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An Experimental Analysis of Trust and Trustworthiness

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We report results from experiments analyzing trust and trustworthiness, which are components of social capital and have an impact on diverse economic phenomena. We conduct a within-subjects experiment where subjects participate in both the trust game and the dictator game and find that transfers in the trust game are higher and are motivated by expected reciprocation. Subjects in our experiment exhibit positive reciprocity. We find that trustworthiness in the trust game implies trust but not vice versa. Trustworthy subjects are also more generous in the dictator game. Finally we explore gender differences in behavior and find that men are more trusting than women but there are no significant gender differences in reciprocal behavior.

JEL Classification: C72, C91, D83

1. Introduction

A large body of evidence suggests that "social capital" as embodied in the tendencies to "trust" and to "reciprocate" trust influences a wide range of economic phenomena and activities (Fukuyama 1995; Knack and Keefer 1997; La Porta et al. 1997; Putnam 2000). There is now a large body of experimental literature that explores such trusting and reciprocal motivations in economic transactions. (See Camerer [2003] for a review.) Many of these papers have used the trust game introduced by Berg, Dickhaut, and McCabe (1995) or variants thereof to measure trust and reciprocity.[1,2] The findings of these researchers have in

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[1] In the Berg, Dickhaut, and McCabe (1995) trust game, two players are paired anonymously, with one player designated the sender and the other player the receiver. Both players are given an identical initial endowment. The sender is then told that she can keep all of her initial endowment or split it with the anonymous receiver. Any amount offered to the receiver is tripled by the experimenter. The receiver is free to keep the entire tripled amount, but if he wants he can send some or all of it back to the anonymous sender. This latter amount is not tripled. The game ends after this point. The resolution of this one-shot game using backward induction is simple. A self-interested receiver would not send any money back knowing that the game ends immediately thereafter. The sender, anticipating the receiver's decision, should send no money to the receiver in the first place. However, actual behavior is different from the one predicted above with both senders sending positive amounts and receivers sending non-trivial amounts back.

[2] In a one-shot game, an action taken by an agent is "trusting" if (1) it leads to the creation of a surplus that can be shared with another agent but (2) leaves the first agent vulnerable to the possibility of exploitation if the second agent expropriates the entire surplus, which makes the first agent worse off than she would have been had she not taken the trusting action. An action by the second agent is "reciprocal" if the second agent foregoes the opportunity to expropriate said surplus (even though he can do so with impunity in a one-shot game) and shares any such surplus created with the first agent.

turn led to the development of theoretical models that explicitly incorporate such noneconomic motivations in decision making as in Rabin (1993), Fehr and Schmidt (1999), and Bolton and Ockenfels (2000). Both the inequity aversion model of Fehr and Schmidt (1999) and the Equity, Reciprocity, and Competition model of Bolton and Ockenfels (2000), which assumes that players care about both their pecuniary payoff as well as their relative standing vis-à-vis others in the group, can explain the rationale behind trusting and reciprocal behavior in sequential prisoners' dilemmas such as the Berg, Dickhaut, and McCabe (1995) trust game or the Fehr, Gächter, and Kirchsteiger (1997) gift exchange game.[3]

In this paper we wish to further explore facets of trusting and reciprocal behavior. Each subject in our study takes part in a dictator game and a trust game where the dictator game acts as a control treatment.[4] We find that transfers are significantly higher in the trust game compared with the dictator game and we argue that expectations regarding reciprocation play a significant role in the decision to send money.[5] Second, we find that there is substantial evidence in favor of positive reciprocity in the sense that receivers do return money to the senders given the opportunity and the amount returned is positively correlated with the amount received. Third, we explore the connection between trust and reciprocity. We show that subjects who are "trustworthy" (defined as subjects who reciprocate the trust placed on them), are also more trusting. But the converse is not true—subjects who appear to be trusting do not necessarily reciprocate the trust of others. Furthermore, when it comes to the dictator game trustworthy subjects behave in a more generous manner. We also explore gender differences in these decisions and show that men exhibit significantly higher levels of trust but the two groups do not differ significantly in their levels of reciprocity. We argue that the lower level of trust exhibited by women may be attributed to a greater degree of risk aversion.

The rest of the paper is organized as follows: section 2 explains the experimental design, section 3 presents the results, and section 4 concludes.

2. Experimental Design

A total of 100 subjects—47 men and 53 women—participated in the experiments in groups of 8 to 14. They were mostly undergraduate students ranging in age from 17 to 27. All the experiments were implemented as non-computerized classroom experiments. We used a within-subjects design that allows for powerful comparison across our control treatment (the dictator game) and the trust game treatment. To control for ordering effects, in half of the sessions (comprised of 52 subjects) subjects participated in the dictator game first and then in the trust game, while the remaining 48 played the trust game first, followed by the dictator game.

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[3] Rabin's model applies primarily to normal form games and is of limited applicability to a sequential prisoner's dilemma game.

[4] Subjects participate in a dictator game where each allocator has to decide how to divide $10 between herself and an anonymous recipient. More details are provided in section 2.

[5] To avoid confusion, we will refer to the first and second movers in the trust game as "sender" and "receiver," respectively, and the first and second movers in the dictator game as "allocator" and "recipient," respectively.

There are two features of the design that are different from the Berg, Dickhaut, and McCabe trust game. First, in our experiment each subject makes a sender as well as a receiver decision. Our design is similar to the one used by Chaudhuri, Sopher, and Strand (2002) as well as the "two-role-trust prior knowledge" treatment employed by Burks, Carpenter, and Verhoogen (2003). The following example illustrates how the senders and receivers were matched.

Room A Sender	Room B Receiver	Room B Sender	Room A Receiver
1	5	5	2
2	6	6	3
3	7	7	4
4	8	8	1

In this example, Subject #1 would make a sender decision and offer a split to Subject #5 as the receiver. At the same time, Subject #1 would receive a split as receiver from Subject #8, who is the sender, and so on. This preserves the one-shot nature of the interaction since each subject interacts with a different subject in her role as a sender and a receiver and thus there is no scope for reputation building. Since we have both a sender and a receiver decision for each subject, this allows us to measure the levels of trust and reciprocity for that subject. All subjects make the sender decision simultaneously. We also asked each sender (provided she transferred a positive sum to the paired receiver) if she expected the receiver to return any money and, if she did, what proportion she expected the receiver to return. Following this all subjects make a receiver decision simultaneously.

Given that each subject plays both roles in the trust game—that of sender and receiver—we have each subject play both roles of allocator and recipient as well in the dictator game. They are always paired with a different subject in each role as they are in the trust game along the lines explained above. Each player then actually plays four different roles—sender and receiver in the trust game and allocator and recipient in the dictator game—except each player is paired with a different player in each of those roles.

The second feature that is different is that, at the receiver's decision level in the trust game, we have data from actual decisions that the subjects made in their role as a receiver as well as data on their reciprocity levels elicited via the strategy method. The subjects were asked, before they knew how much they had received as a receiver, how much they would return to the sender if they received different hypothetical amounts of money. We discuss the consistency of responses using the two methods below.

Experimental Procedure

For each session, subjects were gathered in a room where they had instructions read to them. A show-up fee of $3.00 was given to the subjects.[6] The subjects were divided into two equal-sized groups. One group stayed in the same room while the other group was sent to an

[6] The experiments were conducted at the University of Melbourne and the dollars mentioned in the paper refer to Australian dollars. The exchange rate is roughly AU $1 = US 0.75 cents. However, given that the Australian dollar has been undervalued in recent years, the Australian dollar and the U.S. dollar are roughly equivalent in purchasing power terms.

adjoining room. The subjects were paired anonymously. The first and second movers in each pair were always in different rooms and could not see one another and did not know who they were paired with. Each group consisted of a mixture of the sexes and there were no same-sex groups. At the end of the experiment all subjects filled out a demographic survey.

Suppose the session starts with the trust game followed by the dictator game. All subjects had \$10.00 added to their total experimental earnings. No money was disbursed at that point and all actual payments were made at the end of the experiment. Each subject was told that in her role as the sender in the trust game she could keep the entire \$10.00 or, if she wished, she could split it (in whole dollar amounts) with an anonymous receiver. But any amount offered to the anonymous receiver would be tripled by the experimenter. The anonymous receiver then could decide to keep the entire amount of money offered or, if he wished, could send all or part of it back to the anonymous sender. This latter amount is not tripled.[7] Once the trust game decisions have been made we move on to the dictator game. Each subject is given another \$10.00 and makes a decision about how to split it with the anonymous recipient.

Subjects make their decisions using record sheets. (See the Appendix for the instructions to the subjects and the record sheets.) Decisions made by a first mover in one room are conveyed to the corresponding second mover in the other room and vice versa. The record sheets were collected by the experimenter and taken from room to room.[8] In the dictator game, none of the decisions are revealed to the subjects concerned until the very end of the session. In the trust game we have to reveal to the receiver the amount of money sent to him by the paired sender. Other than that, all other decisions and the amounts of money they have earned are revealed to the subjects *at the very end of the session*. This was done so that a subject's decision in the second game will not be unduly influenced by his earnings in the first game. This way subjects are not completely informed about their total earnings in the two games until the very end of the session.

