# "EQUAL OR NOTHING": CONCERN FOR FAIRNESS AND RECIPROCITY IN TRUST GAME

**Chiradip Chatterjee**
*University of North Florida, USA*

**Christopher K. Johnson**
*University of North Florida, USA*

**Arthur B. E. Sams**
*Colorado State University, USA*

## Abstract

*We present the results of a contingent trust game experiment measuring the impact of a 'Fair' allocation by the proposer on the reciprocal reaction of the responder. We used an online questionnaire to ask participants how they would respond to each possible transfer made by the proposer in a standard trust game. Existing research suggests that there is a 'norm of reciprocity' dictating that one repays (in kind) for the provision made by another. We have confirmed that the traditional relation between trust and reciprocity exists, and that there is a positive and significant relation between the amount transferred by the proposer and the return made by the responder. More significantly, our results suggest that in response to unequal (unfair) allocations by the proposer, responders on average return more proportionally. We believe this is the evidence of negative reciprocity, where responders return proportionately more to humiliate and/or to refuse any bond of alliance with the proposer. We also find that responders who are not economically dependent on their parents, return more than others. Psychological characteristics were also tested and interestingly a respondent who 'cries' when their feelings get hurt return significantly more than others.*

**Key words:** Trust; Trust Game; Reciprocity; Fairness.

## 1. Introduction

A fundamental assumption in Economics is that individuals are rational and act in their self-interest. However, behavioral research suggests that even when it goes against self-interest, people reciprocate the acts of others (Ortmann, Fitzgerald, & Boeing, 2000). That is, there exists a 'norm of reciprocity' dictating that one should repay (in kind) for the provision made by

another (Chaudhuri, Li, & Paichayontvijit, 2016; Gouldner, 1960). The notion of reciprocity has been well established in the literature using the trust game experiment. In the standard format of a trust game experiment, there are two players (proposer and responder) who must decide on how to share a certain amount of money. The proposer (player 1) receives certain amount of money (x) and decides on a transfer (t ;$0 \leq t \leq x$) to the responder (player 2). The responder receives three times the amount of the transfer (3t) and decides how much he/she wants to return (r; $0 \leq r \leq 3t$) to the proposer. The concept of Nash Equilibrium suggests that the responder will maximize his/her wellbeing by returning r = 0 to the proposer and consequently, the proposer will make no initial transfer (i.e., t = 0). Despite this theoretical underpinning, studies have found that proposers make considerable transfers (Berg, Dickhaut, & McCabe, 1995) and responders return (r) proportionately as per the norm of reciprocity (Bchir, Rozan, & Willinger, 2012; Pillutla, Malhotra, & Murnigham, 2003). While both positive reciprocity (i.e. the rewarding of cooperative behavior) and negative reciprocity (the punishment of non-cooperative behavior) have been examined in the existing literature, evidence of the latter has not been fully explored in the trust game experiment, particularly from the responder's perspective. No study has established the coexistence of positive and negative reciprocity in the return decision of the responders. Using a standard intention-based trust game, we explain how the return decision of the responder is simultaneously influenced by both positive and negative reciprocity.

## 2. Review of the Literature

In the trust game experiment, the return made by the responder can be described as reciprocal only if she interprets the proposer's transfer as trusting (McCabe, Rigdon, & Smith, 2003). Reciprocity captures the responder's tendency to adjust her own behavior to the previous behavior of the proposer. Depending on whether the responder rewards cooperative behavior of the proposer, or the proposer punishes uncooperative behavior of the responder, one can distinguish between positive and negative reciprocity in a trust game (Perugini, Gallucci, Presaghi, & Ercolani, 2003). According to the economic literature, two simultaneous principles explain the positive reciprocal behavior of the responder: a feeling of obligation and a desire for equality (Malhotra, 2004). Theoretically, the feeling of obligation is proportional to the transfer made by the proposer through an implicit compulsion to compensate (Burnham, McCabe, & Smith, 2000). The desire for equality maintains a non-linear but positive relation with transfers made by the proposer. For example, suppose the experimenter assigns $10 (i.e., x = $10). If the proposer transfers $2 (t) and keeps $8, the responder will in turn receive $6 (= $2 x 3). In this scenario, the desire for equality suggests that the responder should not return any amount back to the proposer. The responder should return a positive amount only when the transfer made by the proposer is $3 or more. Hence, both the above factors explain a positive association between trust (symbolized by t) and reciprocity (symbolized by r), known as 'positive reciprocity' (Fehr & Gächter, 2000).

