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When Equality Trumps Reciprocity

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Abstract: Inequity aversion and reciprocity have been identified as two primary motivations underlying human decision making. However, because income and wealth inequality exist to some degree in all societies, these two key motivations can point to different decisions. In particular, when a beneficiary is less wealthy than a benefactor, a reciprocal action can lead to greater inequality. In this paper we report data from a trust game variant where trustees' responses to kind intentions generate inequality in favor of investors. In relation to a standard trust game treatment where trustees' responses reduce inequality, the proportion of non-reciprocal decisions is twice as large when reciprocity promotes inequality. Moreover, we find investors expect that this will be the case. Overall, we find a majority (more than half) of trustees do not reciprocate when reciprocity increases inequality that favors investors. Our results call attention to the potential importance of inequality in principal-agent relationships and have important implications for policies aimed at promoting cooperation.

JEL classification: C91; C72; D63

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I. Introduction

Research in economics, psychology, and sociology provides compelling evidence that people often make decisions inconsistent with monetary earnings-maximization. From this observation has emerged a substantial empirical and theoretical literature seeking to improve our understanding of human decision making. This literature points to inequity aversion and reciprocity as important motivations underlying human decisions (see, Fehr and Gächter, 2000). These two motives, however, do not always offer convergent implications for decision-making. In particular, if a beneficiary is less wealthy than his benefactor, his reciprocal action might actually increase inequality. Given that inequality is ubiquitous in human societies in general, and that it typically exists in principal-agent relationships in particular, it is perhaps surprising that little previous research has attempted to characterize decision making when equality and reciprocity are in conflict. To our knowledge, this paper provides the first direct evidence on decision making in environments where inequality aversion and reciprocity have divergent behavioral implications.

Plentiful evidence shows that humans are averse to inequitable outcomes (Walster, Walster and Berscheid, 1978), and are willing to incur costs to reduce inequality between themselves and their counterparts (see. Güth, et al.,1982). On the other hand, substantial evidence also reveals that inequality aversion cannot fully explain behavior, and that intention as well as expectations about others' behavior, also matter (e.g. Blount, 1995; Charness and Haruvy, 2002; Cox, 2004; Andreoni, Brown and Vesterlund, 2002; Bolton, Brandts and Ockenfels, 2003; Houser, et al., 2008; Falk, Fehr and Fischbacher, 2008; Bicchieri and Chavez, 2008). For example, people tend to

respond more negatively to an unequal outcome that is the result of an intentional choice than to an unequal outcome brought about by nature. Individuals seem disposed to positively reciprocate kind intentions, and to display negative reciprocity in response to hostile intentions. This is the case even when the reciprocal acts yield no future or current monetary payoffs and might even be costly (Fehr and Gächter, 2000).

Reciprocity relationships between principals and agents have been widely studied. Agents' reciprocating the good intentions of principals plays an important role in promoting cooperative relationships in economic exchanges (Berg, Dickhaut and McCabe, 1995). On the other hand, a principal (e.g. an employer) might often be wealthier than his agent, so that reciprocation would also increase the wealth or earnings inequality between them. In this case one's propensity to reciprocate could potentially be reduced, thus undermining mutual trust. Understanding how people behave when equality and reciprocity motives are at odds is important for designing institutions or policies that promote public cooperation and trust. Previous research aimed studying these two motives, however, cannot inform behavior under this conflict.

This paper focuses on the case where reciprocating kind intentions (i.e., positive reciprocity) is at odds with inequality aversion. Our baseline experiment is similar to a standard trust game. An investor and a trustee are both given the same initial endowment. The investor decides whether to transfer a preset amount to the trustee. The trustee receives the tripled transfer amount and decides whether to transfer back any amount to the investor. In this case, any reciprocal return from the trustee to the investor that is less than or equal to two-third of the tripled transfer amount also reduces inequality.

In our second treatment, asymmetry treatment, the trustee receives the same endowment as in the baseline treatment, but the investor is given relatively more, so that both investor and trustee earn equal amounts in the event that the investor decides to transfer a preset amount and the trustee returns zero. Thus, any positive return by the trustee increases inequality. We find a majority (more than 50%) of trustees reciprocate in the baseline treatment, while a majority do not reciprocate in our second treatment where equality conflicts with reciprocity.[1]

The remainder of this paper is organized as follows. We discuss related literature in section II. Our experimental design is presented in section III. Section IV defines reciprocity, inequality aversion and what each motive predicts in our experiment. Sections V and VI report and discuss the results, respectively.

II. Background

II.1. Theories of Reciprocity and Inequity Aversion

Over the past decades, experimental data have repeatedly shown that subjects' decisions often violate the common auxiliary hypothesis of monetary payoffs maximization. In ultimatum games, for example, a proposer suggests how to split a certain amount of money and a responder decides whether to accept or reject the offer. It turns out that responders often reject selfish offers, with the result that both players get nothing (Güth et al., 1982).

[1] Charness and Rabin (2002) conducted a series of experiments to differentiate motives including social welfare, reciprocity and difference aversion (similar to the inequality aversion we study here). They found that individuals' behavior in some of the games suggests that people are willing to sacrifice inequality aversion to reciprocate good intentions if reciprocity is not costly to them, i.e., if reciprocating does not reduce their payoffs. In this paper, as we discuss later on, reciprocity is defined as costly behavior.

In a one-shot trust game (Berg, Dickhaut and McCabe, 1995), both investor and trustee receive an equal endowment, e.g., $10. The investor first decides how much of her endowment to transfer to the trustee, who then receives the tripled transfer amount. After receiving it, the trustee decides how much of the tripled transfer amount to send back to the investor. It has been found that investors typically transfer a positive amount and that trustees typically return at least the amount transferred (Camerer, 2003).

Scholars have developed a number of economic models to explain these observations. Inequality aversion models argue that a person's utility depends not only on his monetary payoff but also on other individuals' monetary payoffs in relation to his own. In this context, Bolton and Ockenfels (2000) assume that the disutility of inequality is symmetric regardless of who receives the higher payoffs. Fehr and Schmidt (1999) instead argue that individuals have a stronger aversion to disadvantageous (i.e., one has less than others) inequality than to advantageous inequality (also see, Loewenstein, Thompson and Bazerman, 1989).

