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Abstract

We run an experiment that implements a finitely repeated version of the trust game in which players can choose in each period with whom to interact. Change in trust and trustworthiness in terms of previous experience is statistically investigated where confounding factors are controlled for. Motives such as reinforcement learning, reciprocity and rationality are useful to explain findings. Overall we find a high persistence of choice and uncover more trust and trustworthiness than in the one shot experiments. Towards the end of the game the degree of trust and trustworthiness decline.

Keywords: economic experiments, reciprocity, reinforcement learning, trust
JEL classification: C92, C73, D83

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1 Introduction

The main purpose of this paper is to investigate trust and trustworthiness in a dynamic setting. We provide alternative behavioral motives for such behavior and test for them. We set up an experiment where trust can emerge as the result of an experimentally controlled interaction between individuals. Hence, we do not just study the general propensity of people to trust, but the motives that determine the evolution of trust in repeated interactions.

In the trust game a player is given 100 units of the experimental currency and is allowed to send some to a different player. During the transaction the transferred money is tripled. Finally the recipient is allowed to return part of the tripled transfer with no obligation how much to return to the sender. The money sent can be interpreted as an investment in a project, the increase during the transfer as the return on investment. The project is managed by the recipient who decides how to divide the surplus.

The way that game theory analyzes this trust game is to invoke backwards induction. For any given amount transferred the receiver is best off not returning anything. If the sender knows that he will never get back anything then he will not send anything. The outcome of this behavior is inefficient. This is reminiscent of the Prisoners' Dilemma where similarly an inefficient outcome is predicted by game theory. Any efficient outcome (equivalent here to maximizing the sum of the payoff of the sender and of the receiver) is characterized by the sender sending all 100 units (so the recipient receives 300 units). In our experiment we implement a repeated trust game where players have the opportunity to select a new opponent in each round. However, given that there is a finite number of rounds (6 in our experimental design), the backwards induction argument yields the same result. No player should ever send anything.

The rational prediction is mainly a theoretical benchmark as experiments show that subjects trust (send money) even when the trust game is played only once. Berg et al. [1995] find that subjects send slightly above 50 points and return slightly less to the sender and keep over 100 points for themselves. Among their subjects it was not rational, given the behavior of the recipients who on average return 47 points, to transfer anything. Burks et al. [2002] show that if two subjects get money to send to each other simultaneously (so both are sender and receiver) then subjects send again about 50 points but return much less, namely on average 24 points. Here it is even less rational to send money. Or in other words, subjects are even less trustworthy when they are both sender and receiver. Our design is related to Burks et al. [2002] as all subjects are senders and possibly also receivers. It is also related to Cochard et al. [2000] as we repeat the game a finite number of times. It is different as subjects can choose who to transfer money to.

As game theory is a poor predictor we test for other motives such as reinforcement, reciprocity and directional learning. We find that much of the observed behavior in the game can be explained by the two motives reciprocity and reinforcement learning. Players reward opponents for their choices and their actions if their behavior was favorable. This is visible in the choice, the transfer made and the ratio returned. In addition, payoff oriented reinforcement is also observable. Players are more likely to repeat their actions if they have proven successful. Finally, the end game effect that can be observed both in the transfers made as in the ratio returned is indicative for some degree of rationality.

The reminder of the paper is organized as follows. Section 2 relates our experiment and the main findings to the existing literature. The experimental design is described in detail in section 3. Section 4 presents some general descriptive statistics on the game. Different behavioral motives are briefly discussed in section 5 before an econometric analysis is undertaken in section 6. The last section concludes and discusses directions for further research.

2 Related Literature

While sociologists mainly use attitudinal surveys on rather vaguely defined concepts of trust and trustworthiness, economists have recently been trying to be more precise on the issue and its conditioning factors. Glaeser et al. [2000] combine survey data and experimental data in an attempt to quantify the general perception of trust towards different groups surrounding an individual. There is evidence that trust and trustworthiness are related to the sociological background of people. For example, Buchan et al. [2000] find mixed support for the relationship between trust and social distance across countries. Fershtman and Gneezy [2001] find different levels of trust according to the opponents' origin. Croson and Buchan [1999], among others, identify gender as another determinant for trust, with women being trusted more than men. These results stress the importance of controlling for confounding factors when the emergence of trust in an economic interaction is analyzed.

Our experimental design combines several elements of previous studies. The basic trust game with one sender and one randomly matched receiver is known from the study by Berg et al. [1995]. In this study pairs are matched with assigned roles as sender and receivers to play a one shot trust game. We follow the extension by Burks et al. [2002] that both players assume the role of a sender and receiver at the same time. However, contrary to this study, this was known to the players from the outset. We also combine the element of a repeated game as analyzed by Cochard et al. [2000], but also run a control treatment with one shot interactions. In addition, we add the element of a free choice, which to our knowledge has not been investigated in this context. Our results compare nicely to the existing literature as indicated by table 2.1.

Table 2.1: Results and related literature

study	*N*	*avg. sent (0-100)*	*average returned*	*comment*
Berg et al. [1995]	32·2	52	47^a	assigned roles as S or R, one shot
Burks et al. [2002]	22·2	65	85^a	assigned roles as S or R, one shot
Burks et al. [2002]	20·2	47	24^a	both are S and R, one shot
Cochard et al. [2000]	30·2	42	$39\%^b$	assigned roles, one shot
Cochard et al. [2000]	16·2	75	$56\%^b$	assigned roles, repeated
this study: repeated	110	76	$54\%^b$	both S and R, choice, repeated
this study: random assignment	110	67	$38\%^b$	random assignment

Note: S and R mean sender and receiver respectively, ^{a} amount sent back, ^{b} ratio returned, conditional on having received a positive amount.

With experimental economics being a rather new field in economics, a thorough econometric analysis of experimental data is more the exception than the rule. Numerous studies content themselves with basic descriptive statistics and significance tests. The advantages of an econometric analysis is that confounding factors can be controlled for, which may prevent premature interpretation of results and that hypothesis can be singled out more clearly. However, to link the experimental setup to the correct econometric specification is not always an easy task. For example, with the exception of rather simple games the derivation of a likelihood function is intractable for more complicated settings. Hence the correspondence between the theoretical model and the empirical specification is not perfect. An exception in this context is the analysis by El-Gamal and Grether [1995] who are able to translate their (simple) game one-to-one into a likelihood function, estimate and identify the relevant parameters.

Identification is a particular problem in the context of behavioral economics. As Manski [2002] points out, several behavioral hypothesis might be observationally equivalent, making it impossible for the econometrician to distinguish between them. Our aim is to characterize typical behavior at different stages of the game. We confine ourselves to find empirical support for or evidence against such hypothesis controlling for confounding factors.