If the participant punishes uncooperative behavior, the retaliatory action is known as 'negative reciprocity' (Fehr & Gächter, 2000). The existence of negative reciprocity has also been addressed, but only in a variant of the trust game or an ultimatum game. For example, Engle-Warnick and Slonim studied a trust game with repetitions (Engle-Warnick & Slonim, 2004). Trust requires people to make themselves vulnerable to others, as it is not possible to punish untrustworthiness of the responder. Engle-Warnick and Slonim found that the level of trust is indistinguishable between the finite and indefinite games when players are inexperienced. However, the proposers in the indefinite game threatens to permanently stop trusting if the responders are untrustworthy. Fehr et al., on the contrary, conducted a

sequential one-shot trust game with third party involvement to find proof of punishment (Fehr, Hoff, & Kshetramade, 2008). In their experiment, the third player had the power to punish the responder for not returning the favor made by the proposer at her own expense. Yamagishi et al. discussed the existence of negative reciprocity in ultimatum games through rejection of 'unfair offers' made by the proposers (Yamagishi et al., 2012). Thielmann and Hilbig (Thielmann & Hilbig, 2015) also found evidence of negative reciprocity in trust game based on personality structure as designed by Ashton and Lee (Ashton & Lee, 2007).

Every study has always expected a positive and linear relation between transfers made by the proposers and the returns by the responders in a pure one-shot trust game (Altmann, Dohmen, & Wibral, 2008; Johansson-Stenman, Mahmud, & Martinsson, 2005). Responders' choice to return in pure trust games were believed to have no impact of negative reciprocity (McCabe et al., 2003). No one has been able to establish the coexistence of positive and negative reciprocity in the return decision of the responders. Using a standard intention-based trust game, we have explained how the return decision of the responder is simultaneously influenced by both positive and negative reciprocity.

It is important to understand that by the virtue of reciprocal behavior people pay back gifts and they also take revenge even in interactions with strangers at their own cost. According to Marcel Mauss, one of the founding scholars of reciprocal behavior, refusing to accept an allocation "is tantamount to declaring war" (Mauss, 2002). It is not the refusal of the allocation itself, but the rejection of the bond of alliance that is at stake. The reason behind such rejection is the reciprocal reaction to unfair action (Gintis, 2003). It is our intrinsic motivation to punish non-cooperators, even when the behavior cannot be justified in terms of self-interest (Calabuig, Fatas, Olcina, & Rodriguez-Lara, 2016; Fehr, Fischbacher, & Gächter, 2002; Offerman, 2002). In the trust game set-up responders lack any ability to punish the proposer in financial measures as they can in an ultimatum game (Rabin, 1993). Still, they have a unique way to refuse the bond with the proposer in protest to an unfair/unequal allocation (transfer). That is, to return a major portion of money received to humiliate the proposer. If the responder reciprocates more proportionately for small transfers (e.g. $1) than she does for comparatively larger transfers (e.g. $3), we may identify those returns as a possible form of refusal of the allocation made by the proposer. We have introduced the concept of 'fair' transfer by the proposer. That is, the proposer may not trust the responder but makes at least equal allocation. In our trust experiment, a "fair" allocation requires the responder to transfer $3 more. This makes a transfer below $3 unfair to the responder. The idea of fair allocation is not new (Yamagishi et al., 2012), but has never been applied in a trust game set-up.