Whereas models of inequality aversion focus exclusively on outcomes, reciprocity models also take intentions into account. Reciprocity means that one responds to perceived kindness with kindness (i.e., positive reciprocity) and to perceived spite with spite (i.e., negative reciprocity). In Rabin (1993), reciprocity affects decisions and, one's payoff depends not only on one's actions, but also on one's beliefs regarding the other party's kindness or lack thereof.[2]

Since reciprocity is related to kindness, it is important to be clear about what we mean by kindness. According to Rabin (1993), a player *i* is kind if she believes that her

[2] See also Dufwenberg and Kirchsteiger (2004) for a similar model for extensive form games.

choice will give player *j* a payoff that exceeds the fair payoff.[3] For player *i*, the perceived kindness of *j* is defined as follows: player *i* believes player *j* is kind to the extent that, given the belief of player *i* about the strategy choice of player *j*, player *i* believes that player *j* believes he/she is granting *i* a payoff higher than the fair payoff. The exact definition of kindness varies in the literature. For example, Falk and Fischbacher (2006) combine concerns for outcome equity with reciprocity. In their model, player *i* believes that *j* is acting kindly/unkindly if she thinks that *j* wants her to get more/less than *j* keeps for herself.

II.2. Evidence of Reciprocity and Inequity Aversion

In traditional games, such as the standard trust and ultimatum games, an unequal outcome is often the result of a player's choice. Thus, sensitivity to intentions coexists with aversion to unequal payoff distributions. Consequently, these games cannot offer sufficient evidence to differentiate between these two motives (and the respective theories). Recently, however, experiments have been designed to isolate one motive from the other. For example, Dawes et al. (2007) designs an interesting experiment that isolates egalitarian motives. They find that people are willing to pay costs to achieve equal outcome even when there are no opportunities for reciprocity. As we mentioned earlier, reciprocity can be positive or negative. This paper focuses on positive reciprocity

[3] A fair payoff is defined as the average of the highest and lowest payoffs, excluding Pareto-dominated payoff pairs.

and inequality aversion. We next describe research aimed at distinguishing these two motives[4].

For example, Cox (2004) designed a triadic game to sort out the motivations of investors and trustees in the trust game. To differentiate positive reciprocity from inequality aversion or other unconditional other-regarding preferences potentially held by the trustee, Cox compared trustees' behavior in a standard trust game with a new treatment where the investors' intentions are removed. Investors in the new treatment are given an amount of money equal to the money the investors hold after making a transfer in the standard trust game, so that the payoff distributions before the trustees' decisions are kept the same between the two treatments. Cox finds that both inequality aversion and positive reciprocity can account for trustees' return behavior.[5] As discussed below, however, Cox's study does not inform how trustees make decisions when reciprocity increases inequality.

Charness and Haruvy (2002) conducted a gift-exchange experiment. They compared the employee's decisions when the wage is given by the employer with the employee's decision when the wage is randomly decided. They found that reciprocity, distributive concerns and altruistic considerations all play a significant role in employees' decisions. Also, Falk, Fehr and Fischbacher (2008) study both positive and negative reciprocity in a moonlighting game where a player can take money from or pass money to her counterpart, who can either return money to or punish the player. They find that both reciprocity and inequality aversion play a role in decision making.

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[4] Interesting research differentiating inequality aversion from negative reciprocity such as punishment include Blount (1995), Brandts and Solà,(2001), Bolton, Brandts and Ockenfels (1998), Fowler, et al. (2005) and Nelson, (2002).

[5] For related work, see also McCabe, Rigdon and Smith (2003); Charness (2004).

Most previous research, as we noted above, identifies the roles of equity and reciprocity motives by comparing a treatment that allows both reciprocity and inequality aversion to a treatment that excludes reciprocity motives. The data point to the importance of both equity and reciprocity. Such data, however, cannot and are not meant to tell how reciprocity and inequality aversion affect decision making when these two motivations are in conflict.

To our knowledge, few studies of trust games have involved asymmetric investor and trustee endowments (see, e.g., Anderson, Mellor and Milyo, 2006; Brülhard and Usunier, 2007; Glaeser, et al., 2000; Greiner, Ockenfels and Werner, 2007; Johansson-Stenman, Mahmud and Martinsson, 2005). In principle, such studies could have included cases where a trustee faces conflicting equality and reciprocity motives. However, all of these studies focus on trust, without providing the necessary variations to compare trustees' decisions when equality and reciprocity are in conflict against trustees' decisions in cases where these two motives are mutually reinforcing.

For example, in a trust game studied by Glaeser et al. (2000), an investor is given $15 and her trustee is given zero. Any amount transferred from the investor to the trustee is doubled; therefore, when the investor transfers $5 or less, a reciprocal return from the trustee increases inequality. Consequently, in this case the two motives are incompatible. Note, however, that this incompatibility occurs only when the trustee receives a transfer amount of $5 or less. For any transfer amount greater than $5, there is no incompatibility between equality and reciprocity motives.

Because trustees' wealth differs between the compatible/incompatible motives environments, this wealth effect constitutes a confounding element. That is, the

difference in trustees' returns in the two environments could be due to the relative importance of the two motives, or to a wealth effect. The experiment we describe below is designed to avoid such confounds. It provides particularly clean evidence on decision making in environments where equality and reciprocity motives cannot be reconciled.

III. Experiment Design

We are interested in potential conflicts between positive reciprocity and inequity aversion. Trust games offer a good starting point for studying such conflicts. Our experiment consists of two treatments. Subjects participated in only one of the treatments. In the baseline treatment, similar to the standard trust game, the investor and the trustee are given equal endowments. In the asymmetric endowment treatment, however, the trustee is given a lesser endowment than the investor. In this treatment, reciprocity and inequity aversion lead to very different decisions. Comparing trustees' return amounts between these two treatments enables us to draw inferences about decision making in environments where reciprocity and inequality aversion are incompatible motives.

III. A. Baseline Treatment

In the baseline treatment, both the investor and the trustee are given 40E$ (experiment dollars; we used an exchange rate of 5E$=$1). The investor can transfer either 0E$ or 10E$ to the trustee. If the investor transfers 10E$, then her trustee receives 30E$. After observing the transfer amount, the trustee may send back an amount of money to her investor. The amount sent back can be any multiple of 5 between 0 and 30. The treatment is illustrated in Figure 1(A).

Note that in this treatment, when the investor transfers 10E$, the trustee will have 70E$ in hand, while the investor will have only 30E$. For this reason, any positive back-transfer amount less than or equal to 20E$ reduces earnings inequality and also results in the trustee earning at least as much as the investor (the investor and the trustee have equal earnings when the trustee returns 20E$.)

III. B. Asymmetry treatment

Our asymmetry treatment is identical to the baseline, with the exception that it endows the investor with 80E$. The trustee still receives 40E$. This treatment is illustrated in Figure 1(B). If the investor transfers 10E$ to the trustee, and the trustee sends nothing back, then investor and trustee both earn 70E$. Therefore, any positive amount that the trustee returns to the investor increases earnings inequality to the trustee's disadvantage.

III. C. Expectation Elicitation

We elicited both trustees' and investors' expectations after their decisions (samples of expectations surveys are provided in Appendix B.). Each investor who transferred 10E$, before being informed about the decision of her trustee, was asked to report the amount she believed the trustee would return, as well as the amount she believed the trustee *should* return. An investor earned an additional $1 if the amount her trustee returned matched the amount she reported she believed would be returned.

