

# Do the Reciprocal Trust Less?<sup>†</sup>

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**Abstract:** We study the intrapersonal relationship between trust and reciprocity in a controlled laboratory experiment. Our main result shows that subjects who are more reciprocal exhibit much higher levels of trust than more selfish ones. This relationship is independent of subjects' gender and risk attitudes and raises important questions about theories of social preferences which predict that "fairer" players should trust less.

**JEL classification:** C91, D63, D01

**Keywords:** Laboratory Experiment, Trust, Reciprocity, Social Preferences, Fairness

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# 1 Introduction

By now there seems to be broad agreement that trust and reciprocity are conducive to economic performance and efficiency. Trust is involved in essentially all economic transactions. If trading parties trust each other contracting costs are reduced and exchanges are facilitated, making it easier to realize gains from trade. Ultimately, a high level of trust might therefore be associated with higher economic growth (Knack and Keefer 1997). Reciprocity, i.e., the willingness to reward kind actions and punish unkind ones even at a cost, can also enhance performance in many areas of economic life. In employment relations or insurance markets characterized by moral hazard, it can help to mitigate enforcement problems of incomplete contracts (Fehr et al. 1997). Moreover, reciprocal punishment of free-riding behavior can increase cooperation and thus partly solve social dilemmas (Fehr and Gächter 2000).

While obviously trust and reciprocity are connected in the sense that trusting is less risky in interactions with a reciprocal trading party, surprisingly little is known about the *intrapersonal* relationship of trust and reciprocity. In other words, do reciprocal people also trust more? In this paper we study exactly this relationship, employing a variant of the trust game that allows us to measure both variables for each individual (see section 2). Our main result (presented in section 3) shows a strong and positive relation between a person's reciprocity and her trusting behavior. Reciprocal players exhibit much higher levels of trust than more selfish ones. This effect is highly robust, e.g., if we control for the influence of gender or risk attitudes.

Some other studies (e.g., Ashraf et al. 2006 or Cox 2004) have tried to disentangle unconditional kindness or altruism from trust and reciprocity. However, they do not analyze the direct link between a person's (own) reciprocity and trust. Another distinguishing feature is that we measure trust and reciprocity in the same game, while the other studies analyze subjects' behavior across games (e.g., by comparing a person's decision as responder in a trust game to her decision as dictator in a dictator game). It is, however, not fully understood to what extent one can infer from behavior in non-strategic environments (like the DG) to players' motives in

strategic interactions (like the TG).<sup>1</sup>

Exploring the link between an individual’s trusting behavior and her reciprocal inclination is also interesting from a theoretical perspective because most theories of social preferences assume—at least implicitly—a certain connection between the two (e.g., Fehr and Schmidt 1999, Bolton and Ockenfels 2000). The observed positive relation between trust and reciprocity raises important questions about theories which predict that “fairer” players trust *less*. Section 4 concludes by discussing potential answers to these questions in light of our findings.

## 2 Experimental Design

In our experiment, subjects were anonymously matched in pairs and played a modified version of the trust game (Berg et al. 1995). Both players received an endowment of 120 points. The first mover (the *sender*) could send any amount  $t \in \{0, 20, 40, 60, 80, 100, 120\}$  to the second mover (the *receiver*). The amount sent was tripled by the experimenter. Then, the second mover could send back any amount between zero and 480 points. The crucial feature that distinguishes our design from the “traditional” trust game is that—in order to elicit the necessary information about subjects’ preferences—we use a variant of the strategy method: in our experiment, subjects made decisions both in the role of the sender and the receiver. In addition, the receiver decided how much to send back for any possible amount received. This procedure allows us to measure for each subject both the level of trust and reciprocity in the same strategic environment.

As usual, *trust* (denoted “ $t$ ” in what follows) is measured by the amount sent by a subject as a first mover. Our measure of *reciprocity* (“ $r$ ”) is derived as follows: for each subject, we used the decisions as a second mover and ran a simple OLS-regression of the amounts sent back on the (hypothetical) amounts sent by the opponent, forcing the slope through the origin. The slope coefficient gives us a measure of a subject’s willingness to reward kind actions of an opponent by own kind behavior, i.e., positive reciprocity. If a receiver, for example, always matches his final payoff with that of the sender, his reciprocity coefficient is  $r = 2$ . On the

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<sup>1</sup>See Fehr and Schmidt (2006) for a discussion of this point.

other hand, a receiver who sends back nothing regardless of the sender’s decision has a reciprocity coefficient of  $r = 0$ .