3 Experimental design

The experiment was conducted using a computerized setup[1] in 4 sessions at the European University Institute near Florence, Italy. Participants were 110 Masters and PhD students from the faculties of Law (30%), History (15%), Social and Political Sciences (23%), and Economics (33%). Subjects originated from 15 different European countries. They were between 23 and 36 years old (average: 27.7), and 64% were male. Because it was the first time that experiments were conducted at this place, the subject pool was not experienced in playing games. For each of the four sessions a multiple of five subjects was recruited. The profit earned by participants ranged from Euro 24 to Euro 47.90, with an average of Euro 36.34 (s.d. 4.89), including a 5 Euro show up fee paid to each candidate. Each session (including a 15 min. questionnaire at the end) lasted for about 2 hours. Participants were recruited via email and were invited to sign up on a website. Each session took place in 2-3 computer labs with 10 to 25 computers each, located in different buildings of the university campus. Upon arrival to an assigned computer lab, subjects randomly drew a seat number and an account number. This account number was later used to identify subjects for payment, which was organized anonymously. Further to that, the computer labs were prepared using separators to individualize the environment. In each room, a professor of the university monitored the experiment in a discrete way.

Appendix B has further information about the experimental design. Section B.1 contains a transcript of the instructions. Note that at no point in time subjects were deceived. Subjects could choose how often (max 3 times) they wanted to read through the instructions on the screen. They also had a hard copy of the instructions next to their machines. The instructions were followed by a short quiz of three questions covering the crucial aspects of the game (see appendix B.4). We conclude that all subjects understood the game very well before playing. No major clarification questions were asked. After reading

[1] Using the Z-Tree software, Fischbacher [1999]

through the instructions subjects were asked to enter information about their age, gender, nationality, and the number of siblings. To increase anonymity, the age displayed to fellow players was modified by adding a random number. This was also mentioned in the instructions further to a general anonymity and privacy statement which can be found in section B.2.

Each session consisted of six treatments. In each treatment, subjects were randomly matched in groups of five players to play the repeated trust game described below.

Free Choice treatments

Treatments one to four and treatment six were so called 'free choice' treatments (f1-f5). In stage one of the game, each player could see some information about the four other players in his group (see figure B.2, the information included the players' nationality, age, gender, and the number of siblings). The subject then decided *who* and *how much* of his initial endowment of 100 to transfer to the player chosen. No entry in any of the boxes corresponds to making no choice, which was also an option. In stage two, (see figure B.3) subjects saw *who* of the other players had chosen them and *how much* each of them had transferred. In addition, this amount was shown multiplied by three. For each player by which a player was chosen (this could be any from 0 to 4 players), they could choose how much to transfer back. In stage three (see figure B.3) subjects were presented a summary of all transfers and returns they had been involved with that happened in this period. The three stages were repeated 6 times. Then, groups were reshuffled and a new treatment was played. Due to the limited amount of subjects in each session and the large size of each group, the re-matching had to be done on a random basis, hence it is not ruled out that subjects could meet again in subsequent groups.

Control Treatment

Between the fourth and the fifth free choice treatment subjects were informed via the screen about a small change in the game. They were again matched in groups of five players, but instead of being able to choose a fellow player, they were *randomly assigned* one of the fellow players (see figure B.5). We also call this the predetermined treatment. Random assignment was implemented by selecting independently for each individual one of the four other players to transfer to, each with equal probability. Hence it was still possible that the same player receives transfers from different players or from no player but these events were random. In every period of this treatment players faced a new, random choice of the same group. After this treatment, subjects played a last free choice treatment.

4 Descriptive Statistics

The following statistics are organized around the course of the game, starting with statistics regarding the choice, then the amount transferred, and lastly the amount returned. They provide a rough description of the playing behavior. Empirical evidence and interpretation of types will be discussed in section 6. Unless indicated differently, the statistics do not include the control treatment.

4.1 Choice

In each period subjects had the option to choose one of the four players in their group to transfer points to. This group of players remained unchanged for six consecutive periods. Table 4.1 summarizes by treatment and period how often subjects decided not to change their playing partner. The analysis period by period shows a slight increase in periods 2-5 from 53% to 57%, and quite a pronounced drop to just 47% who stay with the same partner in the last period. There was also considerable persistence in the choice of partner exceeding one period. From table 4.2 it can be seen that while the in the majority of cases a player was chosen only once (58%), 24% of the players remained with the same choice for at least two periods or more. 2% did not change the player throughout an entire treatment.

Table 4.1: Fraction of players that chose the same player as in previous period

	period of treatment					
treatment	2	3	4	5	6	*total*
f1	0.42	0.47	0.50	0.55	0.47	0.48
f2	0.51	0.55	0.58	0.54	0.46	0.53
f3	0.47	0.52	0.53	0.56	0.55	0.53
f4	0.51	0.58	0.57	0.64	0.45	0.55
f5	0.52	0.53	0.61	0.58	0.41	0.53
total	0.49	0.53	0.56	0.57	0.47	0.52

Note: Each treatment/period combination was played 110 times.

Table 4.2: Persistence of choice of player

	number of consecutive periods					
	0	1	2	3	4	5
absolute	1899	603	339	225	156	78
fraction	58	18	10	7	5	2

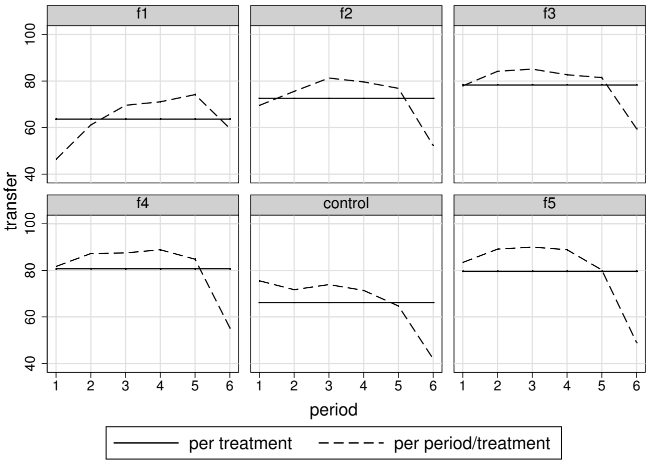
Note: Contrary to table 4.1 this table includes period 1.

[provide additional table in which row shows number of transfers received in previous period and column shows percentage of events "no switch" "switch to received" "switch to new but not received". Additional descriptive statistic needed for choice behavior (eg relating choice to motives?)]

4.2 Transfer

The average transfer was 76 tokens. Figure 4.1 shows how the transfer depends on period and treatment, where the control treatment is also included. It reveals a significant drop in the last period of each treatment. All free choice treatments exhibit the same effect over time. On average, the amount transferred increases from 72 in period 1 to 83 in period 4, decreases slightly to 80 in period 5 before it drops to 56 in the last period, well below value of the starting period. Notice that this is similar to the average transfers in one shot experiments. The average amount transferred rises from 64 in the f1 treatment to 81 in f5 treatment (solid line). The average in the control treatment is 66 and therefore as low as the first treatment. Remind the reader that the control treatment was the fifth treatment and as can be seen from Figure 4.1 the transfer behavior in the sixth and last treatment resumed the pattern of the previous free choice treatment. This shows that subjects understood well the difference between the control and the free choice treatments. [2]

Figure 4.1: Average transfer per period and treatment



There is a clustering of transfers at certain values, as table 4.3 illustrates. In 56% of the cases the full amount of 100 points was transferred. A second point mass is at the value of 50, which was the amount transferred in 9% of the cases.