In addition, trustees whose investors transferred 10E$ were asked to report their beliefs regarding how much their investors expected them to return, as well as what they

believed their investors believed they should return. Trustees were also rewarded according to the accuracy of their answers.

III. D. Experiment Procedures

Subjects were recruited at the University of Pennsylvania using the "Experiments @ Penn" web-based recruitment system. Each subject was randomly assigned the role of investor or trustee.

Each subject was randomly assigned a letter as his or her ID for the duration of the experiment. Investors and trustees holding the same letter were paired together. All subjects received an instruction sheet explaining the rules of the game. Subjects were also given a test to ensure they understood the instructions. The game started after every subject answered the test correctly.

Each subject played the game exactly once. Investors indicated their decisions on decision sheets, wrote their IDs on their decision sheets, and placed the sheets into a blank envelope. After all the investors finished, the experimenter collected all the envelopes and gave each trustee his or her investor's envelope according to the ID. Each trustee saw her investor's decision. If the investor transferred 10E$, the trustee then indicated his or her back-transfer decision on the decision sheet. Each subject was asked to fill out a survey (see Appendix B) after her decision. At the end of the experiment, subjects' earnings were put into envelopes, each of which was marked with an ID letter. Each subject picked up his/her earnings envelope privately. Each subject received a $5 show up bonus in addition to the money earned in the game and the survey ($12 on average). Subjects were in the lab about 40 minutes on average.

Next, we formally define reciprocity and inequality aversion. For both treatments, we derive the behavioral predictions implied by these motives.

IV. Reciprocity vs. Inequality Aversion

IV. A. Inequality Aversion

A trustee can make a decision only when an investor transfers 10E$. There is never a monetary incentive to return a positive amount. In the spirit of the inequality aversion model of Fehr and Schmidt (1999), we say that a trustee's backtransfer is consistent with an *equality motive* if: (1) it is less than the difference between x_1 and x_2, where x_1 and x_2 are the amount the investor and the trustee receive after the investor decides to transfer 10E$, respectively; and 2) it does not leave the trustee earning less than the investor (because trustees have a stronger aversion to disadvantageous inequality than advantageous inequality). Note that Fehr and Schmidt's (1999) model implies that a zero return can be consistent with an equality motive in certain circumstances[6]. This type of inequality aversion, while theoretically possible, is uninteresting for practical purposes. Consequently, in our experiment, by inequality aversion we mean that one is willing to incur at least a 5E$ (or $1) cost to reduce advantageous earnings inequality. We use this definition because 5E$ is the smallest amount that can be sent to another player in our experiment.

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[6] Applying Fehr and Schmidt (1999)'s model into our environment, the trustee's utility for the allocation $X=(x_1+y, x_2-y)$ where y is the backtransfer of trustee is:
$U_2(X)=x_2-\alpha_2 * \max\{[(x_1+y)-(x_2-y)],0\}-\beta_2 * \max\{[(x_2-y)-(x_1+y)],0\}$, where $0\leq \beta_2<1$ and $\beta_2\leq \alpha_2$. Following this formula, the trustee will return

$$y^* = \begin{cases} = \frac{x_2 - x_1}{2}, \text{ if } \beta_2 > \frac{1}{2} \\ \in [0, \frac{x_2 - x_1}{2}], \text{ if } \beta_2 = \frac{1}{2} \\ = 0, \text{ if } \beta_2 < \frac{1}{2} \end{cases}$$

The behavioral implications of an equality motive for trustees are straightforward. Consider first the decision of a trustee who has received 30E$. In the baseline trust game (where each party receives 40E$), a trustee motivated by equality should reduce earnings inequality by returning positive amounts up to 20E$. In the asymmetry treatment, however, the equality motive predicts that a trustee who has received 30E$ should return nothing. The reason is that any positive return will produce disadvantageous earnings inequality.

The implications for the investor with an equality motive are less straightforward. If investors believe that trustees are inequality averse, then there is a range of possible back-transfers that may be chosen by trustees. An investor's decision will depend on the subjective probability distribution she places on the backtransfers that an inequality averse trustee may choose. Nevertheless, in the baseline and asymmetric treatments, both the decision to send 0E$ and the decision to send 10E$ can be reconciled with an equality motive, depending on the investor's degree of inequality aversion and her beliefs about the trustee's degree of inequality aversion. Thus, in contrast with the predictions for trustee behavior, the inequality motive does not provide sharp predictions regarding investor behavior in either treatment (and we will see in section IV. B that the same is true for investors who attribute a reciprocity motive to trustees.)

To see the above point, consider first the (40E$, 40E$) baseline treatment. If an inequality averse investor believes her trustee will return 10E$ or less with probability one, then that investor will not transfer 10E$, because doing so will leave her earning 40E$ or less, and this leads to disadvantageous inequality between the investor and her

trustee. On the other hand, if the investor expects the trustee will return 20E$ with probability one, then the investor will transfer 10E$.

Consider next the treatment with asymmetric endowments (80E$, 40E$). Clearly, it can be the case that an inequality averse investor who also believes that her trustee is inequality averse (and therefore will send back nothing) might prefer to send 10E$ and achieve the equal earnings outcome. Recall, however, that in our experiment, sending 10E$ is the only way for the investor to reduce her advantageous inequality. It is easy to see that investors could, in principle, be willing to sacrifice 5E$ to reduce inequality (consistent with our definition of inequality averse preferences), and yet still prefer to send 0E$ as compared to 10E$. Given that the investors' action space is limited, transfers of both 0E$ and 10E$ are *consistent* with an equity motive.

IV. B. Positive Reciprocity

Following McCabe et al. (2003), we say that a trustee's backtransfer decision is consistent with a *positive reciprocity motive* if the trustee believes the investor's decision was motivated by kindness (i.e., an intention to increase the trustee's payoff). Hence, the trustee transfers back more than the minimum (which in our case is 0E$). It is necessary to clarify two points regarding this definition.

First, it is routine to posit that reciprocally-motivated trustees in standard trust environments, such as our baseline game, will interpret a positive offer as a kind act. It has been suggested that *any* positive transfer will be interpreted as kind, including cases in which the investor expects a substantial return (e.g., 2/3 of the transfer amount). The reason is that the investor takes a risk that is very likely to increase the trustee's monetary

payoff (Camerer, 2003). In the context of our asymmetric treatment, where the investor has a larger endowment than the trustee, this argument has even greater force. In particular, the trustee in the asymmetric environment would not likely believe that the investor wanted a greater return than in the symmetric environment. To the contrary, the trustee probably believes the investor to expect less (indeed, this is what our data suggest.) Consequently, as noted by Rabin (1993),a trustee would perceive the investor's transfer in the asymmetric context as a kinder action than when they believe the transfer was motivated by the investor's desire to maximize her own profit, as in the symmetric endowment case (see also Charness and Haruvy, 2002, for a discussion of this point).