To give subjects the monetary incentives to take all decisions seriously while at the same time avoiding potential confounds if subjects interact repeatedly in different roles, we employed the following incentive-compatible procedure. After all decisions had been made, a random mechanism determined which player of a given pair had the role of the sender and which player had the receiver role. Then, the players’ decisions were implemented and subjects were paid accordingly.

The experiment was programmed with the software z-Tree (Fischbacher 1999) and conducted at the experimental laboratory of the University of Bonn. A total of 240 subjects participated in the experiment. During the sessions, the subjects participated in a series of other experimental games and a post-experimental questionnaire. Unless otherwise noted, the decisions in these games are not related to the question under consideration here.<sup>2</sup> The trust game lasted about 10-15 minutes and subjects earned on average 3.20 Euro.<sup>3</sup>

### 3 Results

Before turning to the main results, we summarize the basic patterns of behavior in our experiment and compare them to previous studies on the trust game. As our specific procedures have not been employed for a trust game before, such an instrument check is important to generalize from our results to other settings. For other experimental games, there is mixed evidence whether the use of the strategy method and play under role uncertainty affects behavior of experimental subjects: Andreoni et al. (2003) play ultimatum games using a strategy method and role uncertainty. They report that behavior in their experiment is “well in the range of previous ex-

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<sup>2</sup>The experimental instructions as well as the full description of the experimental procedures are available upon request. Our design ensured that decisions in the other games are strategically independent from the trust game (e.g., the subjects had not interacted before with their opponent in the trust game). In addition, no monetary payments were communicated until the end of the experimental session.

<sup>3</sup>In total, sessions lasted approximately 90 minutes and subjects earned an average of 20.80 Euro.

periments”. The results of a public goods experiment by Fischbacher et al. (2001) also suggest that there is no systematic effect of role uncertainty and the use of the strategy method. For trust games there is mixed evidence whether playing both roles (without role uncertainty) influences behavior: while Burks et al. (2003) find that trust and trustworthiness tend to decrease, Weimann and Riechmann (2003) observe the opposite effect.

Table 1 summarizes the behavior of senders in our game and compares it to the results of Berg et al. (1995) who used neither role uncertainty nor the strategy method. The table shows that, on average, senders send about 50 % of their endowment in both setups. While the fraction of subjects who “trust fully“ (i.e., those who send their full endowment) is slightly higher in our experiment this also holds for the fraction of subjects who do not trust at all. Overall, the general patterns of senders’ behavior are very similar to the original trust game and its numerous replications.<sup>4</sup>

	Our data	Berg et al. (1995)
Average share of endowment sent	48.0 %	50.0 %
Fraction of subjects who send full endowment	17.1 %	15.6 %
Fraction of subjects who send zero	10.8 %	6.3 %

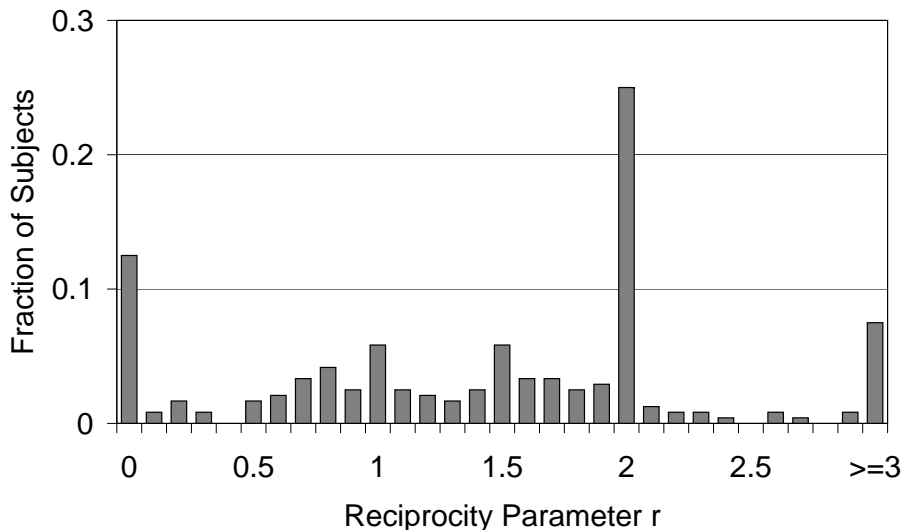
**Table 1:** *Descriptive statistics of sending behavior. Senders were endowed with 120 points and could send amounts in  $\{0, 20, 40, \dots, 120\}$  points.*

