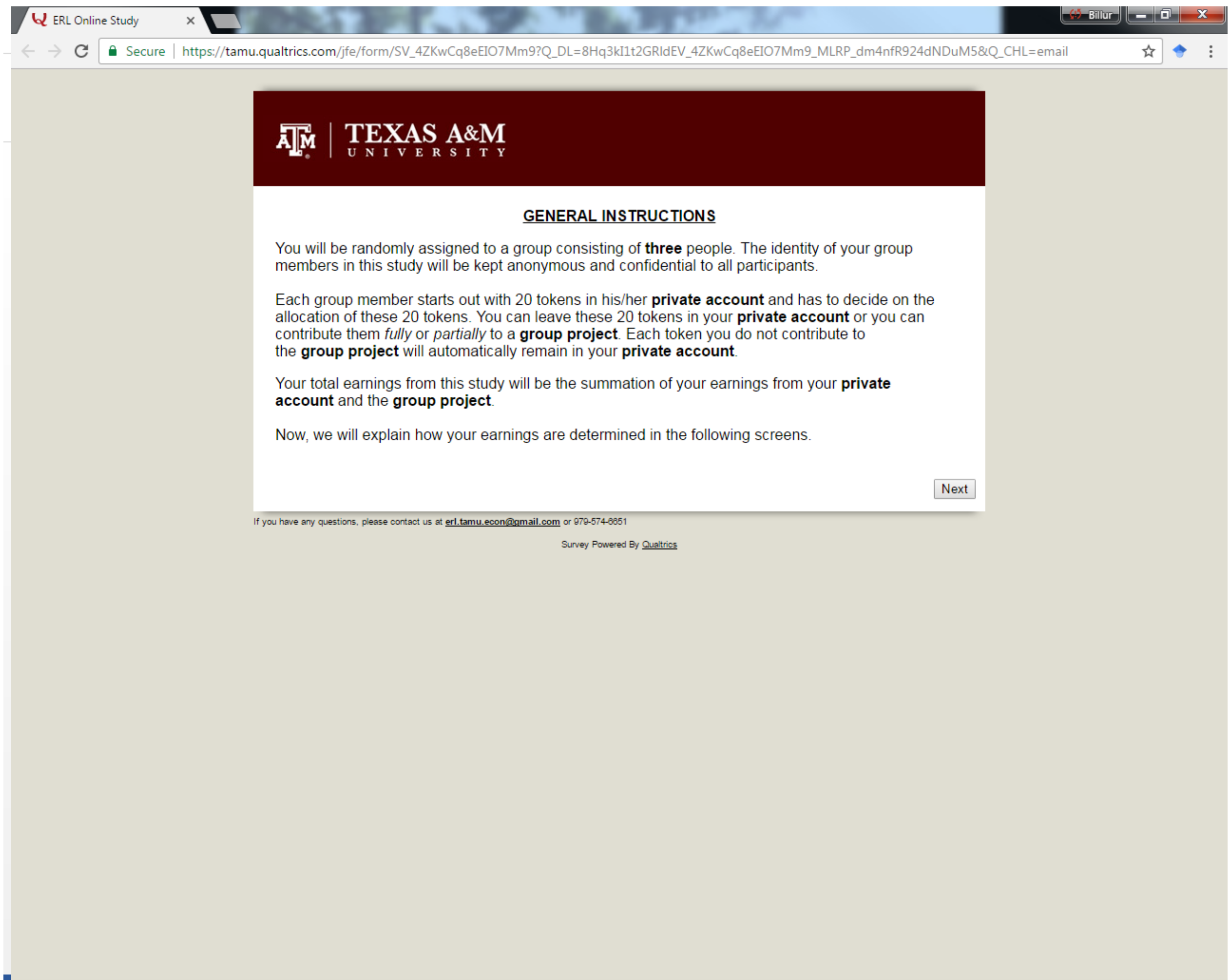
Feel free to use a calculator if you need.

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-8651

Survey Powered By Qualtrics

4



ERL Online Study

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TEXAS A&M UNIVERSITY

GENERAL INSTRUCTIONS

You will be randomly assigned to a group consisting of **three** people. The identity of your group members in this study will be kept anonymous and confidential to all participants.

Each group member starts out with 20 tokens in his/her **private account** and has to decide on the allocation of these 20 tokens. You can leave these 20 tokens in your **private account** or you can contribute them *fully* or *partially* to a **group project**. Each token you do not contribute to the **group project** will automatically remain in your **private account**.

Your total earnings from this study will be the summation of your earnings from your **private account** and the **group project**.

Now, we will explain how your earnings are determined in the following screens.

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-8651

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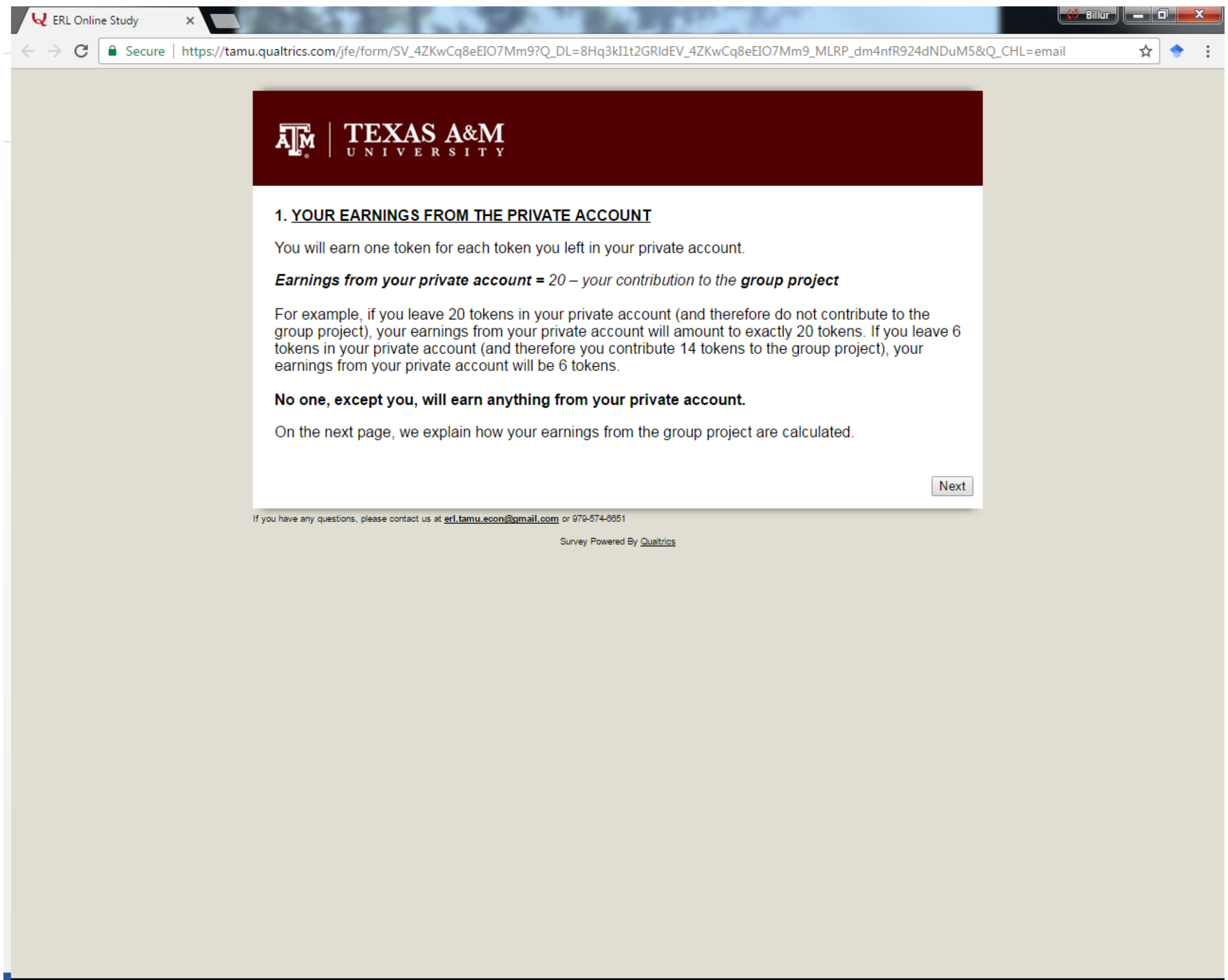
5



ERL Online Study

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TEXAS A&M UNIVERSITY

1. YOUR EARNINGS FROM THE PRIVATE ACCOUNT

You will earn one token for each token you left in your private account.