In this paper, we adopt a more conservative approach and assume that reciprocally-motivated trustees in both treatments will associate the same degree of kindness to an investor's decision to transfer 10E$. Since our minimal definition of positive reciprocity does not distinguish between degrees of perceived kindness of transfer, we predict the same positive returns in both treatments. A stronger reciprocity model would instead predict that in the asymmetry treatment the back-transfer would be no less and probably more than what it would be in the (40, 40) case.

A second point to make with respect to our definition is that, as noted by Cox (2004), positive returns in trust games can be motivated by factors (altruism being one) other than reciprocity. What we want to stress here is that a zero return is inconsistent with reciprocity, whereas a positive return is consistent with some degree of reciprocity. [7]

[7] Our definition of positive returns as reciprocity is the weakest possible form of reciprocity. For example, if we were to adopt the kindness definition of Rabin (1993), then the trustee, to be viewed as kind, needs to return more than 15E$ (the average of the highest and the lowest amount the investor could get). Our weaker definition maximizes the probability of finding reciprocal behavior in the asymmetry treatment. Yet we found that reciprocity diminishes significantly when it conflicts with equity.

In view of the above discussion, it follows that trustees motivated only by positive reciprocity should return a positive amount in both treatments, and the returned amounts should be the same on average in each treatment. As to investors, predicting their decisions would require knowing their subjective probability distribution over the trustees' possible backtransfers. For example, investors would be expected to send 10E$ if they believe they will receive a return of at least 10E$ with probability of one. However, if the investor believes the backtransfer will be 5E$ with probability one, then she will send 0E$.[8] Thus, depending on the expectations investors hold, transfers of both 0E$ and 10E$ can be reconciled with the investor's assumption of a reciprocity motive.

IV. C. Summary of Predictions

It is worthwhile to summarize the predictions we can derive from assuming different motives. The standard model based on purely selfish preferences predicts that in both treatments, the trustee will send nothing back. Thus, the investor who expects such behavior should send nothing. This prediction differs from the predictions of the two social preference models we discussed, and those predictions in turn differ from each other.

A summary of the predictions of each theory in the two treatments is provided in Table 1. Because any investor decision (i.e., a transfer of either 0E$ or 10E$) in either treatment can be reconciled with both models, Table 1 includes only predictions regarding trustees' decisions. The table clearly shows that it is only in the asymmetric

[8] We obtained data on how much each investor believes her trustee will return if the investor transfers 10E$. However, we did not obtain data on the level of confidence that they placed in their answers, so we cannot easily test whether the relationship between expectations and transfer decisions is consistent with positive reciprocity. The same is of course true for our ability to use these data to test inequality aversion.

endowment treatment where the implications of a reciprocity motive sharply conflict with inequality aversion.

V. Results

We obtained observations on 144 subjects: 34 pairs in the baseline treatment and 38 pairs in the asymmetry treatment. We begin by reporting the expectations and decisions of investors, and then proceed to analyze those of trustees.

V. A. Investors' decisions and expectations

With respect to the decision to transfer money, the percentage of investors who transferred 10E$ is not significantly different between the baseline and the asymmetry treatment (60.5% vs. 64.7%, respectively, p=0.72, Mann-Whitney two-tail test). However, the investors expect less to be returned on average in the asymmetry treatment. This can be seen in Figure 2, which shows the distribution of expected returns among those investors who transferred 10E$[9].

As shown in Figure 2, among the 22 investors who transferred 10E$ in the baseline, only about 23% expected a 0E$ back-transfer. In contrast, about 61% of the 23 investors who transferred 10E$ expected a 0E$ back-transfer in the asymmetry treatment. The difference is significant (p=0.01, Mann-Whitney two-tail test). Furthermore, compared with the baseline, significantly fewer investors in the asymmetry treatment expected their trustees to return at least 10E$, the amount required for the investors to avoid a loss (77% vs. 22%, p<0.01, Mann-Whitney two-tail test). While no investor expected a backtransfer of more than 15E$ in the asymmetry treatment, more than one-

[9] Only investors who transferred 10 were asked to report their expected return amount.

third of investors (36%) expected a back-transfer of 20E$ in the baseline, the symmetry treatment.

These data have clear implications for the models discussed above. First, nearly 2/3 of investors in both treatments send a positive amount. Therefore, the standard theory that assumes selfishness does not fit most of our data. Second, although sending is in principle consistent with both inequality aversion and reciprocity models, the fact that the majority of investors who send in the asymmetry treatment expect no return from trustees argues for the importance of the former.[10]

V. B. Trustee's Decisions and Expectations

Figure 3 plots the backtransfer of the trustees whose investors transferred 10E$. As investors expected, significantly more trustees returned nothing in the asymmetry treatment than in the baseline treatment (61% vs. 32%, p=0.05, Mann-Whitney two-tail test). In addition, more than half (55%) of the trustees returned at least 10E$ in the baseline, while only about 26% returned the transfer amount in the asymmetry treatment (p=0.05, Mann-Whitney two tail test). Finally, consider the proportion of trustees who returned more than 15E$. Nine of 22 trustees (41%) did so (returned exactly 20E$) in the baseline treatment, but only 1 of the 23 trustees (4%) made this decision in the asymmetry treatment.

It is worthwhile to emphasize that no trustee in the baseline treatment returned more than 20E$ to the investors (an amount that would leave the investor earning more than the trustee.) Yet, about 40% of trustees in the asymmetry treatment returned more

[10] This behavior might also be consistent with altruism, although we should then explain why investors do not also expect the same motivation in trustees. Inequality aversion offers a more satisfactory explanation of our data.

than 0E$, which runs counter to the predictions of an inequity aversion motive. On the other hand, the average back-transfer among trustees who returned a positive amount is significantly lower in the asymmetry than in the baseline treatment (9.4 vs. 16.0, p=0.01, Mann-Whitney two-tail test). This is consistent with the view that back-transfers in both treatments are motivated in part by reciprocity, while the inequality aversion motive encourages positive back-transfer decisions only in the baseline treatment.

The distribution of trustees' beliefs regarding investors' expected returns in our two treatments is plotted in Figure 4, and displays patterns similar to those of back-transfers. About 60% of trustees believe their investors expect a 0E$ back-transfer in the asymmetry treatment. Only 14% trustees hold this belief in the baseline. Also, in the baseline, about 92% of trustees believe investors expect a return of at least 10E$, and 32% believe investors expect more than 15E$. In the asymmetry treatment the proportions are 26% and 4%, respectively[11].