In the trust game, prior to each subject making the actual receiver decision, we also elicited information about their reciprocity levels by using the strategy method. Specifically, each subject was asked how much she would return if she received a certain amount. Since senders are constrained to transfer money in whole dollars ranging from {\$1...\$10}, this implied that receivers could expect to get one of the ten amounts {\$3, \$6, \$9, \$12, \$15, \$18, \$21, \$24, \$27, \$30}. Receivers were asked to indicate how much they would return if they received each of these hypothetical amounts. Answers to this question allow us to examine the level of reciprocity of the receivers. The answer in each case from a purely self-interested perspective should be \$0. However, those who are motivated by reciprocity are expected to promise to send back more when they receive more. Then they were informed about the money they had

[7] For example, if a sender wished to keep \$4.00 out of the initial \$10.00 and offered \$6.00 to the receiver, then the receiver would actually receive \$18.00. The receiver can then decide if he wishes to send any part of the \$18.00 back to the sender.

[8] The original Berg, Dickhaut, and McCabe experiment followed a double-blind procedure. We use a single-blind protocol since it is debatable whether a double-blind procedure is absolutely essential. Bolton, Katok, and Zwick (1998) comment, "We find no basis for the anonymity hypothesis..." referring to double-blind procedures. Roth (1995, p. 301) comments, "...there is no evidence to the effect that observation by the experimenter inhibits player 1 in ultimatum games, nor that it is the cause of extreme demands in dictator and impunity games." However, within the single-blind protocol we were careful to not look at subject responses while matching the senders to the receivers. In addition, we avoided recruiting subjects from the classes that we were teaching to ensure that the subjects did not feel any pressure to behave in a particular manner.

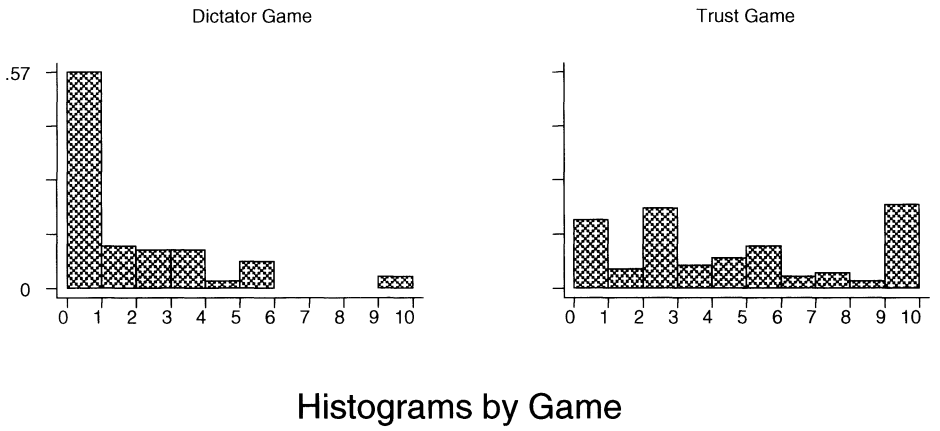

Figure 1. Distribution of Amounts Sent in the Dictator Game and the Trust Game

actually been offered. This allows us to examine their actual reciprocity explicitly as well as to compare their actual behavior with their stated behavior.

3. Results

Transfers in the Trust Game Are Significantly Higher than Those in the Dictator Game

In keeping with prior studies we find that subjects, in their role as senders in the trust game, do transfer positive amounts of money. The average amount transferred is \$4.33 (43.3%) out of the initial endowment of \$10.00. The average amount transferred in the trust game is significantly higher than that transferred in the dictator game. In the dictator game, on average, subjects transferred \$1.345 (13.45%) out of their initial endowment of \$10.00. The difference between the amounts transferred in the trust game and that transferred in the dictator game is highly significant using a non-parametric Wilcoxon paired sign-rank test ($z = 5.87$, $p = 0.00$).[9] In the next section we argue that it is expectation of reciprocation that is the primary driving force behind this behavior. Figure 1 shows the distribution of the amount sent by the allocator in the dictator game (left panel) as well as the distribution of the amount sent by the sender in the trust game (right panel). It is clear from the right panel that the mass of the distribution of amount sent in the trust game shifts towards the right (i.e., towards \$10) as compared with the one for the dictator game. It is interesting to see that roughly one-fifth of the senders (21%) in the trust game send the entire endowment to the paired receiver.

Role of Expectations in the Decision to Send Money in the Trust Game

Each sender in our experiment was asked whether she expected anything back from the receiver she was paired with and if she did, how much she expected to get back. We also asked

[9] There is a significant difference (using both the *t*-test and the non-parametric Mann-Whitney U-test) in the behavior of those subjects who played the dictator game first and those who played it second. The ones who played it first, on average, sent \$2.125 while those who played it second sent \$0.50. Thus, playing the trust game first resulted in greater stinginess on the part of the allocators in the dictator game. However, behavior is not different in the trust game (using either the *t*-test or the Mann-Whitney) according to whether subjects played the trust game first or second. Those who played the trust game first sent \$4.28 on average while those who played it second sent \$4.38.

Table 1. Double-Censored Tobit

Variable		Value
Female coefficient		−1.915** (0.815)
Age coefficient		−0.128 (0.215)
Percent amount expected back from receiver		8.598*** (1.665)
Accumulated wealth coefficient		−0.001 (0.095)
Constant		4.615 (4.282)
Number of observations[a]	97	
Number censored	1	
Number uncensored	82	
Number right-censored	14	
Pseudo-R^2	0.057	
Log likelihood	−246.701	
Likelihood ratio chi-square	29.74***	

Dependent variable: (amount of money sent in the trust game) − (amount of money sent in the dictator game). Standard errors shown in parentheses.

[a] One person did not answer the question about age and two other people did not answer the question about their expectations, giving us 97 observations instead of 100.

** Significant at 5%.

*** Significant at 1%.

the subjects to write down (using free-form responses) their motive in sending money to the receiver. (See the experimental instructions for details.)

We find that the amount of money (or the percentage) expected back from the receiver plays a major role in influencing the amount of money that is sent. Given that each dollar sent by the sender to the receiver in the trust game gets tripled, the sender is as well off or better off if the receiver returns exactly one-third or more of this tripled amount. For returns of less than a third, the sender is worse off. There is a significant difference in the behavior of those who expect less than one-third and those who expect more.[10] There are 44 subjects who expect to get back *less than* one-third of what the receiver gets and these subjects on average sent $2.14 out of $10.00. The modal amount (18 out of 44) sent by these subjects is $0.00. On the other hand, of the 37 subjects who expected to get back *more than* one third, the average amount sent is $6.05. There are 17 subjects who expected to get back exactly one-third and these subjects on average sent $5.41. The average amount transferred for the 54 subjects who expect to get back at least one-third or more is $6.05. The modal amount sent is $10.00 with 17 out of 54 subjects sending all their initial endowment.[11]

The amount that the sender sends to the paired receiver is highly correlated with the sender's expectation about the percent amount that the receiver will return (i.e., the sender's expectations about the receiver's reciprocity), with a Spearman rank correlation coefficient of 0.58 ($p = 0.00$).

Table 1 presents results from a parametric regression that examines this relationship in more detail. We regress the *difference between the amount sent in the trust game and the amount*

[10] Two subjects did not write an amount for what they expected to get back. Thus, there are only 98 observations instead of 100.

[11] Asking subjects about their expectation could have an impact on actual behavior. We asked senders about their beliefs regarding the behavior of receivers after the sender decision is made. Thus, it should not affect the sender decision, but it may have an impact on the receiver decision. See Croson (2000) for similar arguments.

sent in the dictator game against the following independent variables: (i) female (which is "1" if the subject is a female, "0" otherwise), (ii) age, (iii) the percent amount expected back from the receiver, and (iv) an accumulated wealth variable that captures what the subjects know about their earnings prior to participating in the trust game. As mentioned before, 52 out of 100 subjects participate in the dictator game prior to playing the trust game. While these subjects do not know their combined earnings in the dictator game (in the role of allocator *and* in the role of the recipient) until the very end of the session, they do know how much money they kept in their role as the allocator in the dictator game. Thus, they have partial information about their dictator game earnings. We generate the accumulated wealth variable by interacting the subject's known earnings from the dictator game with an order effects dummy that is "1" if the subject played the dictator game first and "0" if she played the trust game first. This variable controls for the potential wealth effect generated by the accumulated earnings in the dictator game.