Earnings from your private account = *20 – your contribution to the* ***group project***

For example, if you leave 20 tokens in your private account (and therefore do not contribute to the group project), your earnings from your private account will amount to exactly 20 tokens. If you leave 6 tokens in your private account (and therefore you contribute 14 tokens to the group project), your earnings from your private account will be 6 tokens.

No one, except you, will earn anything from your private account.

On the next page, we explain how your earnings from the group project are calculated.

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-6651

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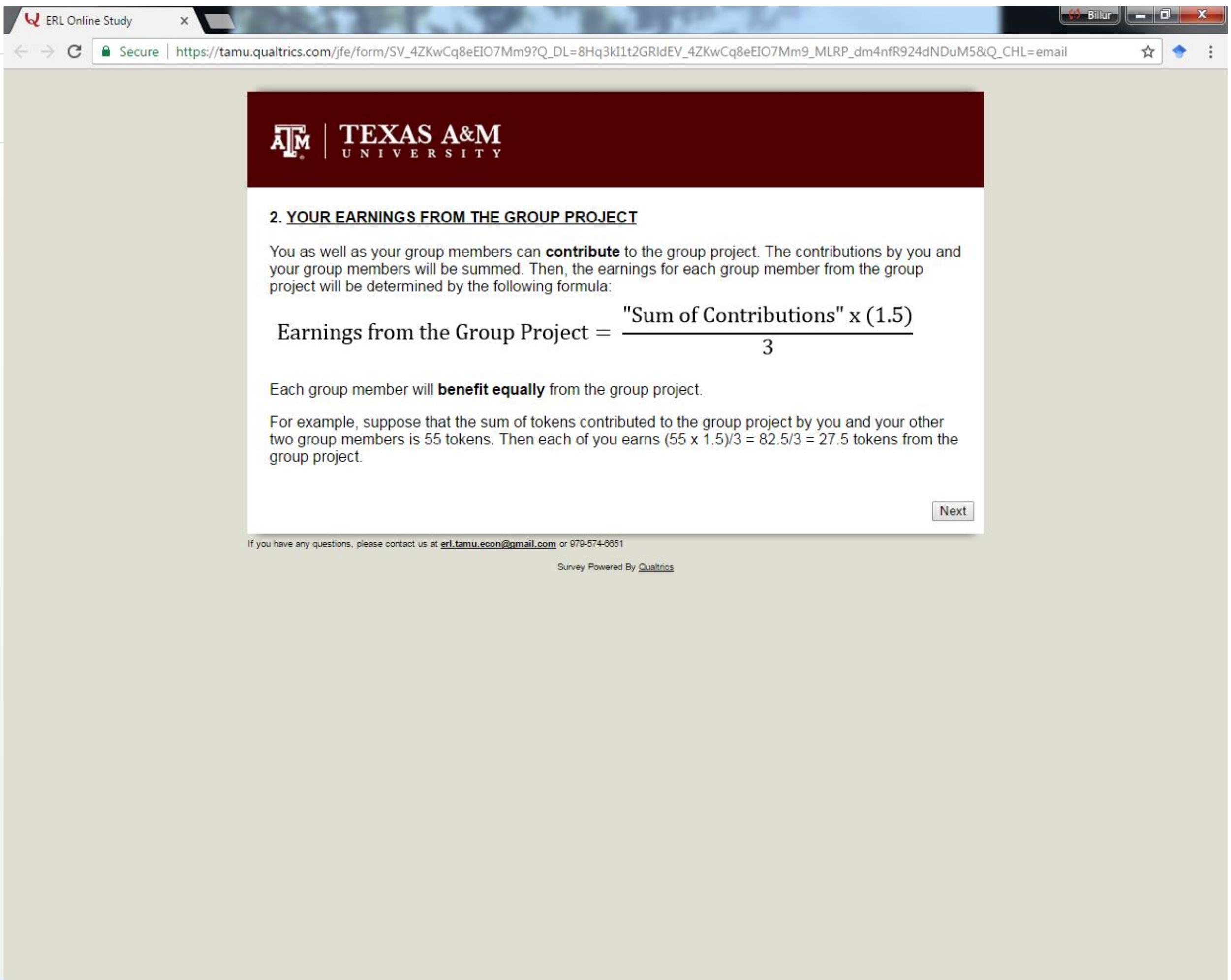

TEXAS A&M UNIVERSITY

2. YOUR EARNINGS FROM THE GROUP PROJECT

You as well as your group members can **contribute** to the group project. The contributions by you and your group members will be summed. Then, the earnings for each group member from the group project will be determined by the following formula:

$$\text{Earnings from the Group Project} = \frac{\text{"Sum of Contributions" x (1.5)}}{3}$$

Each group member will **benefit equally** from the group project.

For example, suppose that the sum of tokens contributed to the group project by you and your other two group members is 55 tokens. Then each of you earns (55 x 1.5)/3 = 82.5/3 = 27.5 tokens from the group project.

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-6651

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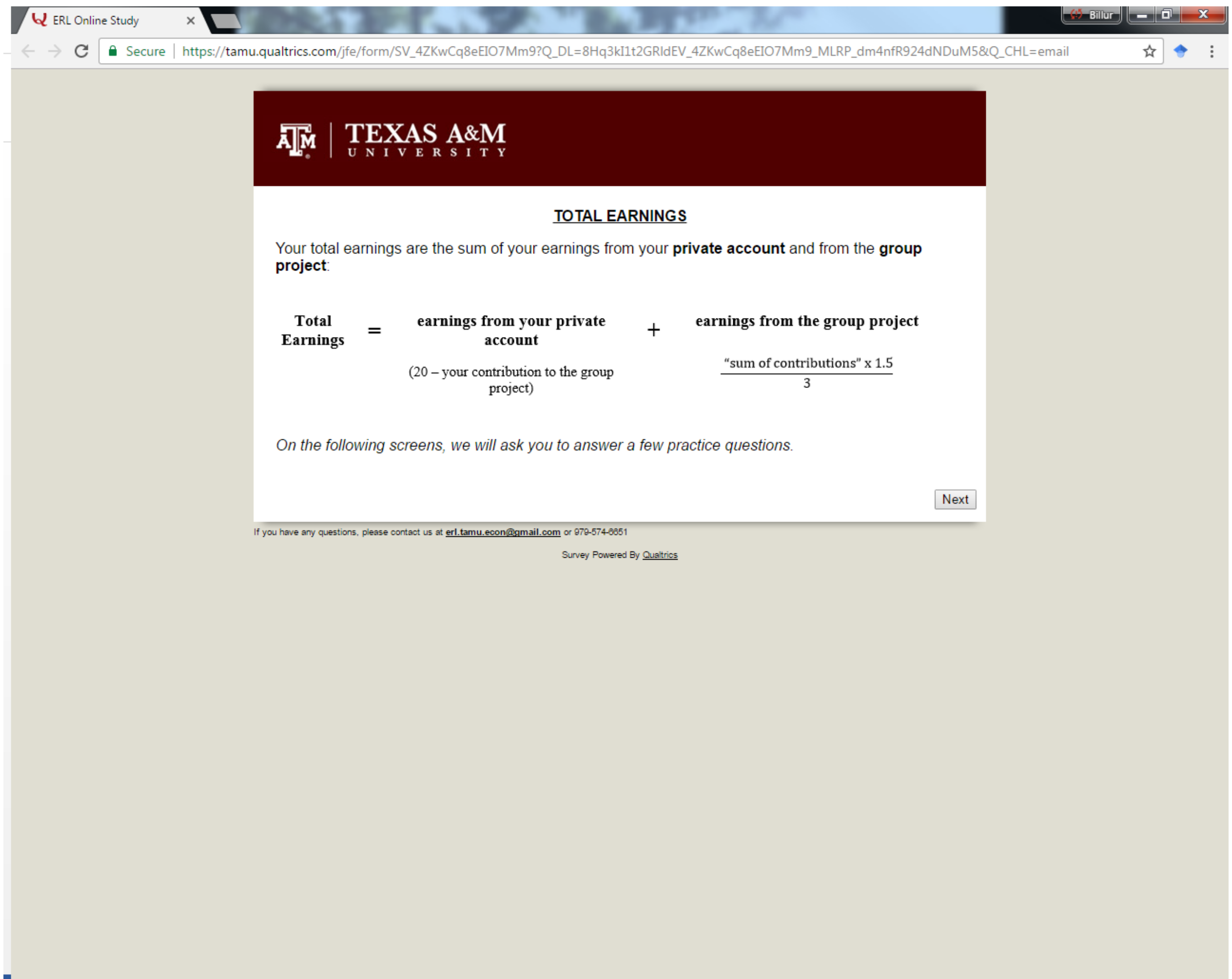