In Figure 5, we also plot the distribution of trustee's beliefs about what investors think trustees *should* return (we refer to them as the *normative expectations* of return, Bicchieri 2006). Interestingly, in the asymmetry treatment, only about 1/3 of the trustees think their investors believe they *should* return 0E$. About 65% trustees think the investors believe they should return at least 10E$. One trustee thinks the investor's normative expectation is 20E$ and two trustees think 30E$ is the investors' normative expectation. In contrast, all trustees in the baseline treatment think the investors believe

[11] It is interesting that the distribution of trustee's backtransfers is identical to the trustee's belief regarding their investor's expected return. However, this does not mean the choice and the belief coincide for any particular individual. In particular, nine of 23 trustees' decisions are at odds with their beliefs. Five transferred less than their reported belief about the investor's expected return. In the baseline treatment, sixteen of 22 trustees reported a belief about the investors' expected return different from their actual back-transfer. Among these, nine trustees transferred back less then the amount they believed their investors would expect them to return.

they should return at least 10E$ and 82% trustees think the investors believe they should return more than 20E$. Again, we see that trustees in the asymmetry treatment believe their investors think they *should* return less than in the baseline treatment.

It is useful to summarize the relationship between the three motives behind trustees' behavior that we have discussed and the data obtained in our experiment. This is found in Table 2.

In summary, we find that a majority of trustees do not reciprocate the investors' transfer when reciprocity conflicts with equality. On the other hand, as has been previously shown in the standard trust game, a majority of trustees return a positive amount when reciprocity reduces inequality. In addition, in the asymmetry treatment we do find positive backtransfers consistent with reciprocity and in violation of equity, but the average amount of these positive backtransfers is significantly lower than in the baseline treatment. Moreover, investors expect less to be returned in the asymmetry treatment than in the baseline treatment, and most trustees also believe that investors expect a 0E$ return in the asymmetry treatment.

VI. Discussion

This paper presents the first systematic investigation of how people behave when reciprocity cannot be reconciled with equality in decision environments. In a trust game, more trustees refuse to reciprocate investors' kindness when reciprocity violates equity than when reciprocity reduces inequality. Moreover, investors evidently expect this will be the case. More investors expect trustees to choose equity over reciprocity when the two are in conflict than when they have consistent behavioral consequences. Trustees

also believe investors expect a relatively smaller return when trustees are required to sacrifice equity in order to reciprocate.

The question raised by our data is why more trustees choose not to reciprocate when doing so increases inequality. One explanation could be the presence of a "self-serving bias", i.e., the tendency of individual's judgments to be biased towards self-interest (Babcock and Loewenstein, 1997). According to the self-serving bias explanation, when reciprocity cannot be reconciled with equality, an individual will tend to follow the motive that best fulfills her own self-interest (in our case, to maximize monetary payoff). Thus, in our asymmetry treatment, a self-serving bias would lead a trustee to choose equity. The fact that positive reciprocity increases inequality becomes an excuse for the trustee to maximize earnings. Such an excuse is not available in the baseline treatment.

Our results have important implications for institution design. In a principal-agent relationship, eliciting positive reciprocity provides a way to avoid problems that might otherwise arise when contracts are incomplete (Fehr and Gächter, 2000). Fehr et al. (1998) reports a gift exchange experiment that shows that when firms offer a "gift" of an above-market wage, workers reciprocate by providing relatively more effort than when the wage is lower (competitive). This suggests that reciprocity could be a solution to moral hazard problems. Our results, however, imply that such a solution would have important limitations. In particular, when employers are wealthier or have more resources than employees, which is very often the case in the real world, our results suggest that reciprocity motives can be significantly weakened. In particular, employees might not provide a proportionally higher effort when the employer offers a high wage. In light of the importance of reciprocity in building long-run exchange relationships, our findings

raise an important question: how does one build a culture of reciprocity when reciprocation increases immediate inequality?

One approach could be to focus people on a reciprocity norm (Cialdini et al. 1990; Bicchieri 2000, 2006). Previous research shows that people often follow what they expect others will do, even when others' decisions are irrelevant to their own material payoffs (see, Cason and Mui, 1998; Bardsley and Sausgruber, 2005; Bicchieri and Xiao, 2007; Krupka and Weber, 2007). This suggests that publicly emphasizing reciprocating behavior could increase an individual's tendency to reciprocate. For example, publicly rewarding loyal employees not only provides an incentive for high effort but also offers clear evidence that other workers do work hard. This can have the effect of increasing other workers' efforts.

Society is clearly complex. Predicting individuals' decisions in different contexts and designing efficient institutions requires not only the ability to identify different motives, but also the equally important capability to understand the impact and interaction of different motives in different contexts. A growing amount of research has been conducted recently along these lines (e.g. Engelmann and Strobel, 2004; Fehr, et al. 2006). This paper can be seen as another step toward this goal.

We have focused on positive reciprocity and inequality aversion. We did not address the question of how people behave when negative reciprocity and equity conflict. For example, subjects are routinely found to punish misbehavior even when it is costly to them. It has been pointed out that such costly punishment plays an important role in supporting social norms (e.g. Fehr and Gächter, 2002). Useful future research will address whether inequality aversion reduces people's willingness to punish in those cases

where costly punishment leaves the punishers worse off than those who receive the punishment. Our ongoing research investigates these important topics.

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Table 1. A summary of theory predictions

Treatment	Motivation	Trustee's return(E$) if receives 30E$
Baseline	Payoff Maximization	0
	Inequality Aversion	(0, 20]
	Reciprocity	(0, 30]
Asymmetry	Payoff Maximization	0
	Inequality Aversion	0
	Reciprocity	(0, 30]

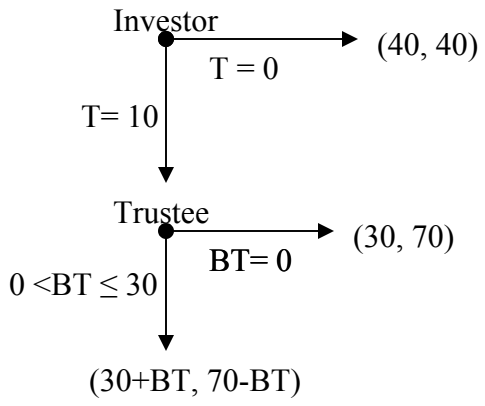
Table 2. Number of trustees' whose decisions are consistent with each motive

Treatment	Motivation	# of Trustees
Baseline	Payoff Maximization	7
	Inequality Aversion	15
	Reciprocity	15
Asymmetry	Payoff Maximization	14
	Inequality Aversion	14
	Reciprocity	9

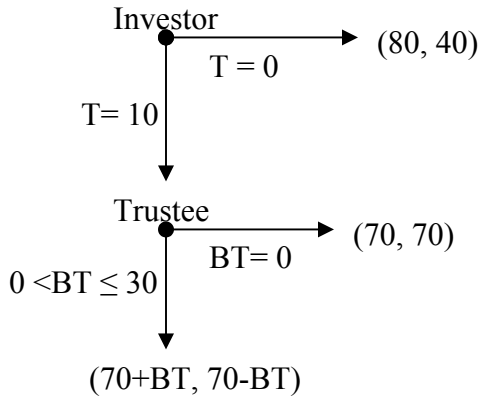
Note: This table includes data only from trustees who received 30E$.