The dependent variable ranges from −\$5.00 to \$10.00. Two subjects sent \$5.00 less in the trust game as compared with the dictator game while 14 subjects sent all \$10.00 in the trust game but sent nothing in the dictator game. Given these upper and lower bounds on the dependent variable, we use a double-censored Tobit model. We find that the coefficient of the female dummy is negative and significant ($t = -2.35$, $p = 0.02$), implying that women send less in the trust game as compared with men and hence exhibit a lower level of trust. The coefficient of the amount expected back (in percentage terms) is highly significant ($t = 5.17$, $p = 0.00$). Thus, there seems to be a significant amount of trust, in general, in that the difference in the amounts sent in the trust and dictator games, respectively, depends significantly on the proportional amount that the sender expects to get back from the receiver. The coefficient of the accumulated wealth variable is not significant, implying that the order in which the subjects played the games and consequently the earnings they brought into the second game do not have a significant impact on the dependent variable. In the regressions we also control for other self-reported individual level characteristics like the subject's ethnicity, their parents' ethnicity, their parents' education levels, the subject's GPA, whether the subject is religious or not, and whether the subject considers herself to be liked, trusted, friendly, and helpful (the last four responses measured on a Likert scale). None of these variables are significant in explaining the decisions made by subjects—in either the dictator or the trust game—and hence we do not report these here. We also asked about family income but a majority of subjects did not answer this question. Hence, we could not use this variable in the analysis.[12]

We also examined the free responses provided by the senders about what motivated them to send money (or not) to their paired receiver in the trust game and find that there are three broad types among the responses.

A majority of responses exhibit an explicit recognition of the role of trust in maximizing the size of the pie. But there are two distinct types among those who show recognition of the

[12] Following the suggestions of an anonymous referee, we also conducted random effects Tobit regressions to control for individual level unobserved heterogeneity in the sample. Subjects make three decisions in the four roles that they play and it can be argued that there is some individual specific effect that is common to all three decisions. The results from the random effects Tobit model are similar to the Tobit regression presented here. The indicator of the panel level variance, rho, is very near zero (rho = 4.46e–34) and a likelihood ratio test that examines the relevance of using panel data methods shows that the panel estimator is not different from the Tobit estimates presented in the paper. In the rest of the paper, we report unconditional Tobit estimates as the random effects estimates do not seem to be adding any information. The results from the random effects models are available on request.

incentives. One type decides to place trust on the pair member and send money. An example of the first type is Subject #1, who kept $0 and sent $10 and who says, "I want the $10 but we could both make more if we work together and split the $30 and make $15 each. This is a total risk because it would be tempting for the other person to keep the $30. I am hoping that an obvious gesture of generosity will get me some money back, $10 at least." There are 55 responses that correspond to this type and are coded as "2."

An example of the second type is Subject #19 who kept all $10 and says, "Because everyone wants to maximize his/her utility, so they want to keep the $10 with them (safely) since they are dealing with an anonymous person, so there is a possibility that he/she will lose some money, that he/she offered to the other person. But that person won't send you back the money, rather he/she will keep the money for themselves. Keep in mind that the chance is I will get 3X more than I offered to he/she, if he/she is willing to do it. However, in general people are not willing to do it with a stranger. So I choose to keep the $10 with me." There are 17 such responses and they are coded as "1."

The point here is that both responses coded as "2" and as "1" exhibit an explicit recognition of the incentives inherent in this game. Both these groups of players recognize that both players can be potentially better off if they behave according to the trust and reciprocity hypothesis but they arrive at starkly different conclusions. One group concludes in favor of exhibiting trust while the other group arrives at the opposite conclusion.

All other types of responses ($n = 28$) are coded "0." For example, Subject #13, who kept $8 and sent $2 saying, "I am expecting some returns from what I have given out. And besides, I would just feel bad if the opposite receives nothing." Or Subject #12, who kept $9 and sent $1, saying, "In this game I am not really losing anything. All that's happening is a gain—someone is gaining more than another. I don't mind sharing some gain/giving some money away. Hence, I thought I will give away $1 where I don't lose much, but my partner in the other room gains more."[13]

There are similarities among the responses coded "2" and many of the responses coded "0." Many of the "0" responses display an appreciation of the value of trust and reciprocity as well. What distinguishes them is that "2" responses were purely payoff- maximizing arguments, which suggested that the sender could get a higher return by reposing some trust in the reciprocity of the receiver. These are responses that put the decision in terms of one's own payoff maximization. "0" responses often refer to payoff maximization as well, but at the same time they show some desire towards "sharing" the money with the paired receiver (i.e., they express some concern about the other player's payoff).[14]

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[13] In some cases it is difficult to ascertain a clear motive. For instance, Subject #61, who sent $1, says, "This is just an arbitrary decision. I'll think that keeping more money to myself will then increase my earnings," or Subject #99, who sent $4, and says, "I make this decision because, first of all, I would like to keep a certain amount to myself, which is larger than the amount that I'll send out ...and then because I prefer to have 6:4 ratio I make this choice out of my intuition. I just pick it randomly. No specific reason as to why." These subjects are included in the "0" category as well.

[14] The coding of responses can be subjective and somewhat arbitrary. Different researchers might interpret different responses in different ways. Some responses have been included in the zero category because it was hard to ascertain what these motives were. We discuss these responses because we believe that they help in understanding what the subjects are thinking and enable us to understand their behavior. By themselves these free-form responses may not be powerful evidence but, added to the other evidence such as the role played by expectations in determining transfers made by senders in this game, these responses do strengthen the trust and reciprocity hypothesis.

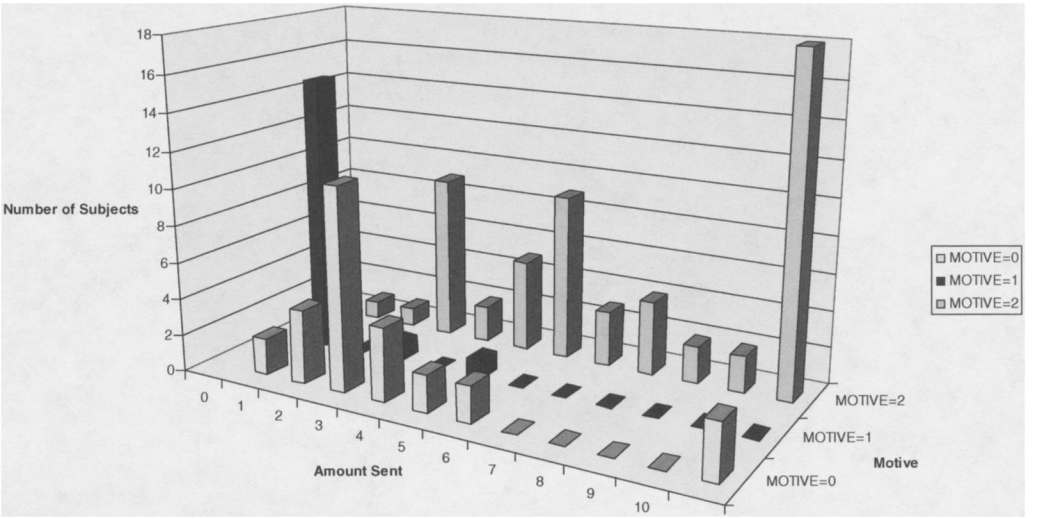

Figure 2. Amount Sent by Motive Type

Figure 2 shows a break-up of the amount sent by each type of motive. On average, people who were assigned a motive of "0" sent \$3.07 out of \$10. The modal amount sent by these subjects is \$2 (11 out of 28 people send this amount). For subjects with motive = 1 (those who recognize the value of trust but refuse to display any), the average amount sent is \$0.36 and the mode is \$0 with 15 out of 17 people choosing to send nothing. For subjects with motive = 2 (responses in keeping with the trust and reciprocity hypothesis) the average amount sent is \$6.20 with a mode of \$10. Eighteen subjects out of 55 with motive = 2 chose to send their entire endowment of \$10 to the paired receiver.[15]

Gender Differences in Trust

We find a significant gender difference in the trust game sender decision, with men sending more money than women. Of the original endowment of \$10.00, men on average send \$5.30 to the paired receiver. The corresponding number for women is \$3.47. The difference in the amount sent is significant using a non-parametric Mann-Whitney U-test ($z = -2.09$, $p = 0.04$). Figure 3 shows the distribution of the amount sent by men and women in the trust game. Apart

[15] We have mentioned above that 44 senders said that they expected to get back less than one-third from the paired receiver. Out of these 44, 18 senders send nothing to the paired receivers. Out of the remaining 26 subjects, 16 subjects express motive = 0, one subject motive = 1 and the remaining nine express motive = 2 as their reason for sending money. Nine of the 16 motive = 0 subjects send \$1. Five of the nine who express motive = 2 send \$3 or less. The surprise is that four subjects expect to get back less than one-third but send all \$10. It is possible that these subjects expect to be disillusioned by getting back less than what they send but are still willing to take a chance in case they turn out to be wrong. The behavior of these subjects is not without precedent. In Berg, Dickhaut, and McCabe's original study, subjects in the social-history treatment could see that in the prior no-history treatment trust did not pay. But the amount transferred by the senders in the social history treatment is actually higher than in the no-history treatment. Ortmann, Fitzgerald, and Boeing (2000) replicate Berg, Dickhaut, and McCabe's study and explicitly ask subjects, "How much money do you think will be returned to you?" Six subjects out of 18 in Treatment 5 and five subjects out of 16 in Treatment 5R send money even though they expect to get back one-third of the tripled amount or less. In treatment 5R, one subject sends all \$10 and another sends \$8 even though these subjects expect to get back strictly less than one-third. See tables A5E and A5RE (p. 93–94) in Ortmann, Fitzgerald, and Boeing (2000).