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TEXAS A&M UNIVERSITY

TOTAL EARNINGS

Your total earnings are the sum of your earnings from your **private account** and from the **group project**:

Total Earnings	=	**earnings from your private account**	+	**earnings from the group project**
		(20 – your contribution to the group project)		$\frac{\text{“sum of contributions” x 1.5}}{3}$

On the following screens, we will ask you to answer a few practice questions.

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-6651

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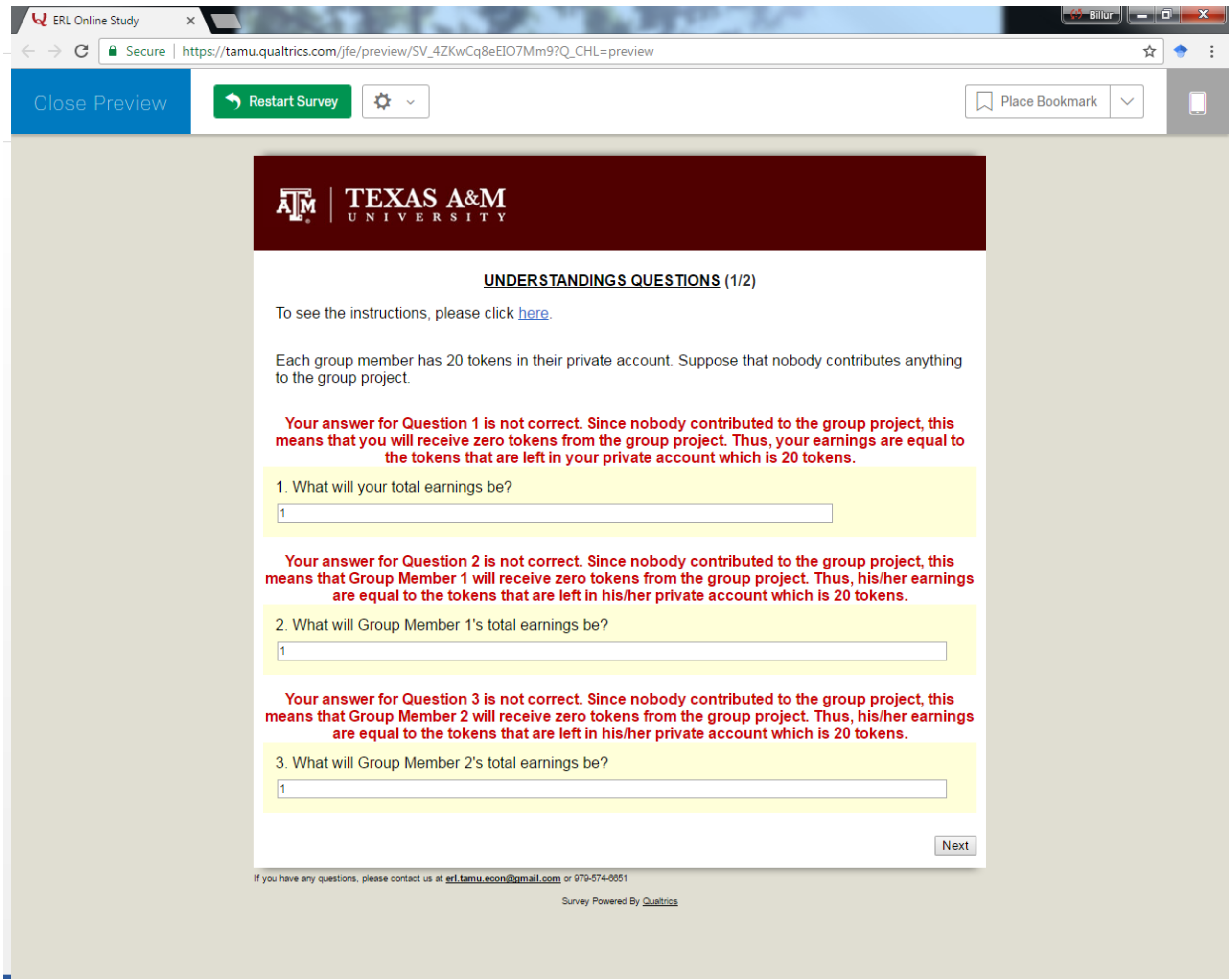

UNDERSTANDINGS QUESTIONS (1/2)

To see the instructions, please click here.

Each group member has 20 tokens in their private account. Suppose that nobody contributes anything to the group project.

Your answer for Question 1 is not correct. Since nobody contributed to the group project, this means that you will receive zero tokens from the group project. Thus, your earnings are equal to the tokens that are left in your private account which is 20 tokens.

1. What will your total earnings be?

1

Your answer for Question 2 is not correct. Since nobody contributed to the group project, this means that Group Member 1 will receive zero tokens from the group project. Thus, his/her earnings are equal to the tokens that are left in his/her private account which is 20 tokens.

2. What will Group Member 1's total earnings be?

1

Your answer for Question 3 is not correct. Since nobody contributed to the group project, this means that Group Member 2 will receive zero tokens from the group project. Thus, his/her earnings are equal to the tokens that are left in his/her private account which is 20 tokens.