Figure 1. Two treatments

(A). Baseline treatment



(B). Asymmetry treatment



Note: T –investor's transfer amount; BT—trustee's back transfer amount.

Figure 2. Distribution of the expected backtransfer of the investors who transferred 10

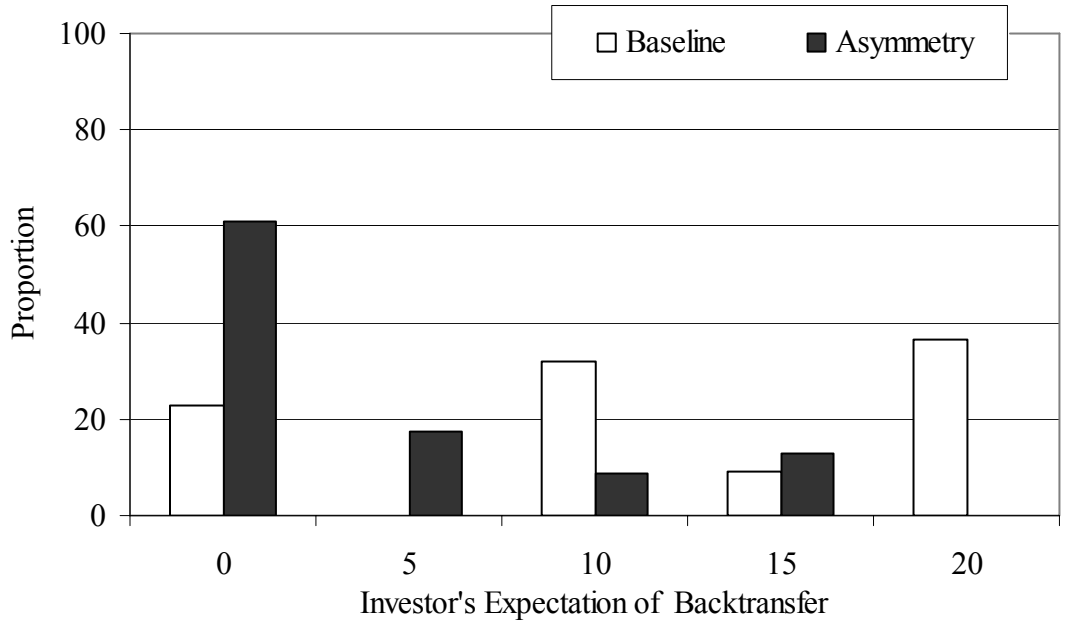


Figure 3. Distribution of the trustees' back transfer

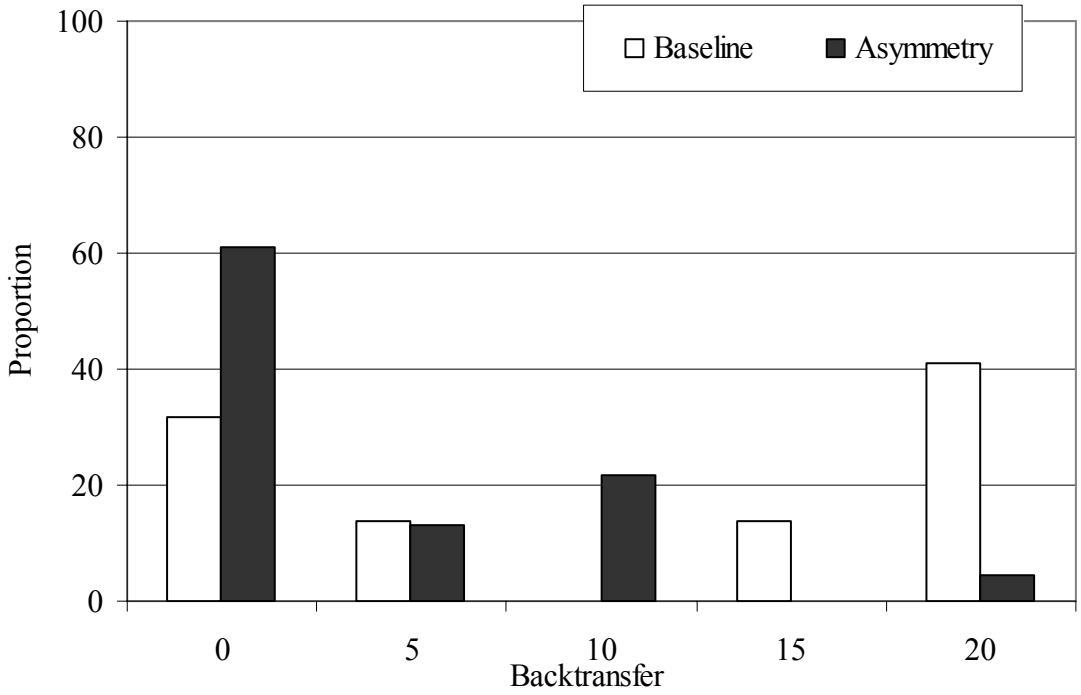


Figure 4. Distribution of trustee's belief of investor's expected backtransfer

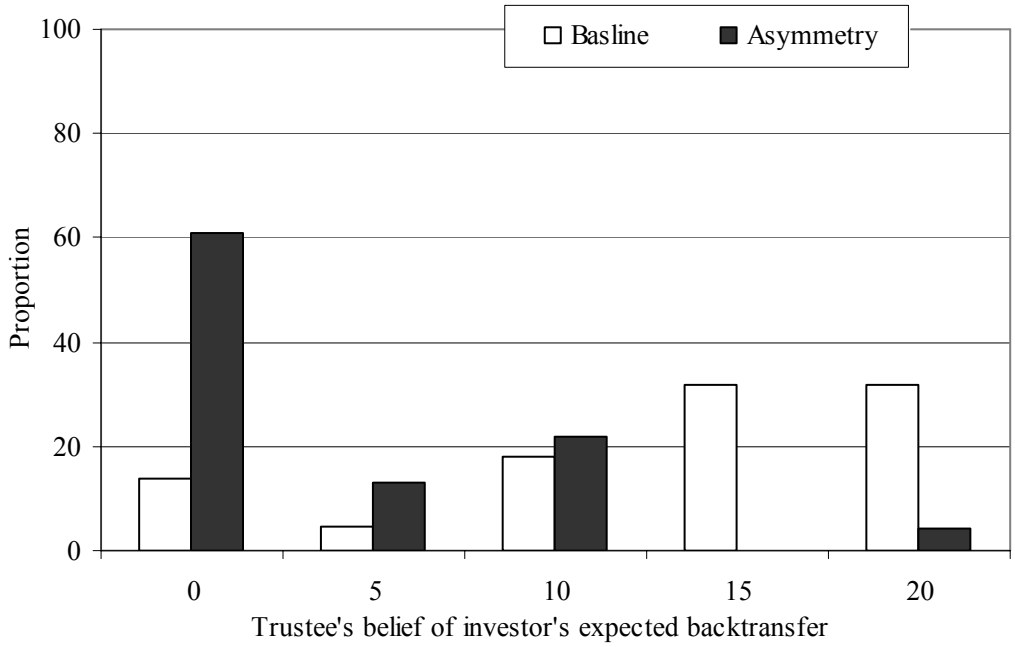
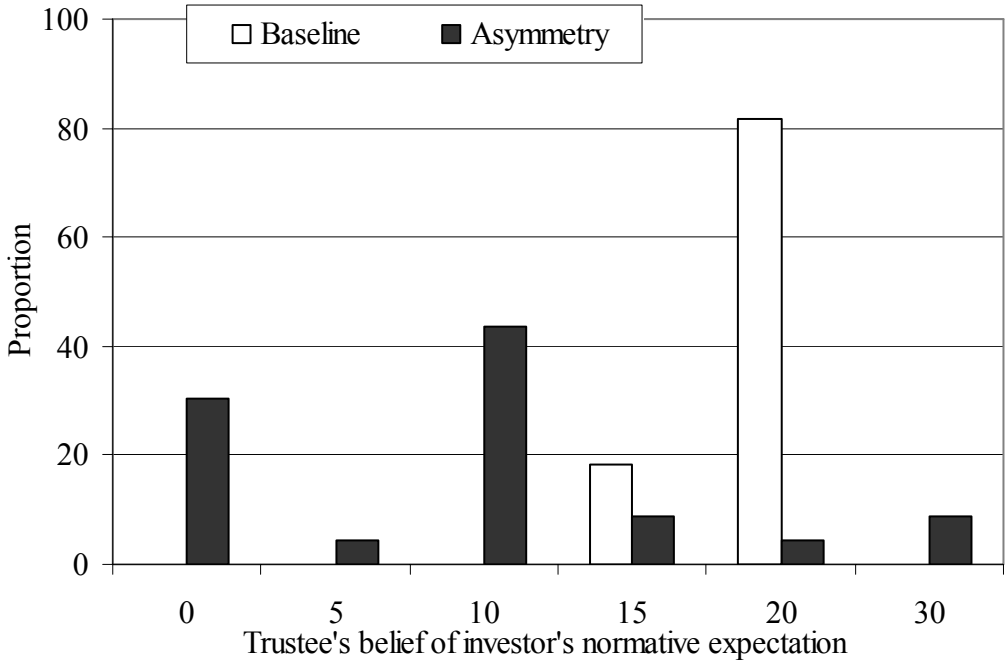


Figure 5. Distribution of trustees' beliefs of investors' normative expectation of return



Appendix A. Instructions of asymmetry treatment

1. Investor's instruction

You are Actor 1

Description of Your Decision Problem

Thank you for coming! You've earned $5 for showing up on time. Whatever you earn in the rest of the session will be in addition to this $5. The instructions explain how you can make decisions. Please read these instructions carefully! There is no talking at any time during this experiment. If you have a question please raise your hand, and an experimenter will assist you.

You will be randomly and anonymously paired with another person in this room. You will never be informed of the identity of this person, either during or after the experiment. Similarly, your matched participant will never be informed about your identity. You are in the role of **Actor 1** and your matched participant will be referred to as your **Actor 2**. You and your Actor 2 will participate only once in this decision problem. All the decisions will be anonymous.

This is how the experiment works.

Endowment

At the beginning of the experiment, each Actor 1 receives an initial endowment of 80 E$ (experimental dollars, which are converted to US Dollars at the rate of 5E$ = 1 US Dollar). Each Actor 2 receives an initial endowment of 40 E$.

Your decision

You, as Actor 1, can decide whether to transfer 0E$ or 10E$ from your endowment to Actor 2. The experimenters will ***triple*** this transferred amount, so that Actor 2 receives three times the amount of E$ you transferred.