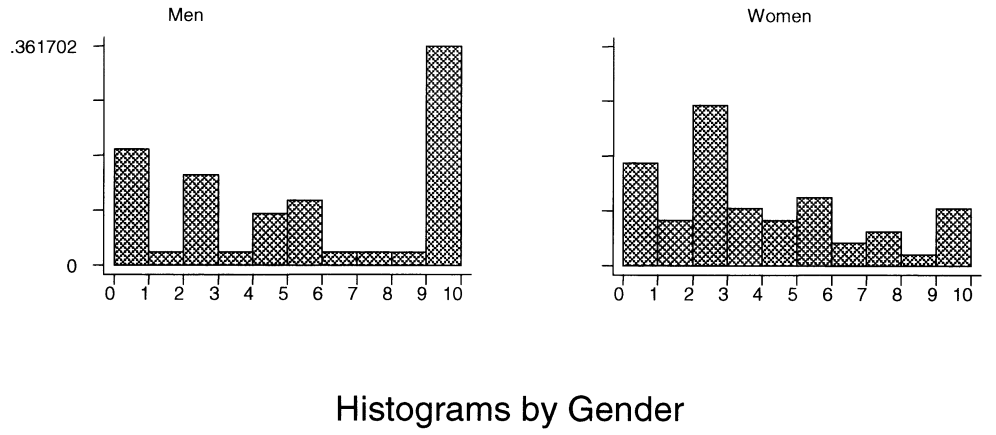

Figure 3. Distribution of Amount Sent in the Trust Game Broken up by Gender

from the fact that men send more than women in the trust game, another curious finding is that a large number of men send all of the \$10.00 initial endowment. As one can see from Figure 3, the modal amount sent for men is \$10.00 while for women it is \$2.00. Out of 47 men, 16 (34%) sent their entire endowment of \$10.00 to the paired receiver. Out of 53 women only five (6.4%) did so. (An equality of proportions test gives a significant difference: $z = 3.08$, $p = 0.00$.) The regression results presented in Table 1 also show that women send less than men in the trust game.[16]

To understand if there are systematic gender differences in the motive behind sending money, we analyze the free-form responses written by the senders in the trust game disaggregated by gender. Table 2 shows the amount transferred by each gender broken up by the motives expressed. In all three motive categories, women send less than men. Two things stand out from this table. First, many more women express motive "0"—20 women as compared with eight men (a larger percentage as well: approximately 38% of women as compared with 17% of men). Second, men who claim that they are motivated by trust and reciprocity (motive "2") transfer \$7.21, while women who express the same motive transfer \$5.08. The difference in these two amounts is significant using a t-test ($t = 2.58$, $p = 0.01$) and a non-parametric Mann-Whitney test ($z = 2.35$, $p = 0.02$). The amounts transferred for those who expressed motives "0" or "1" are not significantly different from one another. This suggests that (i) more women than men invoke motives that refer to fairness considerations, and (ii) even though roughly the same number of men and women express sentiments in

[16] However, we do not find a significant gender difference in the amount sent by the allocator in the dictator game. Men on average send \$1.18, while women send \$1.49. ($z = 0.64$, $p = 0.52$ on a Mann-Whitney test). This finding corroborates the results of Bolton and Katok (1995), who also find no gender differences in giving in the dictator game.

Table 2. Amount Sent in the Trust Game by Gender and Motive

	Amount Sent by Men	Amount Sent by Women
Motive = 0	\$4.25 ($n = 8$)	\$2.60 ($n = 20$)
Motive = 1	\$0.60 ($n = 10$)	\$0.00 ($n = 7$)
Motive = 2	\$7.21 ($n = 29$)	\$5.08 ($n = 26$)

keeping with the trust and reciprocity hypothesis, the women in this category still transfer less money than the men.

One explanation for the observation that women send less money as compared with men in the sender stage is that women might be more risk-averse.[17] One can think of the sender's decision to send money to the paired receiver as an inherently risky one since there is the possibility that the sender's trust will not be reciprocated. In order to examine if the women in our study exhibit greater risk aversion than men, we develop a simple model of risk aversion and then use the data on the amounts transferred in the trust game from the sender to the receiver to estimate the risk aversion parameters of the men and women in our study.

Suppose each sender believes that the receiver can be one of two types—a "reciprocator" or a "non-reciprocator." Let p denote the proportion of reciprocators and $1-p$ the proportion of non-reciprocators. The reciprocators behave according to some norm of reciprocity where they return a fraction α of any amount they have been sent while non-reciprocators return nothing. Suppose the sender in the trust game decides to send \$X to the receiver. The receiver then gets \$3X. With probability p the receiver returns α proportion of that amount and with probability $1-p$ he returns nothing. Using U to denote the expected utility (with $U(0) = 0$), we can express the expected utility of the sender in this case as $E(U) = p * U(10 - X + 3\alpha X) + (1 - p) * U(10 - X)$.

Let us assume that each sender chooses X so as to maximize this above expression. The first order condition yields

$$(3\alpha - 1)pU'(10 - X + 3\alpha X) = (1 - p)U'(10 - X).$$

Let the utility function exhibit constant relative risk aversion with the form $U(W) = (W^{1-\sigma})/(1 - \sigma)$, where σ is the coefficient of relative risk aversion (CRRA). A larger value of σ signifies a greater degree of risk aversion.

Using this CRRA utility function and substituting in the first order condition above, we get

$$p(3\alpha - 1)(10 - X + 3\alpha X)^{-\sigma} = (1 - p)(10 - X)^{-\sigma},$$

$$\left(\frac{10 - X + 3\alpha X}{10 - X}\right)^{\sigma} = \frac{(3\alpha - 1)p}{1 - p}, \tag{1}$$

[17] Jianakoplos and Bernasek (1998) and Sunden and Surette (1998) find that single women choose less risky financial options than single men. Using experiments, Levin, Snyder, and Chapman (1988) find that men exhibited a greater willingness to accept a gamble than women. Hudgens and Fatkin (1985) also find greater risk-aversion among women in two simulated experiments. Croson and Buchan (1999) find that men do send more than women in the investment game (69% as opposed to 63%). However, this difference is not significant in their study. In prisoner dilemma experiments, Ingram and Berger (1977) find that women chose the competitive strategy for fear of falling into the "sucker" role—choosing cooperation when the other player defects. The "sucker effect" occurs when individuals choose to free-ride out of fear that others will too. Orbell and Dawes (1981) first discussed the "sucker effect" as a justification for free-riding behavior in public goods experiments. However, there are counterexamples as well. Chen, Katuscak, and Ozdenoren (2005) find no gender differences in bidding behavior in a first price auction while women are menstruating, but do find that women tend to be more risk-averse when they are not. But as Croson and Gneezy (2004) point out in their recent review of gender differences in preferences, "most lab and field studies indicate that women are more risk-averse than men." (p. 45).

or

$$\frac{10 - X + 3\alpha X}{10 - X} = \left(\frac{(3\alpha - 1)p}{1 - p}\right)^{\frac{1}{\sigma}}. \tag{2}$$

Taking the derivative of X (the amount sent) with respect to the risk aversion parameter (σ), we get

$$\left(\frac{30\alpha}{(10 - X)^2}\right)\frac{dX}{d\sigma} = K^{\frac{1}{\sigma}}(\log K)\left(-\frac{1}{\sigma^2}\right), \tag{3}$$

where $K = \frac{(3\alpha - 1)p}{1 - p}$ or

$$\frac{dX}{d\sigma} = \frac{(10 - X)^2}{30\alpha}K^{\frac{1}{\sigma}}(\log K)\left(-\frac{1}{\sigma^2}\right). \tag{4}$$

The sign of the derivative depends on the value of log K and will be negative if log K is positive while the sign is positive if log K is negative.

If log K is negative, that implies that $K = [(3\alpha - 1)p/(1 - p)] < 1$ or $\alpha p < 1$. This would be true if and only if a subject sends money expecting to get back less than one third of what the receiver gets (i.e., if a subject sends money expecting to end up with less than her \$10 initial endowment). On the other hand, for those subjects who wish to maximize their payoff, log K must be positive (i.e., $K > 1$ or $[(3\alpha - 1)p/(1 - p)] > 1$ or $\alpha p > 1$). Thus, if we are going to relate trusting behavior with risk attitudes then it makes sense to use only those subjects who expect to get back at least one-third or more of what the receiver gets. As noted in section 3.1.1, there are 54 such subjects. These are the subjects whose behavior accords with the trust and reciprocity hypothesis. For these subjects, $\alpha p > 1$ and log $K > 0$ and so the sign of the derivative in Equation 4 is negative (i.e., the amount of money sent is decreasing in σ, or the higher the risk aversion parameter, the smaller the amount sent).