Table 4.3: Distribution of transfer τ.

	percentage	
$\tau =$	*free choice*	*predetermined*
0	7	18
$1 \leq \tau \leq 49$	12	7
50	9	12
$51 \leq \tau \leq$	17	17
100	56	46

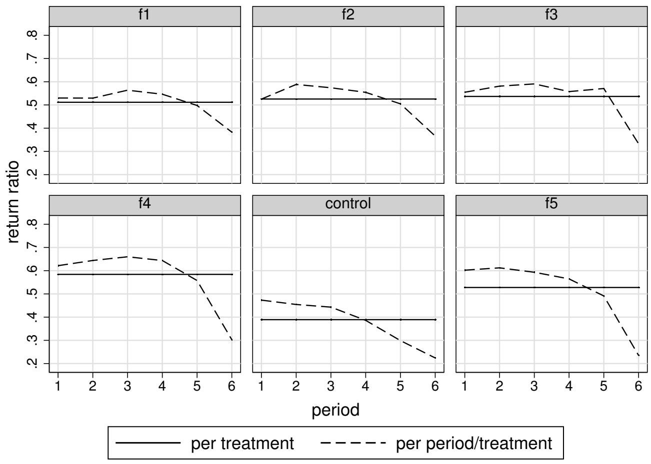
4.3 Return Ratio

The ratio a player got back from his initial transfer is defined as $r = G/(3 \cdot \tau)$, where G is the amount returned and τ is the initial transfer which is multiplied by three upon arrival on the opponent's account. Hence, $r \epsilon [0, 1]$. The average return ratio (54) does not have such a large variation between the free choice

[2]For a histogram of transfers period by period, see figure A.1 in the appendix.

treatments (0.51-0.59) but is significantly lower in the control treatment (0.39). The end game effect is also quite visible in the free choice treatments, where the ratio drops from an average of 0.58 in periods 1-5 to 0.33 in the last period. In the predetermined treatment the return ratio around 45 for the first three periods and then drops steadily to just 22 in the last period. Figure 4.2 depicts this behavior in greater detail.

Figure 4.2: Average ratio returned per period and treatment



The return ratio clusters at certain values, as table 4.4 illustrates. In the free choice treatments the biggest point mass is at 1 and at 2/3, followed by 1/2 and 0. Looking at figure A.2 in the appendix we see that the end game effect is driven by the large share of zero return ratios (37 as compared to 8 percent in periods 1-5). In comparison, we find 48 percent of return ratios equal to zero in the last period of the predetermined treatment.

Table 4.4: Distribution of the return ratio r

	percentage	
$r =$	*free choice*	*predetermined*
0	12	20
$0 < r < 1/3$	6	9
1/3	9	13
$1/3 < r < 1/2$	7	10
1/2	16	22
$1/2 < r < 1/2$	7	7
2/3	18	13
$2/3 < r < 1$	7	3
1	18	3

4.4 Payoff

Following table 4.5 we see that the average payoffs are higher in the free choice treatments. The decline in payoffs starts earlier in the predetermined choice treatment.

Table 4.5: Payoffs

periods	1	2	3	4	5	6	total
free choice	155	168	171	166	150	104	152
predetermined	127	123	125	112	95	85	111

4.5 Summary

The choice of players in the first stage is not random, players show a substantial reluctance to switch to new players. If so, they seem to prefer those players who they have been chosen by before. Previous interaction seems to have a positive effect both on the transfer and on the ratio that is returned to a sender. One can further see from the analysis that players transfer and return more in each repetition of the game up to period 4. In period 5 the end game effect starts, which is visible by stagnating or slightly decreasing transfers. It peaks in the last period where substantially less is transferred and returned.

5 Motives and Behavioral Theories for making Predictions

Several motives and learning theories compete in explaining the way people behave. Below we present the most common, namely reinforcement learning, reciprocity, directional learning and rationality. We will then develop hypotheses based on these motives for choice, transfer and return and then test them.

Our approach is to utilize the qualitative predictions of these motives rather than fitting explicit functional forms derived from them.

Reinforcement learning (RIF)

Reinforcement Learning describes success oriented behavior according to which the subject choose actions or strategies according to how successful they were in the past. Success is measured in terms of earned payoffs. Originating from psychology and biology, where it has been widely studied in both humans and animals, this learning strategy has recently been introduced to economics [Erev and Roth, 1998]. Accordingly, individuals treat the environment as a decision, do not utilize information on how payoffs are generated and in particular ignore the fact that their opponents are also making choices. The subject is assumed to randomize over its actions according to some distribution. Positive reinforcement means that when facing the same decision again the same action is chosen with a higher probability. Typically, positive reinforcement is more likely the more successful an action was. Negative reinforcement in turns means that the same action will be chosen with a smaller probability.

Reciprocity (RCP)

Reciprocity is a motive oriented behavior. Cooperative and friendly behavior is rewarded and unfriendly or non–cooperative behavior is punished, possibly at a cost. [Falk, 2003, Falk and Fischbacher, 1999] provide a formal definition of reciprocity in a specific game–theoretic setting. It is important to highlight that altruism, in contrast to reciprocity, is an unconditional attitude (see e.g. Cox [2002]), whereas reciprocity conditions on the actions of others.

Directional learning type (DLT)

The Directional Learning approach was developed by Selten and Stoecker [1986] for simultaneous move games. According to this theory, after some experience people evaluate their experience and adjust their behavior according to what would have been a better decision provided that the opponents would not change their behavior. DLT does not make any predictions about the quantitive change of behavior, but indicates the qualitative direction of the change.

Rationality (RTN)

The finitely repeated trust game has a unique subgame perfect Nash equilibrium in which each player sends 0 in each period and returns 0 whenever something positive is received. This can be derived using the standard procedure of backwards induction, anticipating a zero return in the last period from a rational player, no player will ever transfer any points in the preceding period and so forth.

6 Econometric Analysis

6.1 The choice of a player

In the first stage of the game, subjects had the possibility to choose between four players or they could decide not to transfer any points.

The motives outlined in section 5 (RIF, RCP, DLT, RTN) will be used to predict how choice probabilities change over time. Hypotheses are formulated from the perspective of a sending player.