The experiment is identical in construction to that put forward by Berg et al. (Berg et al., 1995). In this experiment used an online questionnaire to ask respondents how they would respond to each possible transfer made by the proposer. After studying the responses, we concluded that in response to an unequal division by the proposer, responders on average return more proportionally. We offer this result as the evidence of negative reciprocity, where responders return to humiliate and/or to refuse the bond of alliance with the proposer

## 3. Experimental Design

The trust game experiment was conducted online using Qualtrics as a platform. A general invitation was sent out to students at the University of North Florida (Jacksonville, FL) asking about their interest in participating in a trust game experiment and getting paid based upon their responses. Altogether, 1065 students expressed interest in participating and provided important demographic information in response to the invitation. Ultimately, 128 students were chosen in

such a way to reflect a good mix of students with respect to gender, race, and ethnicity since one of the broader objectives of the research was to understand whether the selection of responders has any significant gender or ethnic bias. The experiment was carried out in two parts. The first part involved a registration survey, which asked participants to complete a social, psychological, physical and demographic profile of themselves. The trust game experiment was explained where the proposer determines a transfer (split) of an initial endowment of $10. The responder then receives three times the remainder of the endowment left by the proposer and the responder then decides how much he/she will return to the proposer. Each participant had to make contingent choices in the trust game as a responder for every possible dollar transfer (between $1 and $10) made to them. Each participant received $5 to complete the registration survey as long as they completed the second and the final part, the decision-making experiment. The decision-making experiment asked respondents to choose 5 out of 28 characteristics (collected in the registration survey), which they wanted revealed to the rest of the participants. Each participant then chose 10 of the remaining 127 participants, whom he/she desired to have as proposers in the trust game based on their revealed characteristics. Depending upon how the experiment turns out, participants could earn up to $50 from the decision-making experiment alone.

It is important to note that participants were not given detailed information of the decision-making experiment during the registration survey. Rather, they were told that their payoff in the experiment would be determined through a combination of their responses in the registration survey and the decision-making experiment. This study analyzes the contingent responses of 128 participants as responders, collected in the registration survey. Brandts and Charness (Brandts & Charness, 2000) have established that contingent choices are parallel with experimental findings. We therefore propose that the result would be similar if participants were paid based upon their actions in the registration survey instead of compensated uniformly.

## 4. Regression Model and Results

We have analyzed respondents' return ratios (***Return Ratio***), which is the amount returned divided by the amount transferred ($r/t$). We propose that a U-shaped relationship between the transfer and the ***Return Ratio*** indicates the existence of negative reciprocity in the trust game. Figure 1 illustrates how average return ratio change across different transfer amounts (***Transfer***), ranging from $1 to $10. It is important to notice that the return ratio decreases initially from 1.23 (for $1 transfer) to 1.17 (for $3 transfer), and then starts increasing.[1] As explained previously, given that the transfer is less than or equal to $2, the division is unequal and unfair. However, any transfer greater than or equal to $3 is fair since it gives the responder the control to make an equal division of the allocation. As such, we created a dummy variable, ***Fair***, to signify whether a transfer is fair or not. ***Fair*** is set equal to 0 when the transfer is $2 or less, and equal to 1 for all other transfers ($3 and more). As Figure 1 portrays, responders' return ratios are more for $1 and $2 (unfair transfers) than $3 (fair transfer). However, return ratios increase for fair transfer amounts of $3 and more. We have also added a plot of 'Fair Return Ratio', which is calculated based on the sole objective of the responder to equalize payoffs. It is important to notice that as responders are not supposed to return any amount if transfer made by the proposer is less than $3. Therefore, the Fair Return Ratios are zero when proposer transfers $1 or/and $2.

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[1] Using the Levene Test, homogeneity of variance among return ratios $1, $2 and $3 has been tested and established.