To examine whether men and women exhibit differing degrees of risk aversion, we use Equation 1 to obtain the following:[18]

$$\log(3\alpha - 1) = \beta_0 + \beta_1 \log\left(\frac{10 - X - 3\alpha X}{10 - X}\right), \tag{5}$$

where $\beta_0 = -\log\left(\frac{p}{1 - p}\right)$ and $\beta_1 = \sigma$ (the risk aversion parameter).

To see if there are any systematic differences in risk attitudes by gender, we regress log $(3\alpha - 1)$ against a set of independent variables that include log $\left(\frac{10 - X + 3\alpha X}{10 - X}\right)$, a gender dummy (*female*, equal to 1 if subject is female and 0 otherwise) and an interaction term, *female_log*,

[18] Since the logarithm of zero or a negative number is undefined, we have a problem for all those cases where $X = 10$ (i.e., the sender sent all of the initial endowment) or the sender expects to get back less than one-third of the money that the receiver receives (i.e., $\alpha < 1/3$). To skirt this problem, we have used $X = 9.99$ for all values of $X = 10$. Also, as explained above, for this part of the analysis we are dropping those subjects who expect to get back less than one-third.

Table 3. Ordinary Least Squares Regression for Risk Aversion Estimates (Trust Game)

	Coefficient	Standard Error	*t*-Statistic	*p* Value
log ((10-X+3αX)/(10-X))	−0.002	0.0912	−0.02	0.981
Female	−0.202	0.258	−0.75	0.455
Female_log	0.215*	0.113	1.90	0.063
Constant	−0.733	0.201	−3.65	0.001
R^2 = 0.05		Number of observations = 54		
F(3,50) = 4.59		Prob > F = 0.0524		

Dependent variable: log (3α − 1). $\log(3\alpha - 1) = \beta_0 + \beta_1 * \log\left(\frac{10 - X + 3\alpha X}{10 - X}\right) + \beta_2 * female + \beta_3 * female\_log.$
* Significant at the 10% level.

(between the gender dummy, female and log $\left(\frac{10 - X + 3\alpha X}{10 - X}\right)$). The regression equation is

$$\log(3\alpha - 1) = \beta_0 + \beta_1 * \log\left(\frac{10 - X + 3\alpha X}{10 - X}\right) + \beta_2 * female + \beta_3 * female\_log.$$

We find that the coefficient for the interaction term *female_log* is significantly different from zero ($p = 0.06$). See Table 3 for the estimated coefficients. A test of joint significance of the gender dummy female and the interaction term gives an F-statistic of 2.70 ($p = 0.08$). This indicates that the smaller amounts transferred by women senders in the trust game may be motivated by greater risk aversion on the part of women as compared with men.[19]

Receiver's Decision: A Measure of Reciprocity (Reciprocity Elicited Directly Using Actual Amounts)

In this section, we examine how the subjects behaved in their role as the receiver in the trust game. Since different receivers receive different sums of money from the paired sender, we look at the proportion of amount sent back by each receiver. We drop 18 observations here, since 18 out of 100 subjects received \$0 from the paired sender. We find that on average subjects send back around 17.5% of the amount that they receive from the sender. Men return 14.7% and women return 19.8%, a difference that is not statistically significant.

The percentage of money received by the receiver from the paired sender and the percent of money sent back to the paired sender is highly correlated (Spearman's Correlation

[19] We also look at the disaggregated data broken up by gender. We use Equation 5 to estimate the risk-aversion parameter (β_1) separately for men and women and find that for women the coefficient is 0.213 and this value is significantly different from zero with a t-statistic of 3.17 ($p = 0.00$). For men, however, this coefficient is not significantly different from zero (see Table 4).

Table 4. OLS Regression for Risk Aversion Estimates Separated by Gender (Trust Game)

	Women		Men	
	Coefficient	Robust Standard Error	Coefficient	Robust Standard Error
log ((10-X+3αX)/(10-X))	0.213***	0.067	−0.002	0.091
Constant	−0.934***	0.178	−0.732***	0.200
R^2	0.10		0.01	

Dependent variable: log (3α − 1). $\log(3\alpha - 1) = \beta_0 + \beta_1 * \log\left(\frac{10 - X + 3\alpha X}{10 - X}\right)$.
*** Significant at the 1% level.

Table 5. Ordinary Least Squares Regressions for the Percentage Sent Back by the Receivers in the Trust Game

Variable	Coefficient	Standard Error
Female	0.059	0.044
Age	0.020	0.012
Amount of money *received* from the paired sender in the trust game	0.006**	0.002
Amount of money *sent* by the subject as the sender in the trust game	0.012*	0.006
Amount of money *sent* by the subject as the allocator in the dictator game	0.033***	0.010
Accumulated wealth	−0.003	0.004
Constant	−0.415	0.233
Number of observations	82	
Adjusted R^2	0.203	

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Coefficient = 0.32, $p = 0.00$). This implies that when the receiver receives a larger percentage of the initial endowment of the sender, the receiver responds by returning a larger percentage as well. In Table 5 we provide the results of an OLS regression where the dependent variable is the percent amount sent back by the receiver in the trust game. The set of independent variables include (i) the gender dummy—female, (ii) age, (iii) amount of money received from the paired sender, (iv) amount of money the subject sent to the paired receiver in his role as the sender in the trust game, (v) amount of money the subject sent to the paired recipient in the dictator game, and (vi) an accumulated wealth variable exactly as in Table 1, which captures what the subjects know about their earnings in the dictator game prior to playing the trust game. As before, this variable is created by interacting the amount kept by the subject in his role as the allocator in the dictator game with an order effects dummy which is "1" if the subjects played the dictator game first and "0" if they played the trust game first.

We find that there are no systematic gender differences. However, the amount of money received from the sender is highly significant, attesting to the existence of reciprocal tendencies. The coefficient of the amount of money sent in the dictator game is highly significant as well indicating that those subjects who send more money to their paired recipients in the dictator game are also more reciprocal in the trust game. Finally, the coefficient of the amount sent by the subject in his role as the sender in the trust game is significant at the 10% level. This—the connection between the amount sent as the sender in the trust game and the amount returned as the receiver—is an interesting issue that we explore in greater detail in the section that looks at the relation between trust and trustworthiness. We show that for some subjects, who we will refer to as "trustworthy," these amounts are highly correlated while for other, non-trustworthy subjects, these amounts are not correlated at all.

Reciprocity Elicited via the Strategy Method

Now let us look at the responses elicited via the strategy method, where the subjects were asked to respond to how much they would keep if they received the 10 hypothetical amounts

{$3, $6, $9, $12, $15, $18, $21, $24, $27, $30}. They made these decisions before they knew how much they had received from their paired sender.

We have 94 responses in all, since six respondents did not fill out this part of the instructions. Of these 94 responses, there are five clear trends.[20] At one extreme, we have 20 subjects who might be referred to as "egoists." These are people who say that they will send back nothing to the anonymous sender regardless of the amount they might receive from the paired sender. At the other end we have seven subjects who we refer to as "egalitarians." These are subjects who say that they will send back approximately 50% of any amount they receive (as long as that amount exceeds $3). In between, we have three distinct groups who exhibit varying degrees of reciprocity. First, we have a group of 13 subjects who could be thought of as "strong reciprocators." These subjects indicate that for any amount received (as long as that amount exceeds $3) they will send back *at least* 33%. Typically they promised to send back around 33% if the amount received is small, such as $6, and larger fractions (typically close to 50%) if the amount received is much larger, such as $30. Then we have a group of "weak reciprocators" ($n = 32$). They are willing to send some money back but the percentage they are willing to send back is typically small, ranging from 10% to 20% and never exceeding 33%. In between the "strong reciprocators" and "weak reciprocators" we have a group that we will call "late reciprocators" ($n = 21$). For sums of money less than $15, these subjects resemble the "weak reciprocators" in that they would send back only about 10–20% of the money received. However, for amounts of $18 or more these subjects resemble "strong reciprocators" in that they would return 33% or more.

We provide a broad overview of the responses in each of these groups in Figure 4. On the x-axis we have the possible amounts that the receiver can receive. The y-axis shows the percentage of the amount received that the receiver is willing to return to the anonymous sender. In order to create this graph we look at the individual responses as to how much a subject would send back if he received $3, $6, $9, $12, $15, $18, $21, $24, $27, or $30. Then we take the *average* of all those responses corresponding to each hypothetical amount for all subjects in a particular category. Thus, if we look at the 13 "strong reciprocators," these subjects stated that *on average* they would return approximately 40% of any amount received between $6 and $30.