Hypothesis RCP 1 *One is more likely to choose a player from which a transfer was received in the previous period and who transferred a lot.*

Hypothesis RCP 2 *One is more likely to choose the same again if that player returned a lot.*

Hypothesis RIF 1 *One is more likely to choose the same again if the payoff was high.*

Hypothesis DLT 1 *One is more likely to choose the same again if that player returned more than one sent (returned ratio is greater or equal than 1/3).*

The framework in which the theoretical predictions will be addressed is the conditional logit model [McFadden, 1973]. The multiple choice model is motivated using a random utility model representation. Define

$$U_{ijt} \text{ as the utility of } i \text{ if } i \text{ chooses } j \text{ at time } t \text{, and}$$
$$d_{ijt} = \begin{cases} 1 & \text{if } i \text{ chooses } j \text{ in } t, \\ 0 & \text{otherwise.} \end{cases}$$

In the game under consideration, each player has five choices, $j = \{0, 1, 2, 3, 4\}$, at each point in time. A period t extents over all three stages of the game: choice, transfer, and transfer back. The five choices are mutually exclusive and exhaustive. The choice $j = 0$ is the decision to make no transfer at all, and this utility is normalized to zero. The basic random utility model is defined as:

$$\begin{aligned} U_{i0t} &= 0 \\ U_{ijt} &= \alpha d_{ijt-1} + \delta d_{jit-1} + \lambda p_{ijt-1} + \nu X_j + \epsilon_{ijt} \end{aligned} \tag{1}$$

for $j = \{1, 2, 3, 4\}$. Following the notation above, d_{ijt-1} means that player i has chosen j in the previous period. Similarly, d_{jit-1} means that player j has chosen player i in the previous round. Finally, p_{ijt-1} means that i and j have formed a pair in the previous period and is the interaction of the previous two variables. Note that, put together, these variables cover all possible cases in which there was interaction, as compared to the case in which the players have not interacted in $t-1$. The other covariates X_j include the remaining choice specific characteristics such as gender, nationality[3] (both interacted with the corresponding attributes of i) age, and siblings. Notice that the previous choice of i is interpreted as a characteristic of the choice j in t. By the same token, the fact that a player was chosen by some other player in period $t-1$ becomes a characteristic of that player in t. Hence, previous playing behavior can be seen as observable choice specific attributes in t.

So far only the model only accounts for the choice relating variables, e.g. if a a player was chosen or not. In an additional set of estimates, the random utility model presented in (1) will be enriched by adding variables characterizing in more detail the previous behavior. To this end, the choice variables defined above will be interacted with variables indicating a specific behavior, as outlined in the hypothesis. Define τ_{ijt-1} as the transfer from i to j in $t-1$ and G_{ijt-1} as the amount player i got back from player j in $t-1$. Then,

$$\begin{aligned} r_{ijt-1} =& \frac{G_{ijt-1}}{3 \cdot \tau_{ijt-1}} \text{ is the ratio } i \text{ got back from } j \text{ in } t-1 \\ \pi_{ijt-1} =& 100 - \tau_{ijt-1} + G_{ijt-1} \text{ is the payoff of player } i \text{ in } t-1 \end{aligned}$$

In addition, the variable τ_{jit-1}, the amount i received from j in $t-1$ will be used. Notice that these variables only take positive values if the respective

[3]Throughout the paper we group the nationalities into participants from North and participants from South. Further analysis of the effect of nationality on the playing behavior can be found in Bornhorst et al. [2004].

choice specific dummy variables defined above take the value one and are zero otherwise. For example, τ_{jit-1} only takes positive values if d_{jit-1} is one.

Player i chooses player j if this yields highest utility. Hence,

$$\mathrm{P}(d_{ijt} = 1) = \mathrm{P}(U_{ijt} > U_{ikt}) \,\forall\, k \neq j.$$

Table 6.1 and 6.2 contain the estimation results of various specifications of the conditional logit model. For convenience, the choice variables are represented using arrows, where d_{ijt-1} is represented by a dashed arrow $i \dashrightarrow j$ and the pair variable by a double arrow $i \leftrightarrow j$. Notice that in i refers to the person making the choice.

Consider specification C1. This model disregards any success or failure of previous choices and forms the basis for the following analysis. It is evident that that having chosen a player before and having been chosen by a player makes it more likely to choose that player again. The effects are of the same order of magnitude, with the effect of $i \dashleftarrow j$ being slightly bigger. Interestingly the effect of having formed a pair does not significantly alter the choice probabilities, suggesting that there is no pair-specific effect. In the following specifications this variable is dropped. Hypothesis RCP 1, that the probability of choosing a player is increasing in the the amount received from that player is addressed in specification C2 in table 6.1, where the variable which indicates that $i \dashleftarrow j$ is multiplied by the amount transferred. Indeed, the likelihood of choosing a player who transferred previously is increasing in the transfer received. Hence, hypothesis RCP 2 finds empirical support.

Table 6.1: Choice: conditional logit estimation results 1

	C1	C2	C3	C4
$i \leftrightarrow j$	.006 (.11)	.	.	.
$i \dashrightarrow j$	1.24 (.06)***	1.20 (.04)***	-.10 (.10)	-.45 (.11)***
$i \dashleftarrow j$	1.41 (.07)***	.07 (.17)	.33 (.17)**	.35 (.17)**
$i \dashleftarrow j \cdot \tau_{ji}$	.	.02 (.002)***	.01 (.002)***	.01 (.002)***
$i \dashrightarrow j \cdot r_{ij}$	.	.	2.41 (.16)***	.
$i \dashrightarrow j \cdot \pi_{ij}$	.	.	.	.01 (.0007)***
Obs.	13750	13750	13750	13750
Pseudo R^2	.25	.25	.28	.29
log likelihood	-3337.8	-3297.78	-3171.2	-3137.02

Note: All variables refer to the previous playing round. Reported values are coefficients, standard errors in parenthesis. *, ** , *** denote significance to the 10, 5 and 1 percent level. Controls included are: age and siblings of all 4 players, gender and nationality of i interacted with the attributes of j.

Hypothesis RCP 2 which states that choosing the same again is more likely if that player returned a lot is addressed in specification C3, where the ratio the player returned in the previous period is added. Notice that this specification also controls for the amount received by a player in the previous playing round. The significance of the interacted variable $i \dashrightarrow j\ r_{ij}$ shows empirical support for Hypothesis RCP 2. Looking at the variable $i \dashrightarrow j$ in C2 we find that the same player is more likely to be chosen again. In C4 we then add the payoff resulting from this interaction. Here we find that reinforcement depends on the success of the previous action; if the payoff was above 45 then we find positive reinforcement as probability of choosing the same again is higher, confirming RIF 1. Negative reinforcement is triggered when the payoff is below 45, which is the case in 10 percent of the cases. Notice that we do not include both in the same regression as $i \dashrightarrow j\ r_{ij}$ and $i \dashrightarrow j\ \pi_{ij}$ are highly collinear.

Table 6.2: Choice: conditional logit estimation results 2

	C5	C6
$i \dashleftarrow j$	.36	.22
	(.17)**	(.17)
$i \dashleftarrow j \cdot \tau_{ji}$	.01	.01
	(.002)***	(.002)***
$i \dashrightarrow j \wedge r_{ij} \geq 1/2$	1.63	.
	(.05)***	
$i \dashrightarrow j \wedge r_{ij} < 1/2$	.32	.
	(.08)***	
$i \dashrightarrow j \wedge r_{ij} \geq 1/3$	.	1.4
		(.05)***
$i \dashrightarrow j \wedge r_{ij} < 1/3$	.	.17
		(.12)
Obs.	13750	13750
Pseudo R^2	.28	.27
log likelihood	-3198.2	-3246.4

Note: See notes to table 6.1.