Figure 1 - Average return ratios by transfer made by proposers
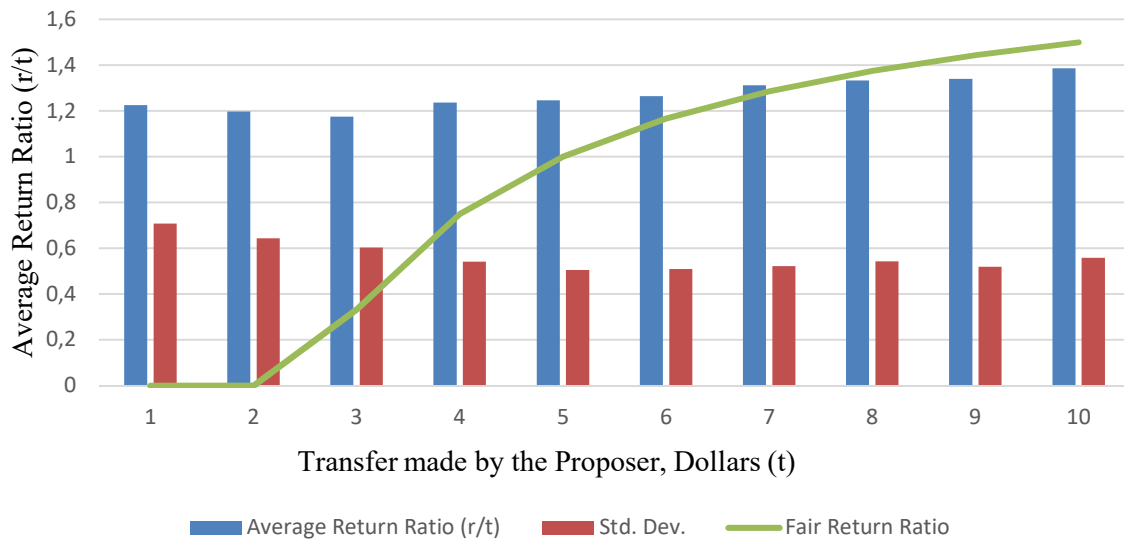


**Note:** The transfer amount ($t$) ranges from $0 to $10. The responder receives three times the amount of the transfer ($3t$), and decides how much he/she wants to return ($r$; $r \leq 3t$) to the proposer.

Figure 2 portrays what percentage of return ratios is less than 1 and what percentage is 1 and above, by transfer amounts. It is evident that the percentage of return ratios that are 1 or above is more for $1 and $2 transfer amounts, than when $3 is transferred.

Figure 2 - Characterization of responses by return ratios



Using panel data regression, we establish evidence of reciprocal reactions to unfair actions. Since each participant made 10 choices, we treated participants as the panel variable and their 10 choices by transfers (**Transfer**) as the time variable. The dependent variable in this regression is **Return Ratio**. The Hausman test was done to determine that a random effect panel data regression model is appropriate for the data. Five different regression models were tested to check the robustness of the relation. The variable descriptions are presented in Table 1. The regression models control for some of the demographic characteristics of the respondents, such as gender, siblings, income, race and psychologic reaction to feelings hurt. The coefficient on **Transfer** is positive and significant at the 1% level in all five models, supporting the economic

literature on reciprocity in the trust game (positive reciprocity). The coefficient on **Fair** is significantly negative (at 5% level), suggesting that return ratios are significantly greater for unfair transfers than fair ones (negative reciprocity). This result shows the existence of negative reciprocity and retaliation to unfair transfers (by the proposer) in the trust game. The results also suggest that respondents who earn their own living (***Independent***), in contrast to those who are dependent on their parents, return comparatively more. Although there is no multicollinearity issue in the regression results, we have dropped ***Independent*** in model 5 to make sure household income (***Income***) is consistently insignificant. It is interesting to observe that the return ratio of respondents who cry when feelings are hurt (***Cries***) is significantly more than of respondents who withdraws themselves as feelings get hurt (***Withdraws***). The result indicates that respondents who supposedly get the maximum impact by others' actions, are those who care the most about other people's feelings as well. Except for the above-mentioned variables, no other factors seemed to be significantly determining the value of ***ReturnRatio***.