Consistency of Responses Elicited using the Direct and Strategy Methods

The consistency of responses obtained from the two methods relates to the issue of "hot" versus "cold" responses (Brandts and Charness 2000). That is, when subjects answered hypothetically that they would return $Y if they received $X (the "cold" response), did they indeed return $Y when they received $X from the anonymous sender (the "hot" response)? Here we have 76 observations. This is because 18 subjects received $0 and six subjects did not fill out the relevant part of the questionnaire. Figure 5 describes the behavior of all 76 subjects for whom we have data. The subjects who were consistent have been assigned a code of "0." If a subject *kept more than she said she would* we have given this subject a *negative number* where the number refers to the actual dollar figure (i.e., how

[20] This ignores one subject who behaves in a "hyper-fair" manner, in that this subject promises to give back more than 50% for all amounts received.

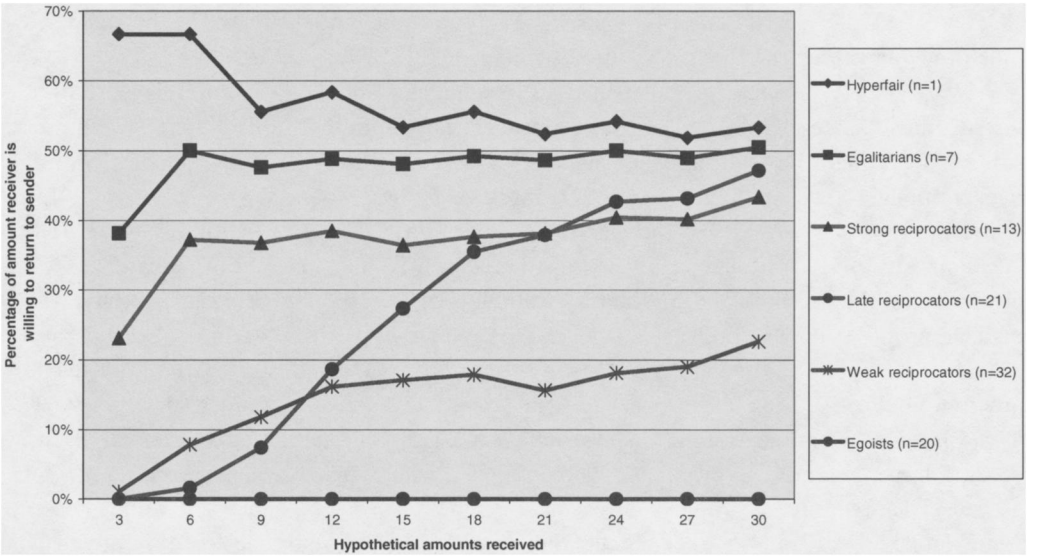

Figure 4. Types of Reciprocators

much less she sent back compared with what she said she would send back). If she *kept less than she said she would and sent more back* to the receiver then she has been assigned a *positive number* where, once again, the number refers to how many dollars more she sent back compared with what she said she would send back. Figure 5 shows that out of 76 subjects, 49 were consistent and another eight erred within $1 on either side, giving us 57 (75%) subjects who were more or less consistent. This corroborates the evidence reported by Brandts and Charness (2000) that the "hot" and "cold" responses in many situations are consistent with one another.

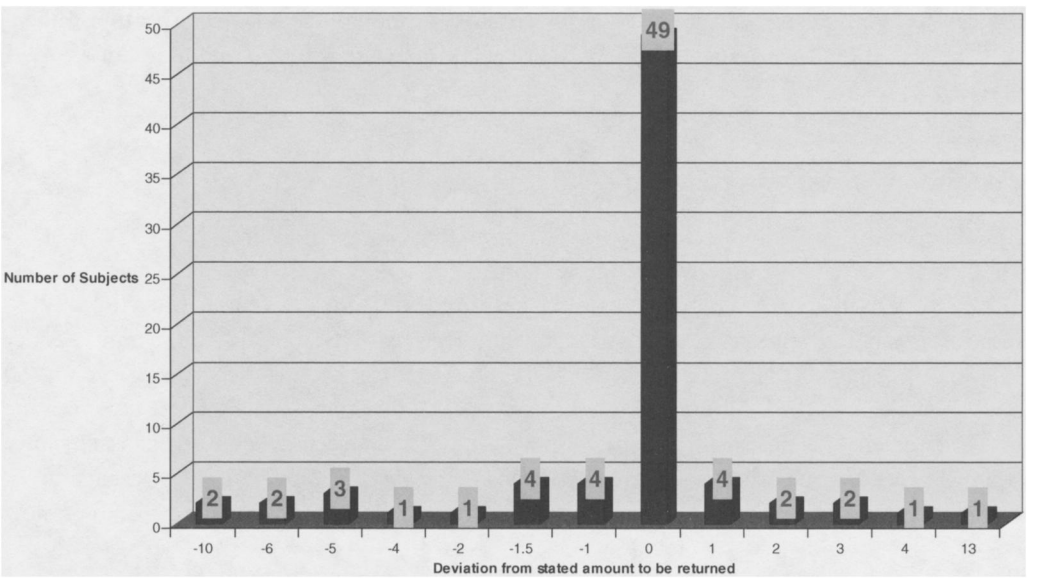

Figure 5. Consistency between Stated and Actual Response

Relation between Trust and Trustworthiness

Next we explore the relationship between trust and trustworthiness, the latter being the level of reciprocity shown by the subject. If a subject reposes trust on her pair-member by sending money, then would that subject necessarily also reciprocate another subject's trust when in a position to do so? We find that those who trust do not necessarily reciprocate. Let us define a subject as "trusting" if he or she sent *exactly 50% or more* of her initial endowment of \$10.00 in the trust game. If they sent *less than 50%* then we call them non-trusting. Then let us see if the subjects classified as "trusting" using this definition exhibit greater reciprocity than the "non-trusting" subjects. It turns out that the answer is no. Using the 50% cutoff, we get 58 subjects who are non-trusting (sent less than 50%) and 42 trusting (sent exactly 50% or more). The non-trusting subjects returned on average 18% of the amount they received, while the trusting subjects returned 16%. This difference is not significant using either a *t*-test or a Mann-Whitney test and the result does not change when we try alternative definitions of "trusting."

This evidence suggests that, while a large majority of subjects in this game exhibit trust, not all of them necessarily reciprocate trust when they have the opportunity to do so. Thus, many subjects, while trusting, may not be trustworthy. How about those who do reciprocate trust? Are they more trusting? The answer turns out to be an emphatic yes. Let us define as "trustworthy" those who return *at least one third or more* of any amount offered to them. There are 27 such subjects. The remaining 55 who return *less than* one third are deemed less trustworthy. Remember that 18 receivers get nothing from their senders and thus we have only 82 observations. Then let us look at how much money these two groups of subjects send to the pair-member in their role as senders, where the amount of money sent is a measure of their degree of trust. It turns out that the 27 trustworthy subjects send \$5.33 on average, which is higher than the \$3.82 on average sent by the remaining 55 subjects ($t = 1.79$, $p = 0.07$ using a *t*-test; $z = 1.84$, $p = 0.06$ using a Mann-Whitney test). A parametric double-censored Tobit model confirms this finding. In Table 6 we regress the amount of money sent as the sender in the trust game against (i) female (= 1 if female, 0 otherwise), (ii) age, (iii) trustworthy, where trustworthy = 1 if the subjects returned *at least one third or more* as the receiver, 0 otherwise, and (iv) an accumulated wealth variable, as in Tables 1 and 5, which capture the subject's known earnings from the dictator game interacted with the order effects dummy. The coefficient for trustworthy is positive and significant showing that as trustworthy goes from 0 to 1 (i.e., toward greater reciprocity) for those subjects the amount of money sent as sender (a measure of trust) is significantly higher. Thus, we have strong evidence that being trustworthy implies being trusting—that is, those who reciprocate others' trust are inclined to trust others as well—but the converse is not true. This finding that subjects who are trustworthy are also trusting is consistent with the results of the Bolton and Ockenfels (2000) Equity, Reciprocity, and Competition model, where players care about both absolute payoff as well as relative payoff. As these authors argue (p. 182–3), the receiver in the trust game will cooperate (reciprocate) if she is sufficiently motivated by relative payoff and the sender cooperates to start with. A sender will cooperate if and only if she is sufficiently motivated by pecuniary payoffs and the expected returns are positive. Thus a receiver who is willing to reciprocate the sender's trust will also be willing, in her role as the sender, to take the chance of being exploited by triggering receiver cooperation. Each subject is making two separate decisions—one as the sender in the trust game and another as the receiver—and in going from the

Table 6. Double-Censored Tobit

Variable	Coefficient
Female	−3.410*** (1.252)
Age	−0.267 (0.345)
Trustworthy	2.901** (1.339)
Accumulated wealth	−0.003 (0.139)
Constant	10.617 (6.892)
Number of observations	82
Number left censored	15
Number uncensored	49
Number right censored	18
Pseudo-R^2	0.032
Log likelihood	−183.038
Likelihood ratio chi-square	12.21**

Dependent variable: The amount of money sent by the subject as the sender in the trust game (a measure of the degree of trust). Standard errors shown in parentheses.
** Significant at the 5% level.
*** Significant at the 1% level.