Notice that hypothesis RCP 2 and is a more general version of DLT 1. While the former just makes a general statement about how the return ratio affects choice, the latter is very specific in determining a break point at 1/3. To shed more light on the functional form, specifications C5 and C6 in table 6.2 test a breakpoint at 1/2 and one at 1/3 respectively. Notice that 1/2 is the median return ratio. From specification C6 it becomes evident that players do not chose the same player more likely if the ratio returned previously was lower than 1/3. This can interpreted as evidence for DLT 1. For a breakpoint at 1/2 no such evidence can be found, players still are more likely to chose a player who has returned less than 1/2 (see C5). [??hopefully andrea or eyal can help us get more out of this table.]

Table 6.3 summarizes the main results of this section.

Table 6.3: Choice: summary of findings

hypothesis	*...probability of i choosing j is higher if*	*significance*	*magnitude*
RCP 1	i received a lot from j	yes	3.0
RCP 2	j returned a lot previously	yes	3.3
DLT 1	j returned more than i sent	yes	3.5
RIF 1	i had a high payoff	yes	2.9

Note: Magnitude reports the effect on the odds of choosing a player. The odds are evaluated at the average of each variable using the estimated coefficients. [We have to discuss if this is the right procedure.]

6.2 The amount transferred

After a player has chosen who to send to, players could choose how much of their endowment of each period to transfer to a player. Our motives will be used to predict changes in amount transferred. These motives are formulated analogous to the choice setting, where an increase in transfers is the equivalent action to increasing the probability of choice.

Hypothesis RCP 3 *Conditional on choosing a player from which a transfer was received in previous period, current transfer is increasing in transfer received.*

Hypothesis RCP 4 *Conditional on choosing the same player again, transfer is increasing in the ratio returned in the previous period.*

Hypothesis RIF 2 *Conditional on choosing the same player again, transfer is increasing in the payoff received in the previous period.*

Hypothesis DLT 2 *Conditional on choosing the same player again, transfer is higher (lower) if the ratio returned in the previous period is greater (smaller) than 1/3.*

Hypothesis RTN 1 *Transfer is lower in the last period.*

The basic framework in which the hypothesis will be addressed is

$$\tau_{it} = \alpha d_{ijt-1} + \beta d_{jit-1} + \delta X_{jt} + \eta Z_{it} + u_{it}$$

which forms the basis for the analysis. The variable d_{ijt-1} and d_{jit-1} are as defined in the previous section. The matrices X_{jt} and Z_{it} contain a set of j and i specific characteristics respectively and u_{it} is a random error component. According to the hypothesis, the choice variables d_{ijt-1} and d_{jit-1} will be interacted with variables that characterize previous playing behavior such as the amount transferred or the ratio returned. Because there are repeated observations for the same individual in the sample, the standard errors are corrected for any possible within-individual correlations.[4]

To facilitate the reading of the tables, the following notation is introduced. Let S denote the sender and R denote the receiver.[5] Consistent with notation above,

- $S \dashrightarrow R$ denotes that S has chosen R in $t-1$
- $S \dashleftarrow R$ denotes that R has chosen S in $t-1$
- $S - R$ denotes that S and R had no interaction in $t-1$

[4]See Moulton [1986].

[5]The notation differs from the (i, j) notation used in the analysis of choice because at this stage of the game players have already chosen a particular receiver among the possible options, hence j becomes R.

Notice that these variables sum up to one. In the subsequent analysis, $S - R$ will be the omitted variable.

The hypotheses distinguish between the behavior towards the same and different choice. Hence, variables are interacted with a variable that indicates whether the same choice was made in t and $t-1$. If a variable corresponds to the set of same choice or the set of different choice will be indicated by s and d, respectively.

Consider table 6.4. Specification T1 forms the starting point for the analysis. Transfers are higher if the same subject is chosen again, transfers increase on average by 7 points. Having been chosen by a player previously increases transfers on average by 11 points. In specification T2 the amount received is interacted with the indicator ($S \dashleftarrow R$). Notice that in order to determine the effect of received transfers on own transfers one has to take account the coefficient of the variable ($S \dashleftarrow R$), which is negative and significant - this is the intercept of the functional relation between the amount received and transfer made. For example, with an intercept of -20 and a slope of $1/3$, the results suggest that only if the transfer received was higher than 60 points this had a positive effect on the own transfer. This is evidence for hypothesis RCP 3.

Hypothesis RCP 4, which relates transfers to the ratio returned in the previous round also finds empirical support, as can be seen from specification T3. This is evident from the positive coefficients of the previous choice multiplied with the return ratio received and interacted with same and different choice. Notice that in this case the coefficient of ($S \dashrightarrow R$) becomes insignificant. However, upon having received a high return ratio players increase their transfer even if they choose a different player. Hence, the *additional* reward when choosing the same player is the difference $16.4 - 8.1 = 8.3$, which is significant. [??as we make the point here to check same and different we should also do this for RCP_transfer1 as it could be that transfer increases in average transfer received even if you choose someone who did not transfer to you in period $t-1$] The insignificance of $S \dashrightarrow R$ points to the fact that transfers are increased even if return ratio is small. In other words, RCP 4 also holds in the unconditional formulation.

The results for hypothesis RIF 2 are similar, for which evidence is provided in specification T4. As in the choice setting we consider RCP and RIF separately due to collinearity. Players do increase their transfer after high payoffs. However, again they do so *regardless* to whether they repeat their choice or not. While in the case of the return ratio the relative difference between the coefficients same and different choice was substantial, in the case of payoffs [??i do not understand: it still significant but smaller. - the absolute difference never matters. either the difference is less significant or the difference in terms of transfers is smaller] Similar to the RCP hypothesis above, the insignificance of $S \dashrightarrow R$ is evidence that transfer increase even if payoffs were very small. Here we speak of positive reinforcement for all payoff values. A comparison of the explanatory power of RCP 4 and RIF 2 shows that the latter one has a substantially better fit to the data. Hence we will refer to evidence for reinforcement as strong.

Hypothesis DLT 2 is addressed in table 6.5. We find evidence of directional learning as the coefficient of $1\{r_{ij} \geq 1/3\}|s$ is significant. This means that when having got back less than sent, the transfer decreases significantly by 23 points (18 - (-5)). Notice that this effect is smaller (7-(-5)=12 points) when

Table 6.4: Transfer: estimation results 1

	T1	T2	T3	T4
$S \dashrightarrow R$	7.22 (1.54)***	6.75 (1.52)***	-.44 (3.35)	-5.1 (3.7)
$S \dashleftarrow R$	10.98 (1.53)***	-19.26 (4.56)***	-15.42 (4.41)***	-12.73 (4.36)***
$(S \dashleftarrow R) \cdot \tau_{ji}$	.	.33 (.05)***	.28 (.05)***	.24 (.05)***
$(S \dashrightarrow R) \cdot r_{ij} \mid s$	.	.	16.37 (3.29)***	.
$r_{ij} \mid d$	.	.	8.14 (3.19)**	.
$(S \dashrightarrow R) \cdot \pi_{ij} \mid s$	.	.	.	.1 (.02)***
$\pi_{ij} \mid d$	.	.	.	.06 (.01)***
Obs.	2540	2540	2540	2540
R^2	.21	.22	.24	.27

Note: $\mid s$ and $\mid d$ means that the variable is interacted with same (s) or different (d) choice. Control variables are: gender, age, siblings, and nationality of sender and receiver, dummies for session and treatments. Dummies for each period.

transferring to a new player. In T7 we investigate the alternative cutoff point at 1/2. While the effect on transfers is still significant for the same choice, it is now only 2.