Table 1 - Demographic survey and variables description

| Variable | Description | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|---|
| ReturnRatio | Amount returned (by responder) divided by mount transferred (by proposer) | 1,240 | 1.27 | 0.57 | 0 | 3 |
| Transfer | Amount transferred by the proposer (between $1 and $10) | 1,240 | 5.50 | 2.87 | 1 | 10 |
| Fair | 1 if Transfer is $3 or more; 0 Otherwise | 1,240 | 0.80 | 0.40 | 0 | 1 |
| Age | Age of the respondent | 1,240 | 23.94 | 5.65 | 18 | 49 |
| Brothers | Number of brothers | 1,240 | 1.04 | 0.98 | 0 | 4 |
| Sisters | Number of sisters | 1,240 | 1.00 | 1.02 | 0 | 4 |
| Male | 1 if responder is Male; 0 Otherwise | 1,240 | 0.51 | 0.50 | 0 | 1 |
| Independent | 1 if the responder supports himself/herself by Self-income; 0 if parents support the responder | 1,240 | 0.75 | 0.43 | 0 | 1 |
| Income | Household income: 0 if under $25,000; 1 if $25,000 - $29,999; 2 if $30,000 - $34,999; 3 if $35,000 - $39,999; 4 if $40,000 - $49,999; 5 if $50,000 - $59,999; 6 if $60,000 - $84,999; 7 if over $85,000 | 1,240 | 2.92 | 2.63 | 0 | 7 |
| Cries | 1 if the respondent Cries when feelings Hurt; 0 Otherwise | 1,240 | 0.15 | 0.35 | 0 | 1 |
| Argues | 1 if the respondent Argues when feelings hurt; 0 Otherwise | 1,240 | 0.18 | 0.38 | 0 | 1 |
| Withdraws | 1 if the respondent Withdraws herself when feelings hurt; 0 Otherwise | 1,240 | 0.68 | 0.47 | 0 | 1 |
| AfrAmer | 1 if respondent is African American; 0 Otherwise | 1,240 | 0.19 | 0.39 | 0 | 1 |
| AmerIndian | 1 if respondent is African Indian; 0 Otherwise | 1,240 | 0.02 | 0.13 | 0 | 1 |
| Asian | 1 if respondent is Asian; 0 Otherwise | 1,240 | 0.19 | 0.39 | 0 | 1 |
| Hispanic | 1 if respondent is Hispanic; 0 Otherwise | 1,240 | 0.21 | 0.41 | 0 | 1 |
| PacIslander | 1 if respondent is Pacific Islander; 0 Otherwise | 1,240 | 0.02 | 0.13 | 0 | 1 |
| Nonresident | I if the respondent is Nonresident Alien; 0 Otherwise | 1,240 | 0.02 | 0.15 | 0 | 1 |
| Other | 1 if Other; 0 Otherwise | 1,240 | 0.15 | 0.35 | 0 | 1 |
| White | 1 if the responder is Caucasian; 0 Otherwise | 1,240 | 0.22 | 0.41 | 0 | 1 |

Table 2 - Data description and panel data regression result (Dependent variable: *Return Ratio)*