sender decision to the receiver decision there is a shift in the "social reference point" as defined by Bolton and Ockenfels (2000).[21]

Relation between Reciprocity in the Trust Game and Generosity in the Dictator Game

Note that the receiver (second) stage of the trust game is analogous to a dictator game except that different receivers in the trust game receive different amounts. Thus, we can compare the *percentage amount* sent back by the receiver in the trust game with the *percentage amount* sent by the allocator in the dictator game to see if these amounts are different. It is important to compare the percentage amounts here, since the receivers in the trust game have different amounts at their disposal (ranging from \$3 to \$30) while the allocators in the dictator game always have \$10. Here we consider only those receivers who received non-zero amounts from the paired sender and thus we have 82 observations. For these 82 subjects, the average amount sent as the allocator in the dictator game is 11.8%, while the average amount returned as the receiver in the trust game is 17.4%. The percentage amount sent back by the receiver in the trust game is significantly greater than that sent by the allocators in the dictator game at the 5% level ($z = 2.01$ and $p = 0.04$ on the Mann-Whitney U-test). Receivers in the trust game return a greater proportion compared with the dictator game, perhaps recognizing the element of positive reciprocity in this game.[22] We next compare the behavior of the trustworthy receivers (defined as those who send back one third or more of the money received from the sender) and the less trustworthy ones (i.e., those who send back less than one third) in the dictator game. As noted above, we have 27 observations in the

[21] We are indebted to an anonymous referee for pointing out this connection to us.

[22] Bolton, Katok, and Zwick (1998) argue that allocators in either the dictator game or the impunity game decide on the total amount of the sacrifice (i.e., the total amount they wish to transfer) rather than percentage amounts. They comment (p. 286): "Our basic finding here is that dictators determine how much money they should keep, and consequently how much they should give in gifts, on the basis of the total available for the entire experimental session, not on the basis of what is available per game." According to this hypothesis the absolute amounts sent by the allocators in our dictator game and the absolute amounts returned by the receiver in our trust game should be roughly equal. We find that this is not true in our data. The average absolute amount returned by the receivers in the trust game (\$3.30) is significantly higher (at the 1% significance level) than the average absolute amount sent by the allocators in the dictator game (\$1.20).

Table 7. Double-Censored Tobit

Variable	Coefficient	Standard Error
Female	0.918	1.130
Age	−0.114	0.293
Trustworthy	2.147**	1.116
Amount sent by the sender in the trust game	0.026	0.158
Accumulated wealth	−0.240**	0.088
Constant	1.149	6.116
Number of observations	82	
Number left censored	49	
Number uncensored	31	
Number right censored	2	
Pseudo-R^2	0.06	
Log likelihood	−114.458	
Likelihood ratio chi-square	14.63***	

Dependent variable: The amount of money sent by the allocator in the dictator game.
** Significant at the 5% level.
*** Significant at the 1% level.

first group and 55 in the second. We find that on average trustworthy subjects send \$1.89 as the allocator in the dictator game. The less trustworthy ones send \$0.83. This difference is highly significant using a t-test ($t = 2.25$, $p = 0.03$) and marginally significant using the non-parametric Mann-Whitney test ($z = 1.76$, $p = 0.08$). In Table 7 we regress the amount of money sent by the allocator in the dictator game against a set of independent variables that include (i) the gender dummy—female, (ii) age, (iii) a dummy variable "trustworthy" that takes the value of "1" for trustworthy subjects as defined above and 0 otherwise, (iv) the absolute amount sent by the sender in the trust game, and (v) an accumulated wealth variable that captures what the subjects know about their earnings prior to participating in the dictator game. Forty-eight subjects played the trust game first. While these subjects do not know their combined earnings as the sender *and* the receiver in the trust game until the end of the session, they do know how much money they kept back in their role as the receiver and to that extent have partial information about their trust game earnings. For Table 7 we create the accumulated wealth variable by interacting a subject's known earnings from the trust game with a dummy variable that is equal to 1 when the subject plays the trust game first and 0 otherwise. Given that the observations are bounded by \$10 at the upper limit and by \$0 at the lower limit in the dictator game, we use a Tobit model with double censoring. The wealth variable is negative and significant, implying that playing the trust game first resulted in less money being sent in the dictator game. This is consistent with the results from the non-parametric tests reported before. The coefficient for the trustworthy dummy variable is positive and highly significant, showing that trustworthy subjects do send more money in the dictator game. This behavior, that subjects who are trustworthy are also more generous in the dictator game, is consistent with both the Equity, Reciprocity, and Competition model of Bolton and Ockenfels (2000), as well as the inequity aversion model of Fehr and Schmidt (1999).

4. Discussion of Our Results and Some Concluding Remarks

In this paper we have adduced evidence in favor of trusting and reciprocal tendencies. We also find that men exhibit higher levels of trust than women do but there are no significant

gender differences in reciprocal behavior or in allocating money in the dictator game. We attribute the lower trust exhibited by women to a greater degree of risk aversion. One interesting finding of this study is the disconnect between trust and reciprocity in that those who trust are not necessarily trustworthy, but the latter are generally more trusting. Moreover, being more trustworthy is closely connected with greater generosity in the dictator game. We argue that what many prior studies (such as Berg, Dickhaut, and McCabe 1995) have interpreted as trust has two distinct components. One is being both trusting and trustworthy in the sense of possessing a general social orientation towards others, while the other has an element of calculated risk-taking or a predilection for accepting a gamble. The former component is definitely a "social virtue" (as defined by Fukuyama 1995), the latter probably not. See Kramer (1999) for a detailed discussion of this point.[23] So when it comes to the idea of social capital—as in Putnam (2000) for instance[24]—it is trustworthiness that is more important and relevant rather than trust. If one is trustworthy, then one is definitely trusting, but a trusting individual is not necessarily trustworthy. Thus, researchers looking at social capital and its role in economic growth and development should concentrate more on the trustworthy aspects of behavior in the trust game rather than the trusting decision.

Appendix: Experimental Instructions

*Player ID #*_____

Experiment Instructions

General Instructions

This is an experiment in the economics of market decision making. The University of Melbourne and other funding agencies have provided funds to conduct this research. The instructions are simple. If you follow them closely and make appropriate decisions, you may make an appreciable amount of money. These earnings will be paid to you in cash at the end of the experiment.

In this experiment you will be asked to make a series of decisions. Please make sure that you completely understand the instructions for each part of the experiment before making any decisions in that part of the experiment. If you have any questions at any point or need clarifications, please raise your hand and the experimenter will come to you and answer your question.

You will be paid $3.00 as a show-up fee. This money is being paid to you just for agreeing to participate and will be paid to you regardless of any other amount that you may earn during the actual experiment.

After we are done with the experiment we would like you to answer a few questions about yourself. Please answer the questions truthfully and as accurately as possible. They provide the experimenter with extremely valuable data that is of enormous help in organizing and interpreting your decisions. Your answers are confidential and will not be revealed to anyone other than the experimenters. The data will only be identified by the ID number assigned to you at the top of this sheet and will not at any point be connected to your name in any way. **If you are ready then we will proceed. Please turn the page and follow along with the experimenter.**

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[23] Chaudhuri et al. (2003) use the Social Values Orientations scale – a psychological questionnaire designed to measure trust – to classify people as "high" or "low trustors" and find, in a different game, that high trustors are both trusting and trustworthy, while low trustors may be trusting but do not reciprocate others' trust.

[24] Putnam (2000, Chapter 8, p. 136–7) comments, "Other things being equal, people who trust their fellow citizens volunteer more often, contribute to charity, participate more often in politics and community organizations, serve more readily on juries, give blood more frequently, comply more fully with their tax obligations, are more tolerant of minority views, and display many other forms of civic virtue." Our findings suggest that here Putnam's use of the word "trust" should be interpreted as "trustworthiness."

Experiment 1 (Dictator Game)

The following experiment will be conducted in pairs. After the experimenter is done reading the instructions you will be divided into two equal groups—one group will stay in this room while the other group will go into the next room. Each of you will ALWAYS be paired with another person who will be in the other room and neither of you will know the other person's identity at any time.

In this experiment, one member of the pair is designated the SENDER while the other is designated the RECEIVER.

Each SENDER has $10.00. No money will be disbursed at this point and all actual payments will be made at the end of the experiment. However, every person who is a SENDER will have $10.00 added to their total experimental earning.

Each SENDER is free to take the entire $10.00 that has been added to his or her account. Or, if the SENDER so wishes, then he or she can split this $10.00 with the anonymous RECEIVER he/she is paired with. For example, if the SENDER wishes to give $X.00 out of $10.00 to the anonymous RECEIVER, then the anonymous RECEIVER will get $X.00 while the SENDER will get $10.00 – $X.00.