3. What will Group Member 2's total earnings be?

1

Next

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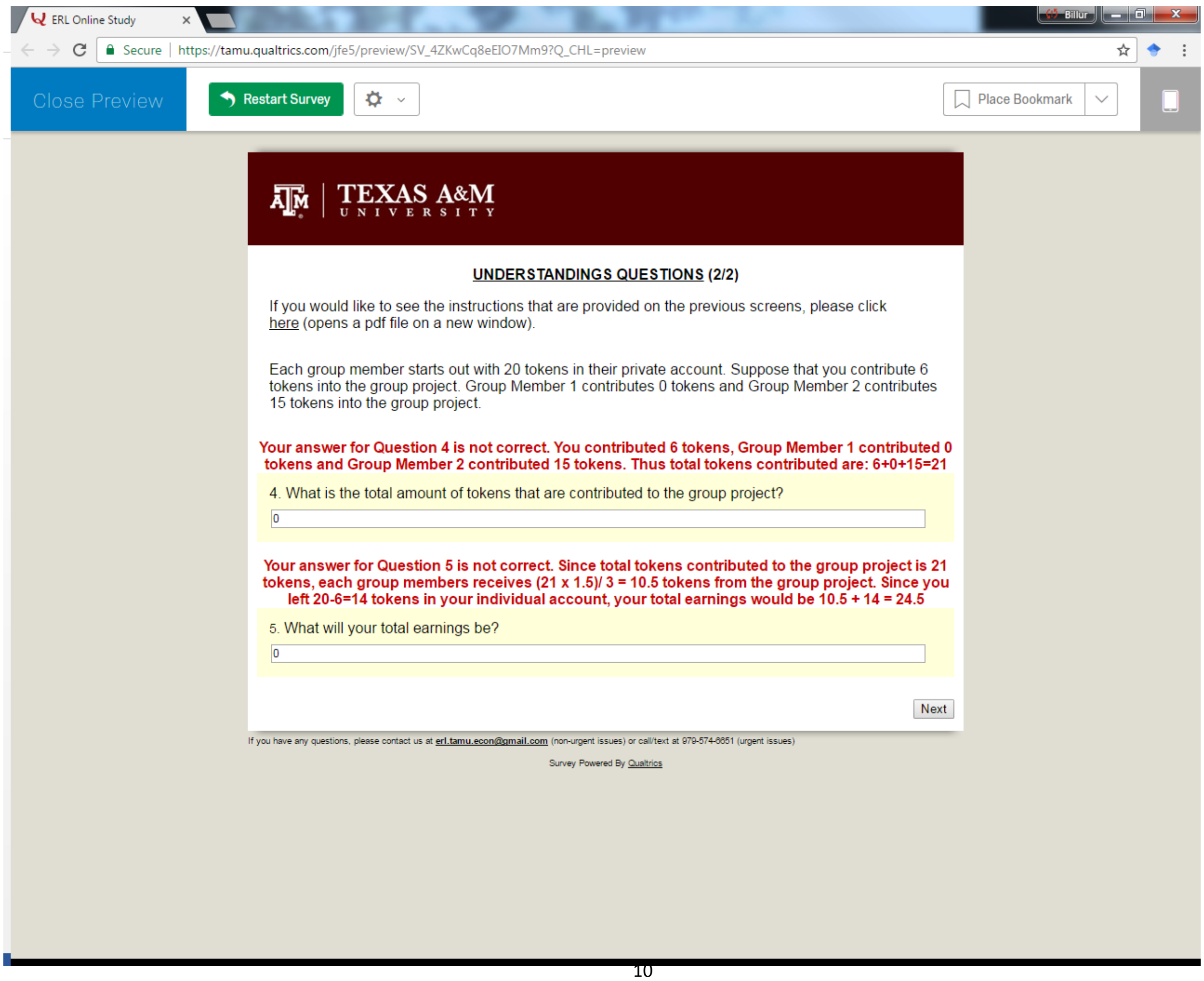
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TEXAS A&M UNIVERSITY
UNDERSTANDINGS QUESTIONS (2/2)
If you would like to see the instructions that are provided on the previous screens, please click here (opens a pdf file on a new window).
Each group member starts out with 20 tokens in their private account. Suppose that you contribute 6 tokens into the group project. Group Member 1 contributes 0 tokens and Group Member 2 contributes 15 tokens into the group project.
Your answer for Question 4 is not correct. You contributed 6 tokens, Group Member 1 contributed 0 tokens and Group Member 2 contributed 15 tokens. Thus total tokens contributed are: 6+0+15=21
4. What is the total amount of tokens that are contributed to the group project?
0
Your answer for Question 5 is not correct. Since total tokens contributed to the group project is 21 tokens, each group members receives (21 x 1.5)/ 3 = 10.5 tokens from the group project. Since you left 20-6=14 tokens in your individual account, your total earnings would be 10.5 + 14 = 24.5
5. What will your total earnings be?
0
Next
If you have any questions, please contact us at erl.tamu.econ@gmail.com (non-urgent issues) or call/text at 979-574-6651 (urgent issues)
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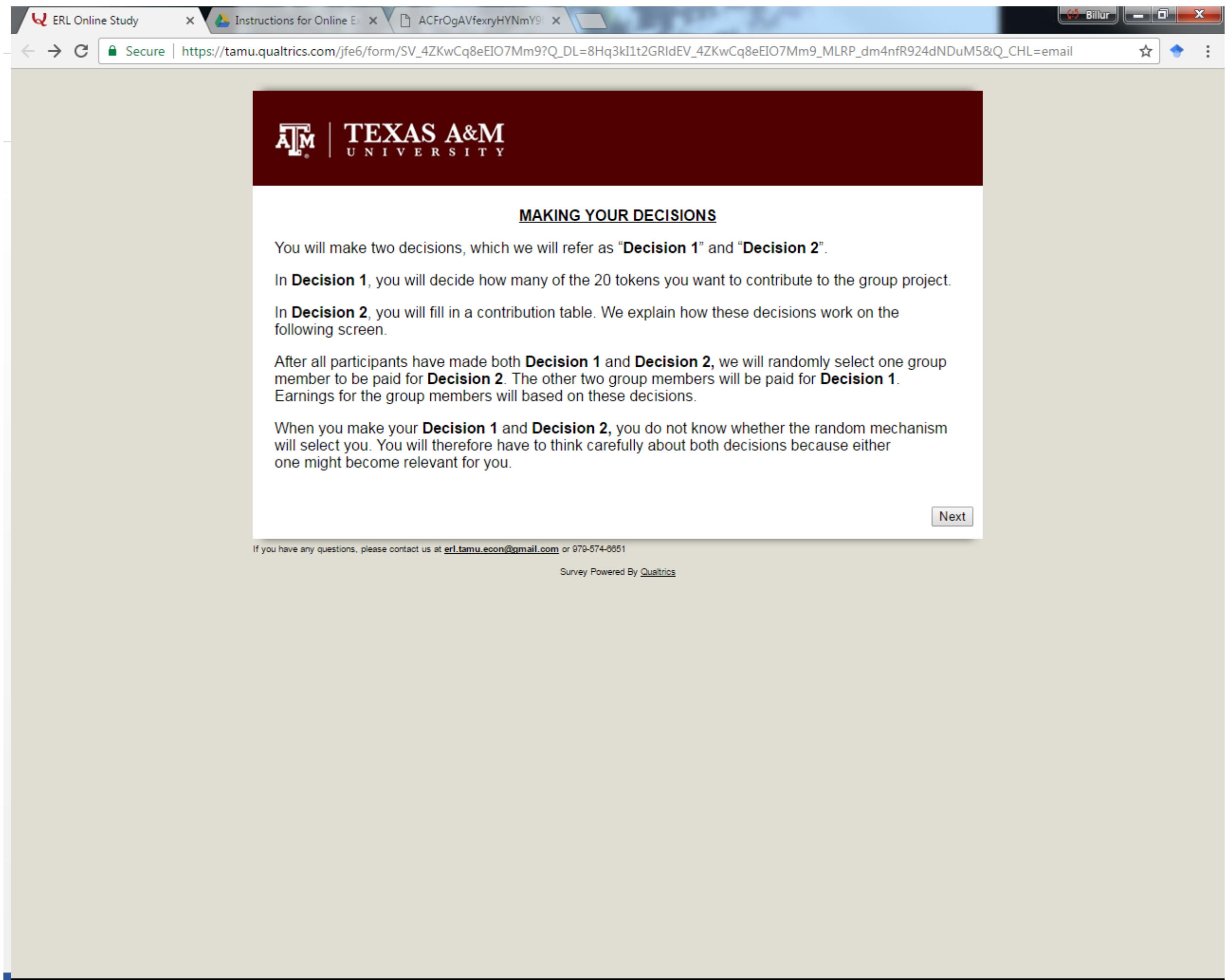
10



TEXAS A&M UNIVERSITY

MAKING YOUR DECISIONS

You will make two decisions, which we will refer as "**Decision 1**" and "**Decision 2**".