To analyze the behavior of second movers, we plot the distribution of subjects’ reciprocity coefficients in Figure 1. The distribution implies that on average “trust paid off” in our experiment, i.e., the second movers send back more than the amount sent by the sender. Previous experiments have frequently found that the return to trust is about zero (e.g., Berg et al. 1995). However, the finding of “trust pays off” has also been observed in the literature (e.g., in Burks et al. 2003), especially for games that also employ the strategy method (but no role uncertainty; see e.g. Falk and Zehnder 2006). In sum, the behavior in our experiment is largely in

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<sup>4</sup>See also Camerer (2003) for a comprehensive overview.

line with previous evidence from trust games, suggesting that our design did not systematically bias subjects' behavior.



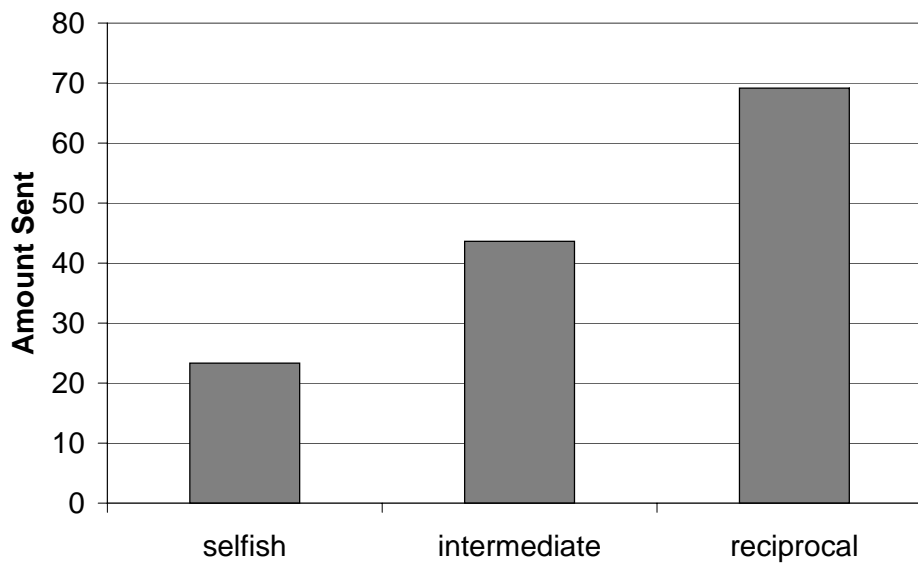
**Figure 1:** *Distribution of reciprocal preferences: histogram of reciprocity coefficient  $r$ .*

In order to depict our main result, it is convenient to classify different types of subjects according to their behavior as second movers. We call subjects who have a reciprocity parameter  $r > 1$  “reciprocal”. These are the subjects who leave their opponent with a positive return to trust, sending back more than the amount sent to them by the sender. 64.6% of our subjects fall into this category. Subjects with a slope parameter  $r = 0$  are called “selfish” as they send back nothing, irrespective of the first mover’s behavior. Our sample includes 12.5% of selfish subjects. The remaining 22.9% of subjects whose slope parameter is positive, but small ( $r \leq 1$ ) are called “intermediate” types.<sup>5</sup>