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Err. | Coefficient | Std. Err. |
| Transfer | $0.03^{***}$ | 0.004 | $0.03^{***}$ | 0.004 | $0.03^{***}$ | 0.004 | $0.03^{***}$ | 0.004 | $0.03^{***}$ | .004 |
| Fair | $-0.06^{**}$ | 0.03 | $-0.06^{**}$ | 0.03 | $-0.06^{**}$ | 0.03 | $-0.06^{**}$ | 0.03 | $-0.06^{**}$ | .03 |
| Independent | $0.23^{*}$ | 0.12 | $0.23^{**}$ | 0.11 | $0.21^{*}$ | 0.11 | $0.21^{*}$ | 0.11 | | |
| Income | -0.02 | 0.02 | -0.02 | 0.02 | | | -0.02 | 0.02 | -0.03 | .02 |
| Age | -0.01 | 0.01 | -0.003 | 0.01 | -0.002 | 0.01 | -0.004 | 0.01 | 0.003 | .01 |
| Brothers | -0.04 | 0.05 | -0.04 | 0.05 | -0.04 | 0.05 | -0.05 | 0.05 | -0.05 | .05 |
| Sisters | 0.01 | 0.05 | 0.003 | 0.05 | 0.02 | 0.05 | 0.02 | 0.05 | 0.02 | .05 |
| Male | 0.18 | 0.10 | 0.14 | 0.09 | | | 0.11 | 0.09 | | |
| Cries | $0.29^{**}$ | 0.15 | $0.24^{*}$ | 0.14 | | | | | | |
| Argues | -0.05 | 0.13 | -0.04 | 0.12 | | | | | | |
| AfrAmer | -0.15 | 0.15 | | | | | | | | |
| AmerIndian | 0.10 | 0.39 | | | | | | | | |
| Asian | -0.04 | 0.15 | | | | | | | | |
| Hispanic | -0.12 | 0.14 | | | | | | | | |
| PacIslander | -0.29 | 0.41 | | | | | | | | |
| Nonresident | 0.15 | 0.32 | | | | | | | | |
| Other | -0.01 | 0.16 | | | | | | | | |
| Constant | $1.16^{***}$ | 0.26 | $1.08^{***}$ | 0.22 | $1.07^{***}$ | 0.20 | $1.16^{***}$ | 0.21 | $1.21^{***}$ | 0.21 |
| Chi-squared | 80.72 | | 78.88 | | 72.33 | | 75.41 | | 70.79 | |
| Observations | 1240 | | 1240 | | 1240 | | 1240 | | 1240 | |

## 5. Conclusion

Trust and reciprocity play a crucial role in economic interactions. Besides demographic determinants, so far trust (measured by the transfer made by the proposer) was believed to be the only action that controls the reciprocal reaction of the respondent in a pure trust game. Based on the results of this study, we propose that transfers made by the proposer trigger a positive reciprocal behavior in the responder via the desire for equality and a feeling of obligation, and a negative reciprocal behavior due to the desire to humiliate or to reject the bond of alliance in reaction to an unfair transfer. Therefore, in the pure trust game set-up, trust and reciprocity (return ratio determined by the responder) should maintain a u-shaped, rather than a linear relation. The results indicate that transfers made by the proposer may not only indicate the trust he/she puts in the responder, but also how strongly they want to make more than the responder and do not want to lose that control.

While we believe that the evidence in this study is compelling, future experiments should be run with monetary incentives tied to decisions. Efforts should be made to separate out trust and reciprocity from intention-based or unconditional other regarding preferences (J. C. Cox, 2004; J. Cox, Walker, & Schoon, 2007). As the responder cannot materially hurt the proposer, the responder must believe that a rejection of the allocation hurts the proposer psychologically. Therefore, future studies need to investigate the proposer's expectations from desired allocation and test whether the responder seeks to act in a way opposite to the proposer's belief to hurt him. That is, future research should explore fairness intentions and distribution preferences of both the proposer and the responder in trust game scenarios (Falk, Fehr, & Fischbacher, 2008). That way, the offered explanation about the u-shaped relation between transfer made by the proposer and the return ratio will be further validated.

Finally, evidence suggests that the return ratio increases with economic freedom. That is, economically independent responders reciprocate more favorably than their counterparts.

Participants were also asked how they react when their feelings get hurt. In response, they mentioned that they either cry, or argue, or withdraw themselves from the situation. Result suggest that respondents who 'cries' when their feelings get hurt return significantly more than others. This indicates that people who are most affected by the actions of others, known or unknown, are also those who care the most about feelings of others. Both the results point to the importance of psychological characteristics of participants. Therefore, trust game experimental studies should also work on the psychological profiling of the participants and tie their responses to their beliefs, socio-demographic and psychological characteristics.

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