Table 6.5: Transfer: estimation results 2

	T6	T7
$S \dashrightarrow R$	-5.31 (4.54)	3.43 (2.23)
$S \dashleftarrow R$	-17.32 (4.28)***	-17.15 (4.46)***
$(S \dashleftarrow R) \cdot \tau_{ji}$	.31 (.05)***	.31 (.05)***
$\mathbf{1}\{r_{ij} \geq 1/3\} \mid s$	17.98 (3.93)***	.
$\mathbf{1}\{r_{ij} \geq 1/3\} \mid d$	6.53 (2.26)***	.
$\mathbf{1}\{r_{ij} \geq 1/2\} \mid s$	.	5.75 (1.76)***
$\mathbf{1}\{r_{ij} \geq 1/2\} \mid d$	.	1.37 (1.81)
Obs.	2540	2540
R^2	.24	.23

Note: see notes to table 6.4.

Finally, hypothesis RTN 1 is widely confirmed by the data. Table 6.6 reports the coefficients for the period dummy variables included in the regressions for two specifications. It is evident that transfers increase slightly in the third period relative to the second but drop on average by 5 points in the last period. Notice that this is the case in both regressions T3 and T5, where once the ratio returned and once the amount received was included. Hence the end game effect is *additional* to any decreases in transfer that could have been induced by lower receipts or return ratios in the previous period.

Table 6.6: Transfer: estimation results for period dummies

	T3	T5
period 3	1.56	1.35
	(.80)*	(.80)*
period 4	1.24	1.07
	(.93)	(.92)
period 5	.018	-.28
	(1.05)	(1.04)
period 6	-4.95	-5.26
	(1.91)**	(1.89)***

Note: Effects with respect to period 2. See notes to table 6.4.

Table 6.7 summarizes the main findings of this section.

Table 6.7: Transfer: summary of findings

hypothesis	*...transfers are higher if*	*evidence*	*magnitude*
RCP 3	the ratio returned was high	yes	9
RCP 4	the receiver sent a lot	yes	11
RIF 2	the payoff was high	strong	14
DLT 2	the receiver returned more than 1/3	yes	11
	...transfers are lower		
RTN 1	in the last period	yes	-5

Note: Magnitude reports the effect on the transfer, which is evaluated at the average of each variable.

6.3 The amount sent back

In the last stage of the game, subjects decided how much of any amount transferred to them (multiplied by 3) to send back to the original sender. Let G_{it} be the amount that the Sender (who is indexed by i) gets back. From a receiver's perspective, the variable G_{it} is the amount he pays back to the sender, and will henceforth be called P_{jit}. This variable, which is naturally bounded by 3 times the amount received τ_{jit}, will be the measure of return used in this section.

Due to the nature of the game, when players take the decision how much to transfer back, they know already who has chosen them in this period t. Hence, in period t receivers know if they are playing in a pair or not and by whom they have been chosen.

The hypothesis are formulated from the perspective of the player that takes action, i.e. the receiver.

Hypothesis RCP 5 *The amount paid back is higher if the transfer received was high.*

Hypothesis RIF 3 *The amount paid back is higher if received from a player for the second time.*

Hypothesis DLT 3 *The amount paid back is lower if received from a player for the second time.*

Hypothesis RTN 2 *The amount paid back is lower in the last period.*

The choice of players in stage one of the game leads to a particular feature of the data analyzed in this section. A player might have been chosen by 0, 1, 2, 3 or even 4 other players. Hence, at each period t there are between 0 and 4 observations for each player of an amount paid back. In total, of course, there are as many observations as for the initial transfer.

The framework to be used in this section goes along the lines of section **??**. Consider the equation for the amount ratio returned

$$P_{jit} = \alpha d_{jit} + \beta d_{jit-1} + \gamma d_{jit-1} + \delta X_{it} + \eta Z_{jt} + u_{it}$$

where the variables are as defined above. Notice that for player j to make a move in t, it has to be that he was chosen by i, ie $d_{ijt} = 1$.

Table 6.8 presents results for four specifications. The names S for sender and R for receiver remain unchanged, even though it is now the receiver to take action. Note that by default, the sender must have chosen the receiver in period t, otherwise the receiver does not make a move. Thus, either S and R formed a pair in t (if $(S \dashleftarrow R)_t$ is one), or S chose R but not vice versa.

Specification P1 forms the starting point for the analysis. We find that payback is on average about 24 units higher when receiving a transfer from the same subject for the second time. This is evidence supporting hypothesis RIF 3 and is evidence against hypothesis DLT 3. We also find that a subject pays back about 33 units more if he also sent a transfer to this subject in the same round. This effect is not directly associated to one of our hypotheses. Notice that sending a transfer to this subject in the previous round has no significant effect (see coefficient of $S \underset{t-1}{\dashleftarrow} R$).

In specification P2 one can find support for hypothesis RCP 5. The amount received increases the amount paid back. Notice in particular that coefficient of the transfer received is 1.8. Together with the insignificant constant this shows that on average for each token sent, which is multiplied by three, subjects pay back 1.8, or, equivalently 60% of amount received. The functional relation between the transfer received and the amount paid back is not linear, as can be seen from the positive and significant coefficient of the variable τ_{ji}^2 in specification P3. However, the curvature does not have a substantial impact in the range 20 to 100 where 90% of the transfers can be found.

One might be pressed to interpret the decreasing period dummies in P1 to P3 as evidence for Hypothesis RTN 2 that payback is lower in the last periods. However, when we add interaction terms between period number and transfer received (see P4) we find that the period dummies become insignificant. Instead we now find significant decrease in return ratio from value 70% in period 4 to 50% in period 6. While transfers are lower in final periods (as shown in previous section) less can only be paid back. Never-the-less, the decline in payback can be explained only by declining return ratio. In other words, the rate of the decline of payback is stronger than that of the decline in transfers.

Table 6.9 summarizes the main findings of this section.

Table 6.8: Amount paid back : estimation results

	P1	P2	P3	P4
$S \underset{t-1}{\dashrightarrow} R$	24.21	13.3	12.04	17.71
	(5.88)***	(4.8)***	(4.78)**	(4.5)***
$S \underset{t-1}{\dashleftarrow} R$	1.69	3.33	2.89	-1.52
	(5.99)	(4.65)	(4.62)	(4.64)
$S \underset{t}{\dashleftarrow} R$	32.68	26.25	25.67	19.45
	(5.16)***	(4.56)***	(4.54)***	(4.6)***
τ_{jit}	.	1.83	.14	.
		(.09)***	(.28)	
τ_{jit}^2	.	.	.01	.
			(.002)***	
period 3	-3.95	-7.24	-6.14	-14.38
	(4.34)	(3.77)*	(3.77)	(9.06)
period 4	-10.14	-12.57	-12.16	-3.95
	(4.93)**	(3.84)***	(3.86)***	(7.98)
period 5	-28.42	-29.73	-29.08	-1.17
	(6.3)***	(5.6)***	(5.63)***	(7.93)
period 6	-74.83	-65	-65.22	-4.96
	(7.82)***	(7.06)***	(6.99)***	(9.63)
$\tau_{ji}\cdot$ period 2	.	.	.	2.11
				(.11)***
$\tau_{ji}\cdot$ period 3	.	.	.	2.18
				(.12)***
$\tau_{ji}\cdot$ period 4	.	.	.	2.01
				(.11)***
$\tau_{ji}\cdot$ period 5	.	.	.	1.77
				(.13)***
$\tau_{ji}\cdot$ period 6	.	.	.	1.49
				(.17)***
Const.	35.02	-109.44	-64.35	-55.84
	(68.58)	(57.85)*	(58.4)	(57.81)
Obs.	2540	2540	2540	2420
R^2	.22	.42	.43	.42

Note: Control variables are: gender, age, siblings, and nationality of sender and receiver, dummies for session and treatments.