Each of you will play both roles in this experiment. Each of you will be paired with two people. In one pair you will be the SENDER while in the other pair you will be the RECEIVER. Let us take an example. Suppose you are Subject #1. In one pairing, you are paired with Subject #5. In this pairing you, Subject #1, are the SENDER while Subject #5 is the RECEIVER. In another pairing you are paired with, say, Subject #8. However in this pair, Subject #8, is the SENDER while you, Subject #1, are the RECEIVER.

So you will play this game once as SENDER and once as RECEIVER. However, the important thing to bear in mind here is that you are NOT paired with the same person as SENDER and RECEIVER. Rather you are paired with two different people. In case you have already participated in another paired experiment just before this then please bear in mind that you will NOT be paired with the same two people but rather with two totally different people.

In all cases, the person you are paired with will be in the other room and you will not be told of the identity of the person at any point.

You will convey your decisions to your paired member using the form provided. Please take a look at this form now.

Player ID #_____

Form for Recording Decisions for Experiment #1

TOTAL AMOUNT	**$10.00**
AMOUNT I WISH TO KEEP	
AMOUNT I WISH TO SEND TO ANONYMOUS RECEIVER	

It is important that you keep track of your earnings accurately since this is the amount you will be paid at the end of the experiment.

You will record your earnings from various parts of this experiment on the RECORD SHEET that has been given to you. Please take a look at the RECORD SHEET now.

Player ID # _____

Earnings Record Sheet for Experiment#1

Box 1	Amount Kept as Sender in Experiment 1	
Box 2	Amount Received as Receiver in Experiment 1	
Box 3	Total Earnings in Experiment 1 (Add amounts in Boxes 1 & 2)	

After you have made your decision as the SENDER, please record the amount that you wish to keep for yourself (out of the $10.00) in Box 1 of the RECORD SHEET. Your job as SENDER is done at this point.

The experimenter will then collect all the forms and convey your decision to the anonymous RECEIVER you are paired with. Since you are the RECEIVER in another pairing you will receive a form from the SENDER you are paired with. This form will indicate any amount that the anonymous SENDER is offering to you. Please make a note of any amount offered to you as the RECEIVER in Box 2 of the RECORD SHEET. This concludes Experiment #1.

Add the two amounts in Boxes 1 and 2 and write down that amount in Box 3. This is your total earning for Experiment #1.

Are there any questions?

We will now proceed with Experiment #1.

Experiment 2 (Trust Game)

The following experiment will be conducted in pairs. After the experimenter is done reading the instructions you will be divided into two equal groups—one group will stay in this room while the other group will go into the next room.

In this experiment, one member of the pair is designated the SENDER while the other is designated the RECEIVER.

Each SENDER has $10.00. No money will be disbursed at this point and all actual payments will be made at the end of the experiment. However, every person who is a SENDER will have $10.00 added to their total experimental earning.

Each SENDER is free to keep the entire $10.00 given to him or her. Or if he/she wishes to, he/she can decide to split it with the anonymous RECEIVER he/she is paired with. However, any amount of money that the SENDER offers to the anonymous RECEIVER will be TRIPLED by the experimenter and given to the RECEIVER. For example, if the SENDER offers to give $X.00 to the anonymous RECEIVER, then the anonymous RECEIVER will actually be given 3×$X.00 since the amount offered is TRIPLED by the experimenter. The RECEIVER, in turn, can decide to keep the entire 3×$X.00 offered to him/her. Or the RECEIVER can, if he/she so wishes, send a part or all of this 3×$X.00 back to the same anonymous SENDER he/she is paired with. This latter amount will NOT be TRIPLED anymore. The experiment ends at that point.

Each of you will play both roles in this experiment. Each of you will be paired with two people. In one pair you will be the SENDER while in the other pair you will be the RECEIVER. Let us take an example. Suppose you are Subject #1. In one pairing, you are paired with Subject #6. In this pairing you, Subject #1, are the SENDER while Subject #6 is the RECEIVER. In another pairing you are paired with, say, Subject #7. However, in this pair Subject #7 is the SENDER while you, Subject #1, are the RECEIVER.

So you will play this game, once as SENDER and once as RECEIVER. However, the important thing to bear in mind here is that you are NOT paired with the same person as SENDER and RECEIVER. Rather you are paired with two different people. In case you have already participated in another paired experiment just before this

then please bear in mind that you will NOT be paired with the same two people but rather with two totally different people.

In all cases, the person you are paired with will be in the other room and you will not be told of the identity of the person at any point.

You will convey your decisions to your paired member using the form provided. Please take a look at this form now.

It is important that you keep track of your earnings accurately since this is the amount you will be paid at the end of the experiment.

You will record your earnings from various parts of this experiment on the RECORD SHEET that you have been provided. Please take a look at the RECORD SHEET now.

Player ID # _____

Earnings Record Sheet for Experiment #2

4	Amount Kept as Sender in Experiment 2	
5	Amount Kept as Receiver in Experiment 2	
6	Amount sent back by paired Receiver in Experiment 2	
7	Total Earnings in Experiment 2 (Add amounts in Boxes 4, 5 &6)	
8	Total Earnings in Experiments 1 & 2 (Add boxes 3 & 7)	
9	Show-up fee	$3.00
10	TOTAL	

After you have made your decision as the SENDER, please record the amount that you wish to keep for yourself (out of the $10.00) in Box 4 of the RECORD SHEET. Your job as SENDER is done at this point.

The experimenter will then collect all the forms and convey your decision to the anonymous RECEIVER you are paired with. This RECEIVER will then get three times the amount you have offered. The RECEIVER can, if he/she so wishes, return some amount to you. Once you get back this amount from the RECEIVER, please make a note of it on Box 6 of the RECORD SHEET.

However, do not forget that you are also paired with another person, where you are the RECEIVER. So you will also receive an amount from the anonymous SENDER you are paired with. When you get this offer, you will have to decide how much to keep and how much to send back. So while the RECEIVER you are paired with is making a decision about what to keep and what to send back, you are making a similar decision about what to keep and what to send back. Once you have decided how much you wish to keep back as the RECEIVER, please make a note of this amount on Box 5 of the RECORD SHEET.

If you are not absolutely sure that you understand the instructions, please get any questions clarified before we proceed.

Are there any questions?

Please turn the page when asked to do so and answer the questions on the next page.

Decision Task 1

Pick ONE out of the following as your decision: Put an X next to your choice.

	I WISH TO KEEP ($)	**I WISH TO SEND ($)**	**THE RECEIVER WILL THEN GET ($)**
	10.00	0.00	0.00
	9.00	1.00	3.00
	8.00	2.00	6.00
	7.00	3.00	9.00
	6.00	4.00	12.00
	5.00	5.00	15.00
	4.00	6.00	18.00
	3.00	7.00	21.00
	2.00	8.00	24.00
	1.00	9.00	27.00
	0.00	10.00	30.00

After you have made your choice, enter the relevant amount on the Form for Making Decision in Experiment #2.

Player ID #_____

Before we proceed please answer the following questions.

Please look at the choice you made on the RECORD SHEET.

You decided to KEEP _____ and send _____ to the RECEIVER. As a result of your decision the RECEIVER will actually receive _____.

Based on the choice you made in DECISION TASK 1, the anonymous RECEIVER will receive _____. The anonymous RECEIVER can then, if he/she so decides, send some money back to you, the SENDER.

Decision Task 2

1. Are you expecting to get any money back? ____ YES ____ NO
2. How much money are you expecting to get back from the RECEIVER? $ _____

Keep in mind the amount of money that the RECEIVER has received that is shown previously and that you have noted above.

Decision Task 3

You decided to KEEP _____ and send _____ to the RECEIVER. As a result of your decision the RECEIVER will actually receive _____.

Why did you make this decision? Please take a few minutes to explain as clearly as you can. (Please feel free to use the other side of this sheet if you need to.)

Each of you will also play as a RECEIVER. Before any of the actual decisions are revealed to you, please complete Decision Task 4.

IF AMOUNT RECEIVED IS	THEN I WANT TO KEEP	I WISH TO SEND BACK TO SENDER
$3.00		
$6.00		
$9.00		
$12.00		
$15.00		
$18.00		
$21.00		
$24.00		
$27.00		
$30.00		

Decision Task 4

As a RECEIVER, you will receive a split suggested by the SENDER. Since the amount suggested by the SENDER is TRIPLED by the experimenter, the amounts that you can expect to receive are listed on page 3 under DECISION TASK 1.

Now as the RECEIVER, you have to decide whether you wish to keep the entire amount given to you, or whether you wish to send some amount back to the anonymous SENDER you are paired with.

Player ID # _____

Form for Making Decision in Experiment #2

ROUND #1: YOU ARE THE **SENDER** NOW. PLEASE FILL OUT LINES A–F.

SENDER: You will get the bottom part back after the RECEIVER you are paired with has made his decision.

A	**Starting Amount**	**$10.00**
B	**Amount you wish to KEEP**	
C	**Amount you wish to SEND** **(A – B)**	

D	**Amount you have been sent** **(3 times C)**	
E	**Amount you wish to KEEP**	
F	**Amount you wish to SEND BACK** **(D – E)**	

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