In **Decision 1**, you will decide how many of the 20 tokens you want to contribute to the group project.

In **Decision 2**, you will fill in a contribution table. We explain how these decisions work on the following screen.

After all participants have made both **Decision 1** and **Decision 2,** we will randomly select one group member to be paid for **Decision 2**. The other two group members will be paid for **Decision 1**. Earnings for the group members will based on these decisions.

When you make your **Decision 1** and **Decision 2,** you do not know whether the random mechanism will select you. You will therefore have to think carefully about both decisions because either one might become relevant for you.

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-6651

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11

TEXAS A&M UNIVERSITY

DECISION 1: Description

For **Decision 1**, you will see the following screen:

DECISION 1

Now, we ask you to make your contribution decision for **Decision 1**.

You have 20 tokens in your private account. Below, we ask you to make your contribution decision to the group project. Your contribution could be any whole number from 0 to 20.

Remember:

- You will earn 1 token for each token you keep in your private account.
- Your earnings from the group project will be:

$$\text{Earnings from the Group Project} = \frac{\text{"Sum of Contributions" x (1.5)}}{3}$$

How many tokens would you like to contribute to the group project?

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-6651

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12

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DECISION 2: Description

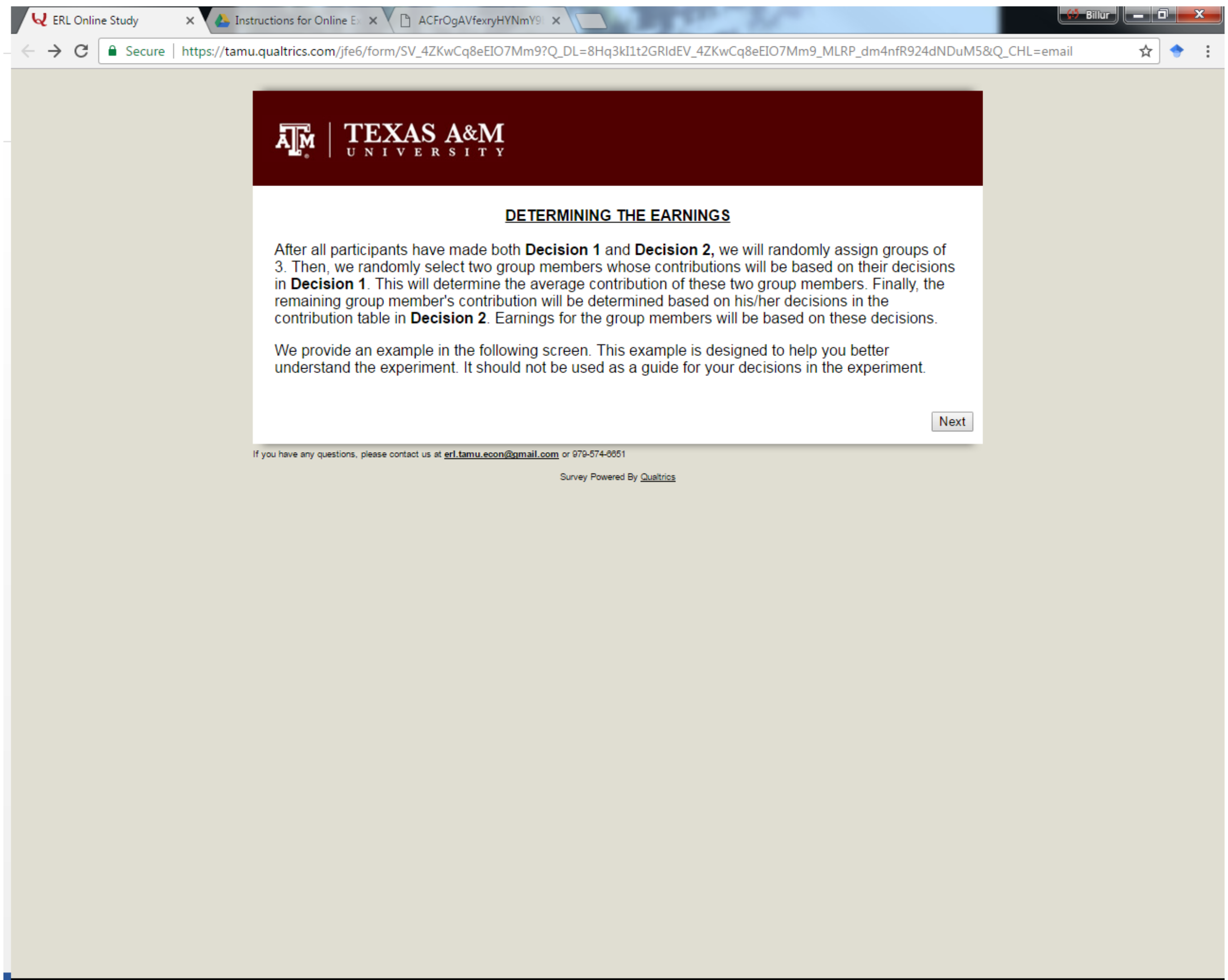
In **Decision 2**, you will be asked to fill in a **contribution table** where you indicate how many tokens you want to contribute to the group project for each possible average contribution from your group members (rounded to the next integer) in **Decision 1**. This will be immediately clear to you if you take a look at the following table:

Please indicate how many tokens (if any) you would like to contribute, for each possible average tokens contributed by other two group members:

	Your Contribution
if others' average contribution is 0 tokens	
if others' average contribution is 1 tokens	
if others' average contribution is 2 tokens	
if others' average contribution is 3 tokens	
if others' average contribution is 4 tokens	
if others' average contribution is 5 tokens	
if others' average contribution is 6 tokens	
if others' average contribution is 7 tokens	
if others' average contribution is 8 tokens	
if others' average contribution is 9 tokens	
if others' average contribution is 10 tokens	
if others' average contribution is 11 tokens	
if others' average contribution is 12 tokens	
if others' average contribution is 13 tokens	
if others' average contribution is 14 tokens	
if others' average contribution is 15 tokens	
if others' average contribution is 16 tokens	
if others' average contribution is 17 tokens	
if others' average contribution is 18 tokens	
if others' average contribution is 19 tokens	
if others' average contribution is 20 tokens	

You simply have to state how many tokens you will contribute to the group project into each input box, conditional on the corresponding average contribution (rounded up) from your group members. You have to make an entry into each input box. For example, you will state how much you would contribute to the group project if your group members' average contribution is 0 tokens, how much you would contribute if your group members' average contribution is 1 token, etc. You can state any whole number from 0 to 20 in each input box.

13



ERL Online Study

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TEXAS A&M UNIVERSITY

DETERMINING THE EARNINGS

After all participants have made both **Decision 1** and **Decision 2,** we will randomly assign groups of 3. Then, we randomly select two group members whose contributions will be based on their decisions in **Decision 1**. This will determine the average contribution of these two group members. Finally, the remaining group member's contribution will be determined based on his/her decisions in the contribution table in **Decision 2**. Earnings for the group members will be based on these decisions.

We provide an example in the following screen. This example is designed to help you better understand the experiment. It should not be used as a guide for your decisions in the experiment.