The decision of Actor 2

After your decision, Actor 2 will decide to transfer back to you (Actor 1) some amount of the tripled transfer amount he/she got. The amount Actor 2 transfers back to Actor 1 can be any multiple of 5 between 0 and the tripled transfer amount (0 and the tripled transfer amount included).
If you transferred 0E$, Actor 2 cannot transfer back any amount to you.
If you transferred 10E$ to Actor 2, Actor 2 will get 30E$. Actor 2 then can transfer back to you: 0E$, 5E$, 10E$, 15E$, 20E$, 25E$ or 30E$.

Payoffs

You (Actor 1) receive: 80 E$ – transfer to Actor 2 + back-transfer from Actor 2.
Actor 2 receives: 40E$+ (3 × transfer from Actor 1) – back-transfer to Actor 1

Exchange rate: For every 5E$ you earn you will be paid $1.

All the possible payoffs are listed in the table below:

If Actor 1 chose to transfer…(E$)	Actor 2 receives … (E$)	If Actor 2 chose to transfer back…(E$)	Payoff (E$)	
			Actor 1	Actor 2
0	0	0	80	40
10	30	0	70	70
		5	75	65
		10	80	60
		15	85	55
		20	90	50
		25	85	45
		30	100	40

<u>How the experiment is conducted</u>

Step 1: Random and anonymous assignment of counterparts
Each of you has randomly chosen a manila envelope. Your ID letter is shown on the last page of the instructions. Persons in this room who get the same ID will be paired. Please do not show anyone your ID letter.

Step 2: You choose the option
You will make your decision by filling in the decision sheet on your table. After making the decision, you will also need to write the letter ID on the decision sheet, and then put it into your envelope. After every Actor 1 has finished, an experimenter will collect all the envelopes.

Step 3: Actor 2 makes the decision.
The experimenter will give each Actor 1's decision sheet to his/her Actor 2 according to the ID. Actor 2 will see the decision made by his/her Actor 1. If you transferred 10E$ to your Actor 2, Actor 2 then decides how much of the 30E$ (3×10) to transfer back to you by filling in the decision sheet. After finishing this, Actor 2 puts the decision sheet back into an envelope. After each Actor 2 has finished, an experimenter will collect all the envelopes.