Table 6.9: Return: summary of findings

hypothesis	*...the amount paid back is*	*evidence*	*magnitude*
RCP 5	higher if the transfer received was high	yes	30
RIF 3	higher if the received for two consecutive periods	yes	13 / 18 [a]
DLT 3	lower if the received for two consecutive periods	no	
RTN 2	lower in the last period	no	
	additional findings		
	higher if transfer sent to same player	yes	26 / 19 [a]
	The return ratio is lower in final periods	yes	-34[b]

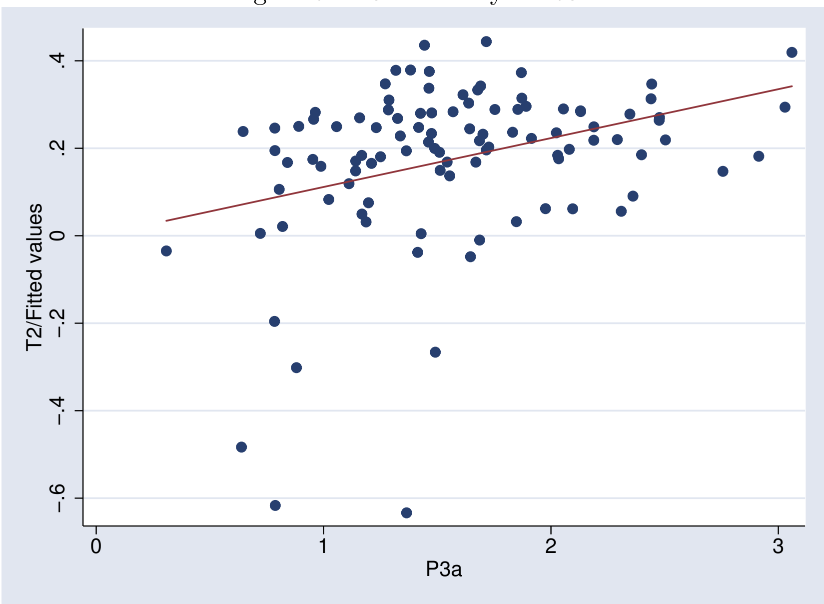
Note: Magnitude reports the effect on the amount paid back, which is evaluated at the average of each variable. [a] The values correspond to specification P2 / P4. [b] Drop is measured relative to period 5.

6.4 Tracking individual behavior

[preliminary] This section investigates if observed individual behavior is consistent at various stages of the game. To this end we compare the propensity to behave according to a certain motive at different stages of the game for each individual.

Consider Hypotheses RCP 3, addressed in specification T2. The coefficient of $(S \dashleftarrow R) \cdot \tau_{ji}$ can be interpreted as the degree of reciprocity. This coefficient is estimated for each of the 110 individuals. Analogously, hypothesis RCP 5, in specification P2, translates into the effect of $\tau_j it$, which is estimated for each participant. Figure 6.1 correlates the individual coefficients obtained for each of the above estimates.

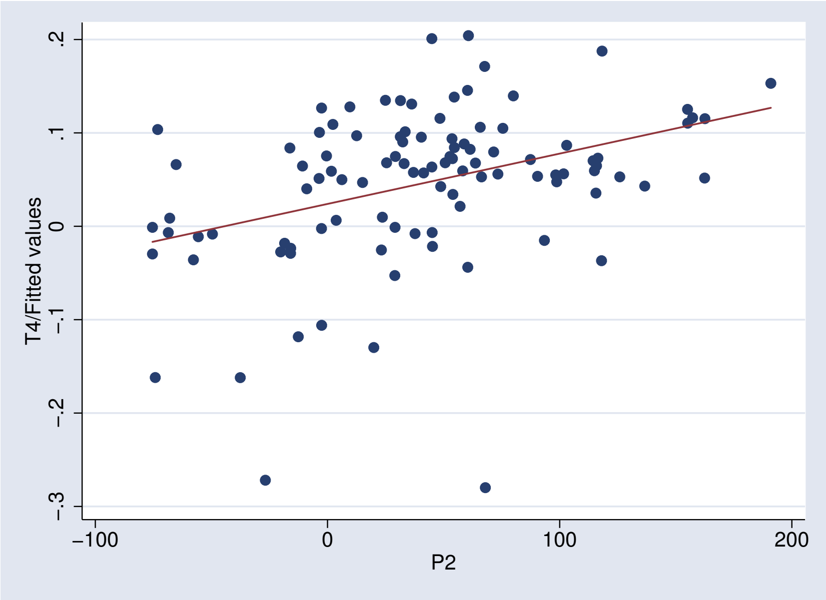
Figure 6.1: Consistency of RCP



The positive correlation indicates that each an individual that showed a high degree of reciprocity when transferring money, confirms this behavior at the stage of return.

The same exercise can be repeated for the reinforcement hypothesis. The candidate coefficients are $\pi_i j$ in specification T4 and $S \dashrightarrow R$ in specification P2. Figure 6.2 shows a scatter of the two variables, confirming the consistency of behavior also for the reinforcement motive.

Figure 6.2: Consistency of RIF



6.5 Predetermined Treatment

In the following we briefly present and compare the findings in the control or predetermined treatment where the receiver of each sender was randomly assigned. Of course one has to take into account for these comparisons that the predetermined treatment only involved 1/5 of the number of observations as the free choice treatment.

Comparing tables 6.4 and 6.10 we make the following observations. From T1 we see that there are now no significant dependence on choice behavior in the previous round. Looking at T2-T4 we see a that higher transfers received in fact now trigger lower own transfers. [??difficult to interpret] Degree of reciprocity or reinforcement due to transferring to same subject again does not change significantly.