Next

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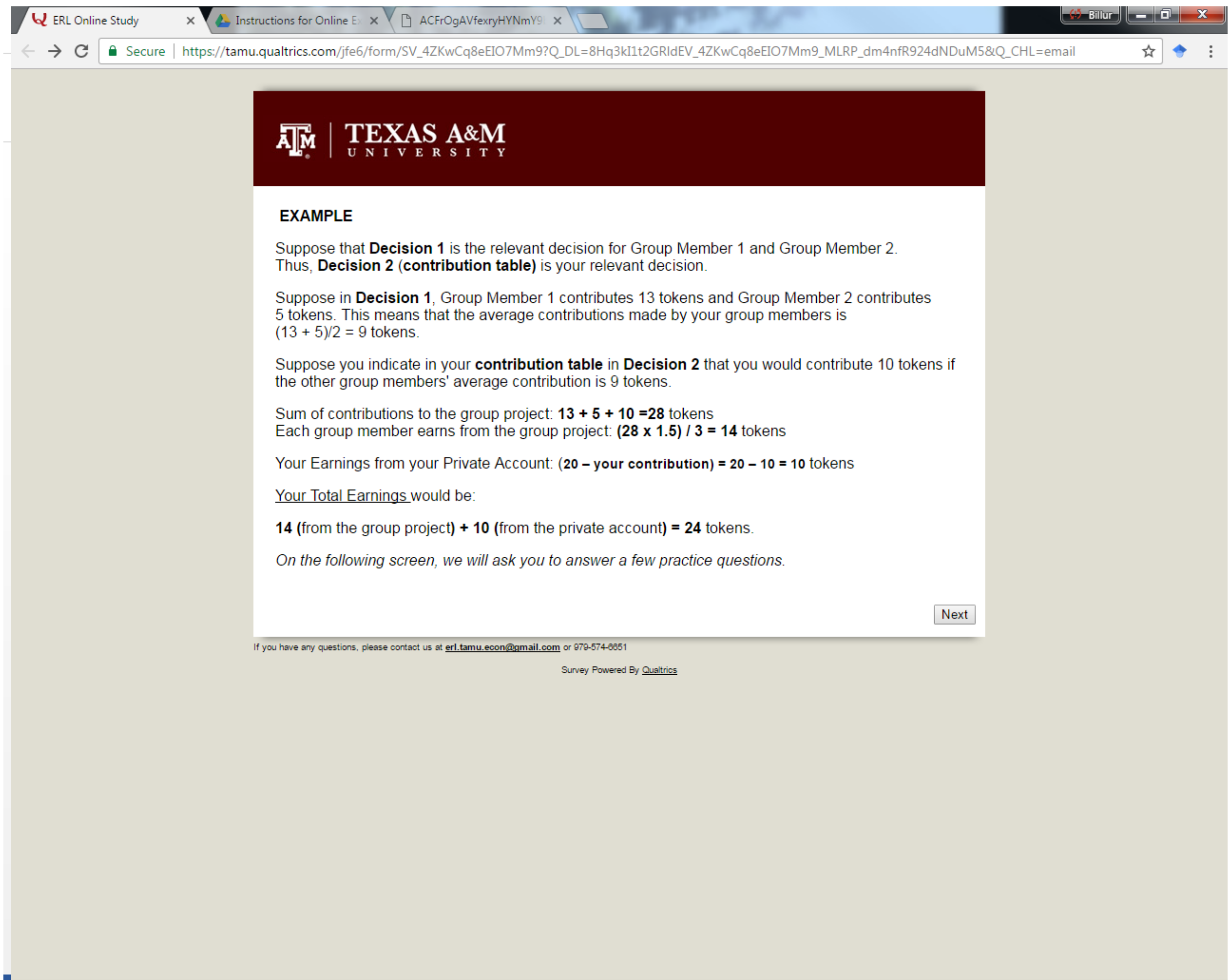

TEXAS A&M UNIVERSITY

EXAMPLE

Suppose that **Decision 1** is the relevant decision for Group Member 1 and Group Member 2. Thus, **Decision 2** (**contribution table)** is your relevant decision.

Suppose in **Decision 1**, Group Member 1 contributes 13 tokens and Group Member 2 contributes 5 tokens. This means that the average contributions made by your group members is (13 + 5)/2 = 9 tokens.

Suppose you indicate in your **contribution table** in **Decision 2** that you would contribute 10 tokens if the other group members' average contribution is 9 tokens.

Sum of contributions to the group project: **13 + 5 + 10 =28** tokens
Each group member earns from the group project: **(28 x 1.5) / 3 = 14** tokens

Your Earnings from your Private Account: **(20 – your contribution) = 20 – 10 = 10** tokens

Your Total Earnings would be:

14 (from the group project**) + 10 (**from the private account**) = 24** tokens.

On the following screen, we will ask you to answer a few practice questions.

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-8651

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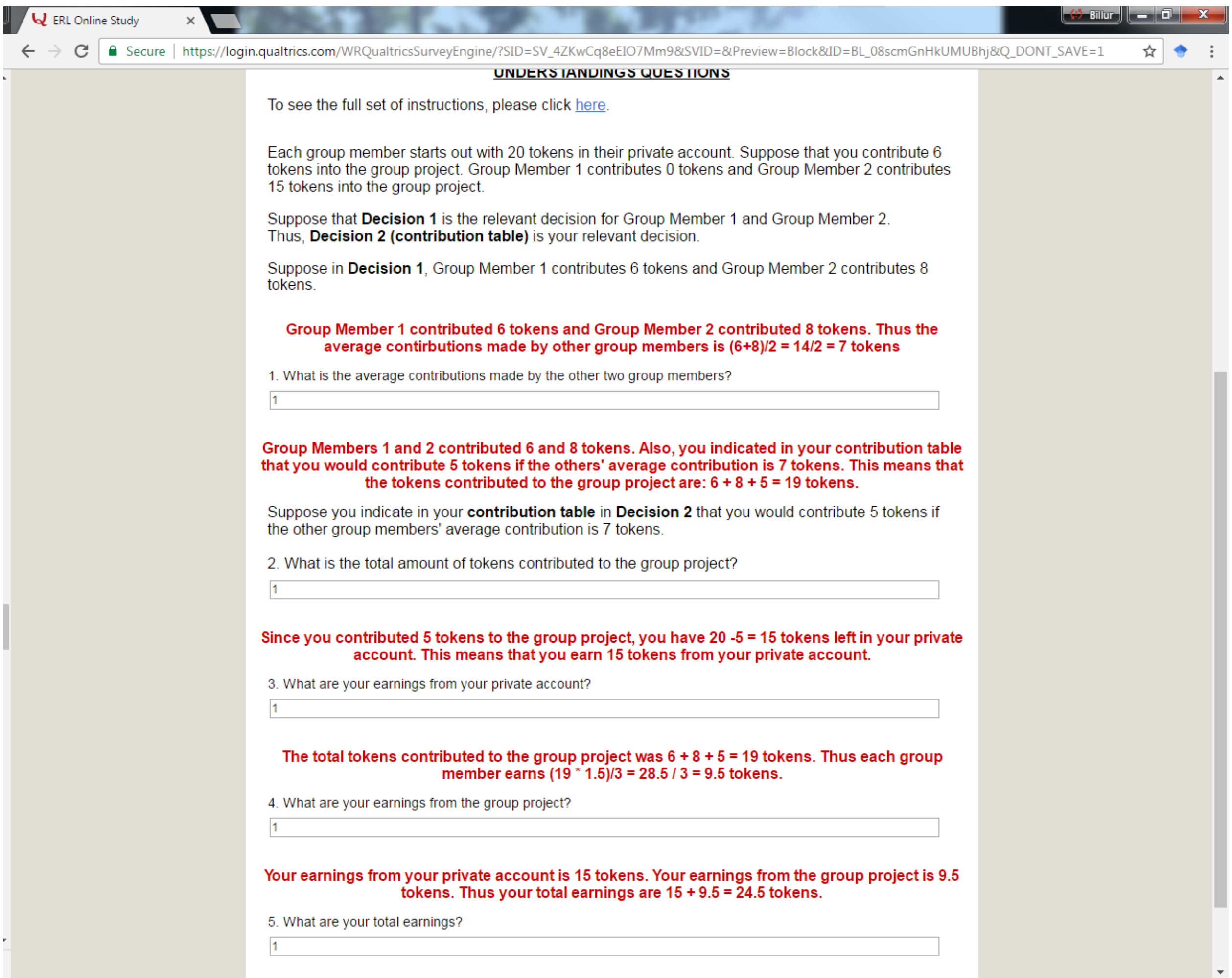

ERL Online Study

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UNDERSTANDINGS QUESTIONS

To see the full set of instructions, please click here.