In Figure 2 we plot the average levels of trust in the three groups of subjects. The figure shows our main result: subjects who are more reciprocal also trust more. A subject classified as “selfish” sends on average 23.3 points, the “intermediate” types send 43.6 points, while reciprocal subjects send 69.2 points. Pairwise U-tests

<sup>5</sup>This classification gives us additional confidence in our instruments, as the fraction of subjects in the different categories resembles similar approaches to identify types, e.g., using data from public goods games as in Fischbacher et al. (2001) or Kurzban and Houser (2005).

indicate that all differences between the groups are highly significant (all p-values  $< 0.01$ ). The highest level of trust (83.5 points) is found for subjects who, as a responder, always “split the pie equally” (i.e., subjects with  $r = 2$ ). The result depicted in Figure 2 is highly robust, e.g., with respect to different classifications of types using a finer “grid”. Moreover, OLS-regressions of the amount sent on the individual reciprocity parameters (see column 1 of Table 2) confirm the result on an individual level.



**Figure 2:** Average amount sent by selfish, intermediate, and reciprocal players.

Several other variables have been discussed in the literature for their potential influence on trust. For example, it is frequently argued that men trust more than women (e.g., Bohnet and Zeckhauser 2004). Moreover, it has been discussed whether risk attitudes influence trusting behavior. As sending positive amounts in a trust game always entails elements of a risky gamble, subjects who are more risk tolerant should send more. While some studies find this positive influence of risk tolerance on amounts sent, surprisingly few do so with incentivized risk measures (e.g., Ashraf et al. 2006 find no influence for their incentivized measure, whereas Schechter 2007 finds a strong influence). In the following, we check whether the strong link between trust and reciprocity is independent of these other influences. To do so, we estimate the trust-regression again, this time controlling for gender and different measures

of subjects' risk preferences. As a measure of risk aversion, we elicited subjects' certainty equivalent for an incentivized, risky lottery with a procedure similar to Holt and Laury (2002). In addition, we asked subjects in our post-experimental questionnaire about their attitudes towards risk-taking in general and with respect to several specific risks.<sup>6</sup>

Columns 2-10 of Table 2 show the results of OLS-regressions of the amount sent on reciprocity, gender, and different risk attitudes. Most importantly, the positive influence of reciprocity on trust is highly significant and also quantitatively stable in all specifications. This suggests that a person's social preferences have a profound impact on her trusting behavior that is independent of other personal characteristics. In addition, the specifications including a gender dummy show that male subjects indeed exhibit higher levels of trust, sending about 15 points more than the female participants in our sample. Interestingly, this gender effect stays significant if one includes indicators of risk preferences (columns 7-10), contrasting the observation of Schechter (2007) that the gender effect in trust vanishes if one controls for risk attitudes.

Finally, our results confirm the importance of risk attitudes for trusting behavior: subjects with a higher willingness to take risks send significantly more. This holds both for our incentivized measure of subjects' certainty equivalents and for the questionnaire measure regarding risk tolerance in trusting strangers, but not for other domain-specific risk measures from our questionnaire (like attitudes regarding health risks; see columns 6 and 10). This underlines the behavioral relevance of domain-specific risk attitudes. It also suggests that the mixed evidence on the influence of risk attitudes on trusting behavior in previous studies might be caused by differences in the measurement of risk aversion.

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<sup>6</sup>Examples of the "specific" risk attitudes are risk tolerance in financial decisions, health issues, or in trusting strangers. The relevance of these risk measures for behavior has been validated in a representative sample by Dohmen et al. (2005).

## 4 Discussion and Concluding Remarks

The strong, positive relationship between a person’s reciprocal inclination and her trusting behavior has important implications for the evaluation and advancement of theories of social preferences. Many of these theories (e.g., Fehr and Schmidt 1999, Bolton and Ockenfels 2000, Falk and Fischbacher 2006) predict for the trust game that individuals who are more reciprocal (or inequality averse) trust *less* than others. The intuition behind this result is that a selfish sender just loses the amount “invested” if the receiver does not send back anything whereas a fair-minded sender additionally suffers from the fact that his trust has been exploited. Along these lines, Fehr et al. (2007) have recently argued that “fairness preferences inhibit trusting behavior because trust typically involves a risk of being cheated”.