Step 4: **Receive cash payment privately**
The experimenter will return to you the decision sheet and you will see your Actor 2's decision. The experimenter will calculate the earnings of each Actor 1 and each Actor 2. The experimenter will put each participant's earnings in an envelope marked with her/his ID letter. Each Actor 1 will pick up the envelope labeled with her/his letter ID one by one. After all the Actor 1s have been paid and left the lab, every Actor 2 will be paid in the same way.

Actor 1 and Actor 2 will remain anonymously matched at all times during the experiment.

End of Instructions

Your ID:_____

2. Trustee's instruction

You are Actor 2

Description of Your Decision Problem

Thank you for coming! You've earned $5 for showing up on time. Whatever you earn in the rest of the session will be in addition to this $5. The instructions explain how you can make decisions. Please read these instructions carefully! There is no talking at any time during this experiment. If you have a question please raise your hand, and an experimenter will assist you.

You will be randomly and anonymously paired with another person in this room. You will never be informed of the identity of this person, either during or after the experiment. Similarly, your matched participant will never be informed about your identity. You are in the role of **Actor 2** and your matched participant will be referred to as your **Actor 1**. You and your Actor 1 will participate only once in this decision problem. All the decisions will be anonymous.

This is how the experiment works.

Endowment

At the beginning of the experiment, each Actor 1 receives an initial endowment of 80 E$ (experimental dollars, which are converted to US Dollars at the rate of 5E$ = 1 US Dollar). Each Actor 2 receives an initial endowment of 40 E$.

The decision of Actor 1

Actor 1 can decide whether to transfer 0E$ or 10E$ from his/her endowment to you. The experimenters will ***triple*** this transferred amount, so that you receive three times the amount of E$ Actor 1 transferred.

Your decision

After Actor 1's decision, you will decide to transfer back to Actor 1 some amount of the tripled transfer amount you got. The amount you transfer back to Actor 1 can be any multiple of 5 between 0 and the tripled transfer amount (0 and the tripled transfer amount included).
If Actor 1 transferred 0E$, you cannot transfer back any amount to Actor 1**.**
If Actor 1 transferred 10E$ to you, you will get 30E$. You then can transfer back to Actor 1: 0E$, 5E$, 10E$, 15E$, 20E$, 25E$ or 30E$.

Payoffs

Actor 1 receives: 80 E$ – transfer to Actor 2 + back-transfer from Actor 2.
You (Actor 2) receive: 40E$+(3 × transfer from Actor 1) –back-transfer to Actor 1

Exchange rate: For every 5E$ you earn you will be paid $1.

All the possible payoffs are listed in the table below:

If Actor 1 chose to transfer…(E$)	Actor 2 receives … (E$)	If Actor 2 chose to transfer back…(E$)	Payoff (E$)	
			Actor 1	Actor 2
0	0	0	80	40
10	30	0	70	70
		5	75	65
		10	80	60
		15	85	55
		20	90	50
		25	85	45
		30	100	40

How the experiment is conducted

Step 1: Random and anonymous assignment of counterparts
Each of you has randomly chosen a manila envelope. Your ID letter is shown on the last page of the instructions. Persons in this room who get the same ID will be paired. Please do not show anyone your ID letter.

Step 2: Actor 1 chooses the option
Actor 1 will make his/her decision by filling in the decision sheet on his/her table. Below is a sample decision sheet. After making the decision, he/she will also need to write the letter ID on the decision sheet, and then put it into his/her envelope. After every Actor 1 has finished, an experimenter will collect all the envelopes.

Sample Decision Sheet

ID:_____

Payoff Table

If Actor 1 chose to transfer…(E$)	Actor 2 receives … (E$)	If Actor 2 chose to transfer back…(E$)	Payoff (E$)	
			Actor 1	Actor 2
0	0	0	80	40
10	30	0	70	70
		5	75	65
		10	80	60
		15	85	55
		20	90	50
		25	95	45
		30	100	40

Please check your decision here:
Actor 1
_____ I will transfer **0** E$ to Actor 2
_____ I will transfer **10**E$ to Actor 2.
Actor 2
I will transfer back _____ **0** E$
_____ **5** E$
_____ **10** E$
_____ **15** E$
_____ **20** E$
_____ **25** E$
_____ **30** E$

Step 3: You (Actor 2) make the decision.
The experimenter will give each Actor 1's decision sheet to his/her Actor 2 according to the ID. You will see the decision made by your Actor 1. If Actor 1 transferred 10E$ to you, you will decide how much to transfer back to Actor 1 by filling in the decision sheet. After finishing this, you will put the decision sheet back into an envelope. After each Actor 2 has finished an experimenter will collect all the envelopes.

Step 4: **Receive cash payment privately**
The experimenter will return to each Actor 1 the decision sheet and Actor 1 will see Actor 2's decision. The experimenter will calculate the earnings of each Actor 1 and each Actor 2. The experimenter will put each participant's earnings in an envelope marked with her/his ID letter. Each Actor 1 will pick up the envelope labeled with her/his letter ID one by one. After all the Actor 1s have been paid and left the lab, every Actor 2 will be paid in the same way.

Actor 1 and Actor 2 will remain anonymously matched at all times during the experiment.

End of Instructions

Your ID:_____

Appendix B. Surveys

1. Investor's survey

Please write down your ID_____ Gender_____ (Actor 1)

Please answer the following questions. You can earn extra money depending on your answers.

Please Note: To answer some of the questions below you need to know that there are _____ Actor 1s in this room. Write on the back of the paper if you need more space.

- **How did you make your decisions?**

- **How many Actor1s in this room do you believe transferred 10 E$?**
  (If your answer is the same as the actual number, you will earn an additional $1)

If you transferred 10 E$, please answer the following questions.

- **How much do you think Actor 2 WILL return to you?**
  (If your answer is the same as the actual number, you will earn an additional $1)

- **How much do you think Actor 2 SHOULD return to you?**

2. Trustee's survey

Please write down your ID_____ Gender_____ (Actor 2)

Please answer the following questions. You can earn extra money depending on your answers.

- **How did you make your decisions?**

- **Please fill the following blank spaces if Actor 1 transferred 10E$ to you.**

  — **Actor 1 thought you would return ____ E$.**

(If your answer is the same as what your Actor 1 wrote on his/her survey before he/she knew your final decision, you will earn an additional $1).

  — **Actor 1 thought you should return ___E$.**

(If your answer is the same as what your Actor 1 wrote on his/her survey before he/she knew your final decision, you will earn an additional $1).

- **Among the Actor 2s whose Actor 1s transferred 10E$, which back-transfer amount do you believe most of those Actor2s chose today.**

(If your answer is the same as the actual number, you will earn an additional $1)

Transfer back_____E$