Each group member starts out with 20 tokens in their private account. Suppose that you contribute 6 tokens into the group project. Group Member 1 contributes 0 tokens and Group Member 2 contributes 15 tokens into the group project.

Suppose that **Decision 1** is the relevant decision for Group Member 1 and Group Member 2. Thus, **Decision 2 (contribution table)** is your relevant decision.

Suppose in **Decision 1**, Group Member 1 contributes 6 tokens and Group Member 2 contributes 8 tokens.

Group Member 1 contributed 6 tokens and Group Member 2 contributed 8 tokens. Thus the average contirbutions made by other group members is (6+8)/2 = 14/2 = 7 tokens

1. What is the average contributions made by the other two group members?

1

Group Members 1 and 2 contributed 6 and 8 tokens. Also, you indicated in your contribution table that you would contribute 5 tokens if the others' average contribution is 7 tokens. This means that the tokens contributed to the group project are: 6 + 8 + 5 = 19 tokens.

Suppose you indicate in your **contribution table** in **Decision 2** that you would contribute 5 tokens if the other group members' average contribution is 7 tokens.

2. What is the total amount of tokens contributed to the group project?

1

Since you contributed 5 tokens to the group project, you have 20 -5 = 15 tokens left in your private account. This means that you earn 15 tokens from your private account.

3. What are your earnings from your private account?

1

The total tokens contributed to the group project was 6 + 8 + 5 = 19 tokens. Thus each group member earns (19 * 1.5)/3 = 28.5 / 3 = 9.5 tokens.

4. What are your earnings from the group project?

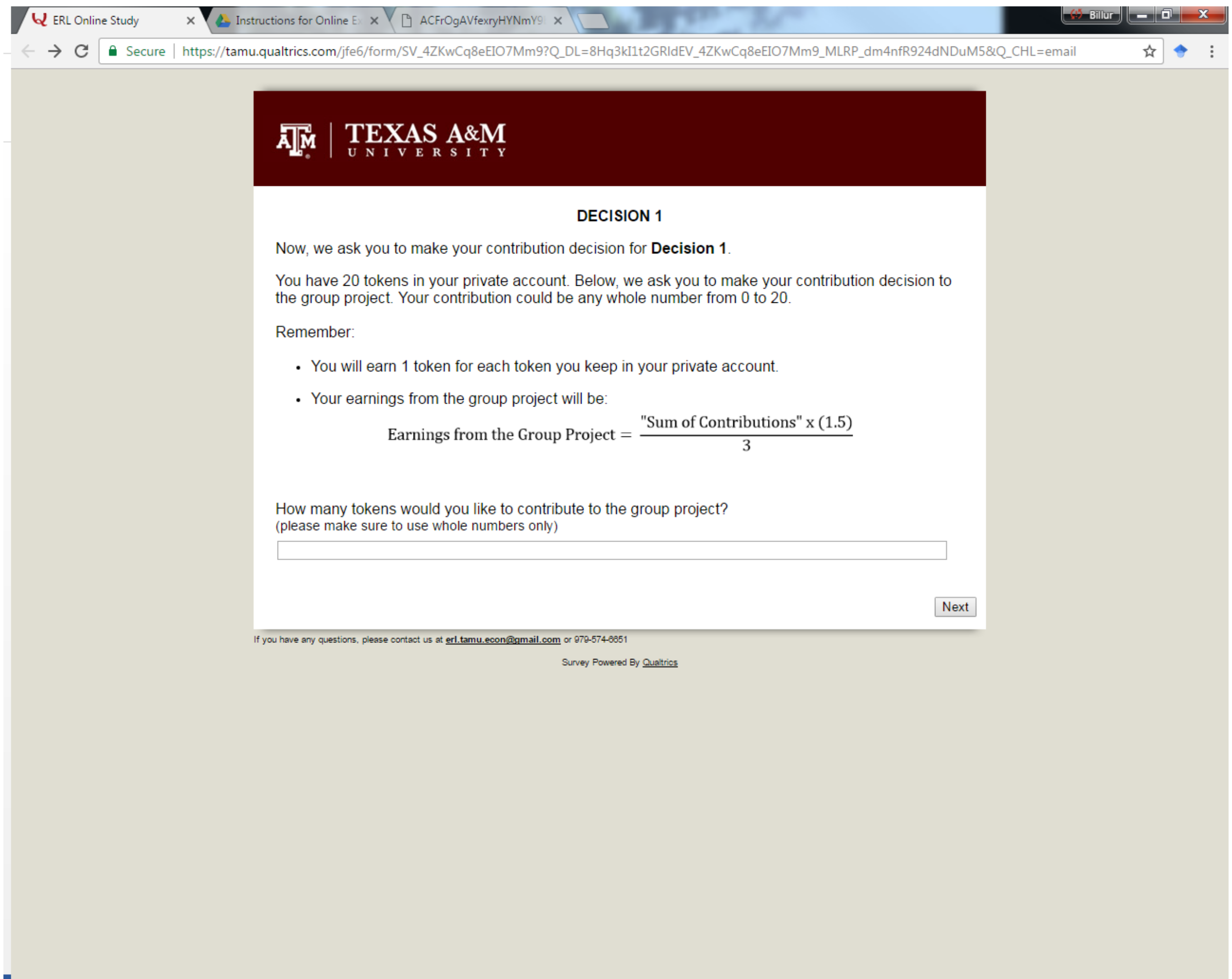
1

Your earnings from your private account is 15 tokens. Your earnings from the group project is 9.5 tokens. Thus your total earnings are 15 + 9.5 = 24.5 tokens.

5. What are your total earnings?

1

16



TEXAS A&M UNIVERSITY

DECISION 1

Now, we ask you to make your contribution decision for **Decision 1**.

You have 20 tokens in your private account. Below, we ask you to make your contribution decision to the group project. Your contribution could be any whole number from 0 to 20.

Remember:

- You will earn 1 token for each token you keep in your private account.
- Your earnings from the group project will be:

$$\text{Earnings from the Group Project} = \frac{\text{"Sum of Contributions" x (1.5)}}{3}$$

How many tokens would you like to contribute to the group project?
(please make sure to use whole numbers only)