Our results show that this intuition may be too simplistic. The finding that people trust more the more reciprocal they are allows different preliminary interpretations. First, in the case of inequity-averse subjects, the ones who have a strong aversion towards disadvantageous inequality might actually not be the same than those who dislike inequality to their monetary advantage. Supportive evidence in favor of this view comes from a paper by Dohmen et al. (2006) who find that survey measures of positive and negative reciprocity are essentially uncorrelated. Secondly, it is possible that people value adherence to certain moral or social norms rather than, e.g., having preferences over outcome distributions. If a norm dictated cooperative behavior both in the sender and receiver role the subjects might adhere to it without focussing much on the monetary consequences of their behavior.<sup>7</sup> Such norm-guided behavior could also help to explain why many senders in trust games send positive amounts despite expecting to get back less than they send (cf. Dufwenberg and Gneezy 2000, Ashraf et al. 2006).

A final interpretation that could reconcile the existing theories of social preferences with our findings is that fair and selfish types have fundamentally different beliefs regarding the behavior of others.<sup>8</sup> As an extreme example, assume that recip-

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<sup>7</sup>One example would be the “golden rule” of treating others as you want to be treated by them. See also López-Pérez (2006) for a model of norm-compliance that is consistent with our findings.

<sup>8</sup>An experiment by Chmura et al. (2005) suggests that in some settings beliefs about social

rocal players expect all others to behave exactly like them. Trusting would then not be perceived as risky by these subjects. At the same time, if a selfish subject expects all others to be selfish as well, he should send nothing. Such differences in beliefs are related to the so-called false-consensus effect and would have interesting implications for the modelling of social preferences as they would require giving up the common-prior assumption. They potentially also have important practical implications as they could lead different types of players to select themselves into different institutional settings. This could help to explain why environments with different degrees of exogenous enforcement coexist, e.g., in the labor market. Which interpretation is more relevant cannot be answered with our data. We hope, however, to be able to address this question in future research.

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preferences can be more important than social preferences per se.

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Dep. Variable	Amount Sent	Amount Sent	Amount Sent	Amount Sent	Amount Sent	Amount Sent	Amount Sent	Amount Sent	Amount Sent	Amount Sent	Amount Sent	Amount Sent
Constant	34.081*** (3.957)	24.329*** (4.668)	21.522*** (7.732)	7.155 (10.310)	21.764*** (5.210)	29.987*** (5.167)	18.894*** (7.619)	3.665 (10.151)	13.746** (5.586)	21.756*** (5.541)		
Reciprocity	16.091*** (2.235)	17.234*** (2.199)	16.529*** (2.235)	16.939*** (2.352)	15.842*** (2.184)	16.161*** (2.233)	17.365*** (2.205)	17.761*** (2.316)	16.921*** (2.157)	17.253*** (2.200)		
Male		16.301*** (4.401)					15.112*** (4.595)	15.167*** (4.688)	15.093*** (4.327)	15.885*** (4.429)		
General Risk			2.212* (1.173)				1.083 (1.199)					
Certainty Equivalent				0.125*** (0.044)				0.100** (0.044)				
Trust Risk					2.882*** (0.817)				2.645*** (0.802)			
Health Risk						1.019 (0.829)				0.702 (0.816)		
$R^2$ adj.	0.175	0.217	0.184	0.197	0.213	0.177	0.217	0.230	0.249	0.216		

**Table 2:** Trust-Reciprocity-Regressions, controlling for gender and different risk attitudes (standard errors in parentheses).

“Male” is a gender dummy equal to 1 if a subject is male.

“General Risk” / “Trust Risk” / “Health Risk” are questionnaire measures of a subject’s willingness to take risks in general / in trusting strangers / in health issues (1 = completely unwilling, ..., 10 = completely willing).

“Certainty Equivalent” indicates the switch from a risky lottery to a certain alternative (=0 if subject is strongly risk averse, ..., =400 if subject is strongly risk loving).

Significance at the 10%, 5%, and 1% level is denoted by \*, \*\*, and \*\*\*, respectively.