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-6651

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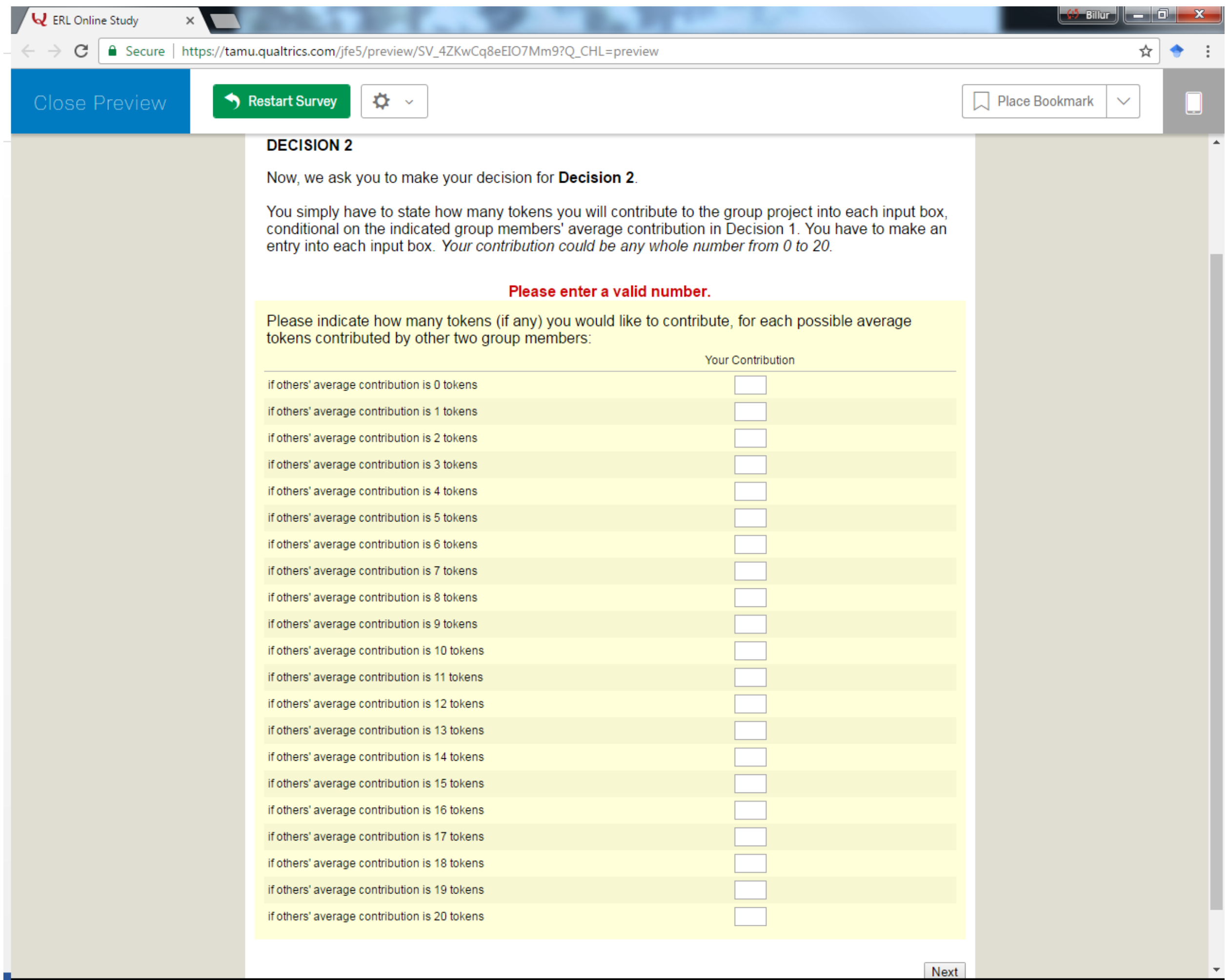
17



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DECISION 2

Now, we ask you to make your decision for **Decision 2**.

You simply have to state how many tokens you will contribute to the group project into each input box, conditional on the indicated group members' average contribution in Decision 1. You have to make an entry into each input box. *Your contribution could be any whole number from 0 to 20.*

Please enter a valid number.

Please indicate how many tokens (if any) you would like to contribute, for each possible average tokens contributed by other two group members:

	Your Contribution
if others' average contribution is 0 tokens	
if others' average contribution is 1 tokens	
if others' average contribution is 2 tokens	
if others' average contribution is 3 tokens	
if others' average contribution is 4 tokens	
if others' average contribution is 5 tokens	
if others' average contribution is 6 tokens	
if others' average contribution is 7 tokens	
if others' average contribution is 8 tokens	
if others' average contribution is 9 tokens	
if others' average contribution is 10 tokens	
if others' average contribution is 11 tokens	
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if others' average contribution is 20 tokens	

Next

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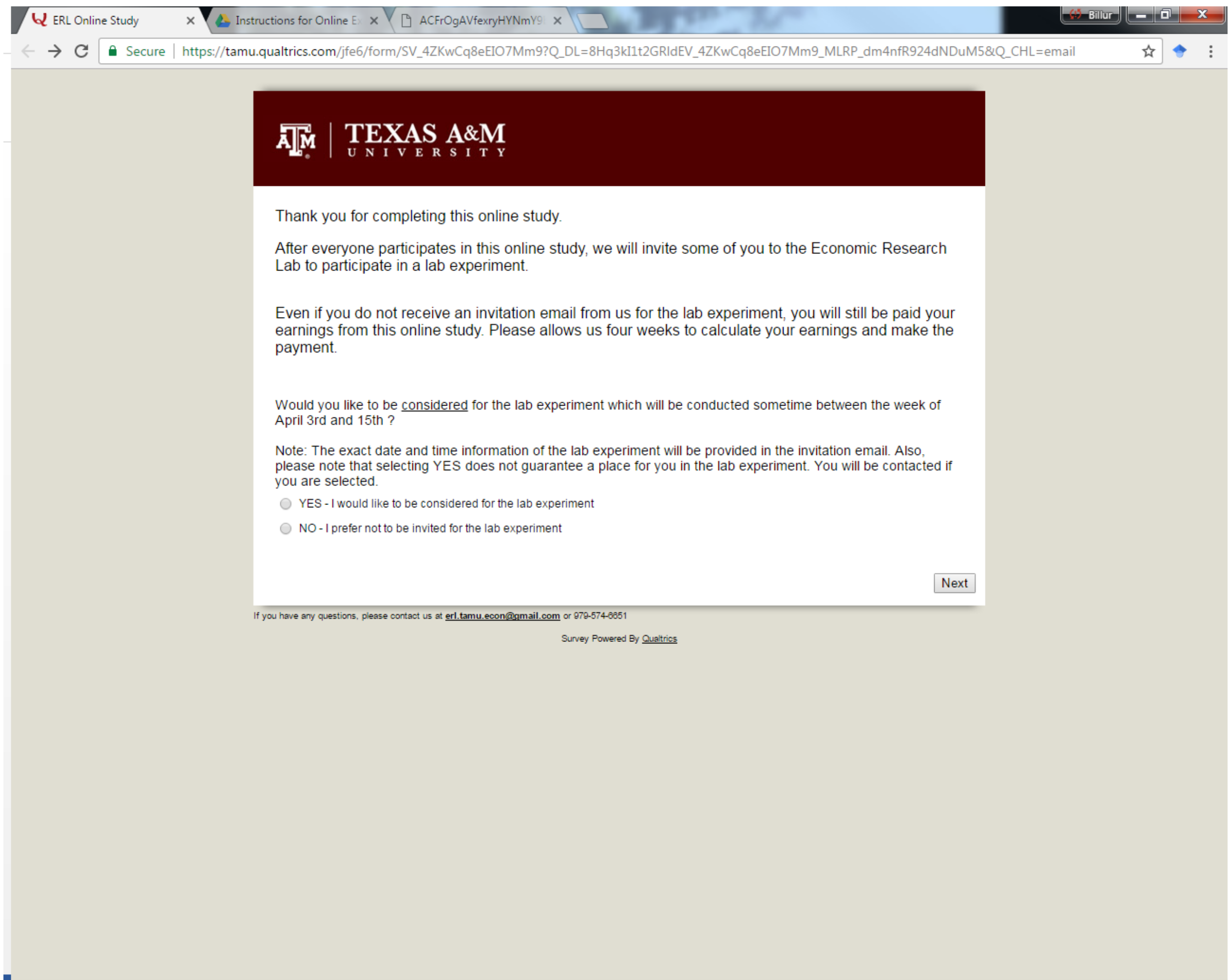

TEXAS A&M UNIVERSITY

Thank you for completing this online study.

After everyone participates in this online study, we will invite some of you to the Economic Research Lab to participate in a lab experiment.

Even if you do not receive an invitation email from us for the lab experiment, you will still be paid your earnings from this online study. Please allows us four weeks to calculate your earnings and make the payment.

Would you like to be considered for the lab experiment which will be conducted sometime between the week of April 3rd and 15th ?

Note: The exact date and time information of the lab experiment will be provided in the invitation email. Also, please note that selecting YES does not guarantee a place for you in the lab experiment. You will be contacted if you are selected.

- YES - I would like to be considered for the lab experiment
- NO - I prefer not to be invited for the lab experiment

Next

If you have any questions, please contact us at erl.tamu.econ@gmail.com or 979-574-6651

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19