Table 6.10: Transfer predetermined : estimation results 1

	T1	T2	T3	T4
$S \dashrightarrow R$	.96	1	-6.6	-14.26
	(3.14)	(3.13)	(7.98)	(8.79)
$S \dashleftarrow R$	4.35	31.04	30.71	30.51
	(6.51)	$(9.42)^{***}$	$(10.01)^{***}$	$(9.89)^{***}$
$(S \dashleftarrow R) \cdot \tau_{ji}$	.	-.3	-.29	-.29
		$(.14)^{**}$	$(.14)^{**}$	$(.14)^{**}$
$(S \dashrightarrow R) \cdot r_{ij} \mid s$	.	.	24.36	.
			$(13.63)^{*}$	
$r_{ij} \mid d$	.	.	10.87	.
			$(4.45)^{**}$	
$(S \dashrightarrow R) \cdot \pi_{ij} \mid s$	.	.	.	.16
				$(.05)^{***}$
$\pi_{ij} \mid d$	.	.	.	.06
				$(.02)^{***}$
Obs.	437	437	437	437
R^2	.17	.18	.19	.22

Note: $\mid s$ and $\mid d$ means that the variable is interacted with same (s) or different (d) choice. Control variables are: gender, age, siblings, and nationality of sender and receiver, dummies for session and treatments. Dummies for each period. 550 observations in total. In 550 - 113 = 437 a positive transfer was made.

[??do not see much in the following table so we could drop this one and say that there was not much difference.]

[??what about end game effect? we could state result without presenting table]

Most importantly we observe an overall lower return ratio of 34% and find that it only is lower in the final period where it takes the value of 20%.

Table 6.11: Transfer predetermined : estimation results 2

	T6	T7
$S \dashrightarrow R$	-9.28 (10.89)	.46 (4.02)
$S \dashleftarrow R$	29.59 (9.79)***	31.1 (9.51)***
$(S \dashleftarrow R) \cdot \tau_{ji}$	-.28 (.14)**	-.3 (.14)**
$\mathbf{1}\{r_{ij} \geq 1/3\} \mid d$	17.34 (11.04)	.
$\mathbf{1}\{r_{ij} \geq 1/3\} \mid s$	6.58 (2.84)**	.
$\mathbf{1}\{r_{ij} \geq 1/2\} \mid s$	.	1.6 (6.12)
$\mathbf{1}\{r_{ij} \geq 1/2\} \mid d$	.	.17 (3.43)
Obs.	437	437
R^2	.2	.18

Table 6.12: Transfer: estimation results for period dummies, predetermined

	T3	T5
period 3	.05 (2.52)	.05 (2.53)
period 4	1.61 (2.89)	1.83 (2.92)
period 5	2.02 (2.75)	2.22 (2.79)
period 6	-9.05 (4.61)*	-8.89 (4.59)*

Table 6.13: Returned ratio / amount paid back : estimation results

	P1	P2	P3	P4
$S \dashrightarrow R$	32.55	24.54	23	22.77
	(16.02)**	(15.15)	(15.7)	(15.12)
$S \dashleftarrow R$	4.26	2.08	1.86	1.81
	(8.82)	(8.19)	(8.15)	(8.45)
$S \underset{t}{\dashleftarrow} R$	22.27	18.81	18.93	18.99
	(7.04)***	(6.7)***	(6.7)***	(6.92)***
τ_{ji}	.	1.02	.21	.
		(.11)***	(.38)	
τ_{ji}^2	.	.	.006	.
			(.003)**	
period 3	.25	1	1.54	4.69
	(8.13)	(7.47)	(7.47)	(18.92)
period 4	-8.19	-9.34	-9.68	16.21
	(9.62)	(9.12)	(9.09)	(19.54)
period 5	-32.53	-34.15	-34.23	-10.42
	(10.52)***	(9.88)***	(9.89)***	(19.07)
period 6	-65.6	-53.16	-53.76	-6.33
	(12.88)***	(11.82)***	(11.89)***	(18)
$\tau_{ji}\cdot$ period 2	.	.	.	1.31
				(.19)***
$\tau_{ji}\cdot$ period 3	.	.	.	1.26
				(.2)***
$\tau_{ji}\cdot$ period 4	.	.	.	.99
				(.2)***
$\tau_{ji}\cdot$ period 5	.	.	.	1.02
				(.22)***
$\tau_{ji}\cdot$ period 6	.	.	.	.67
				(.21)***
Const.	-15.62	-88.08	-66.1	-122.91
	(64.63)	(60.28)	(60.86)	(60.27)**
Obs.	437	437	437	437
R^2	.25	.36	.36	.37

Note: The first two variables refer to $t-1$. $\mid s$ and $\mid d$ means that the variable is refers to the same (s) or different (d) choice for the Receiver, compared to the previous period. Control variables are: gender, age, siblings, and nationality of sender and receiver, dummies for session and treatments.

7 Final remark

This paper analyzes the determinants of trust and trustworthiness in an experiment where trust can emerge as the result of repeated interaction between individuals. We add an element of choice to the setting of a repeated trust game, in that players have the opportunity to choose among four players. For each opponent, players see information such as age, nationality and gender. The influence of four different behavioral and learning theories is looked at: directional learning, reinforcement learning, reciprocity and rationality. The econometric analysis goes along the three stages of the game: choice, transfer and return, controlling for confounding factors. It sheds light on the behavioral motives behind each decision. The low degree of formalization and a certain degree of observational equivalence makes a clear discrimination between the competing approaches impossible. While it is not possible to attribute the entire playing behavior to a single type, at each decision several motives seem to influence the decisions taken, some being of higher explanatory power than others. It was shown that a mixture of several motives is at play at each stage of the game. In the same way as rationality does not offer a satisfying explanation for the behavior of the players, none of the alternative motives such as reinforcement or reciprocity is able to capture all facets of the observed behavior.

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A Appendix A: Additional figures and tables

Figure A.1: Histogram of transfer, periodwise

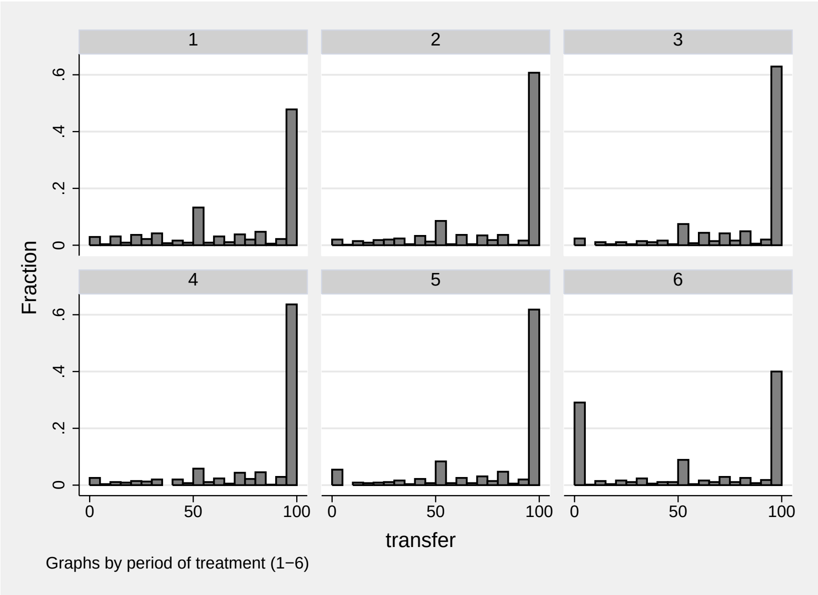


Figure A.2: Histogram of returned ratio, periodwise

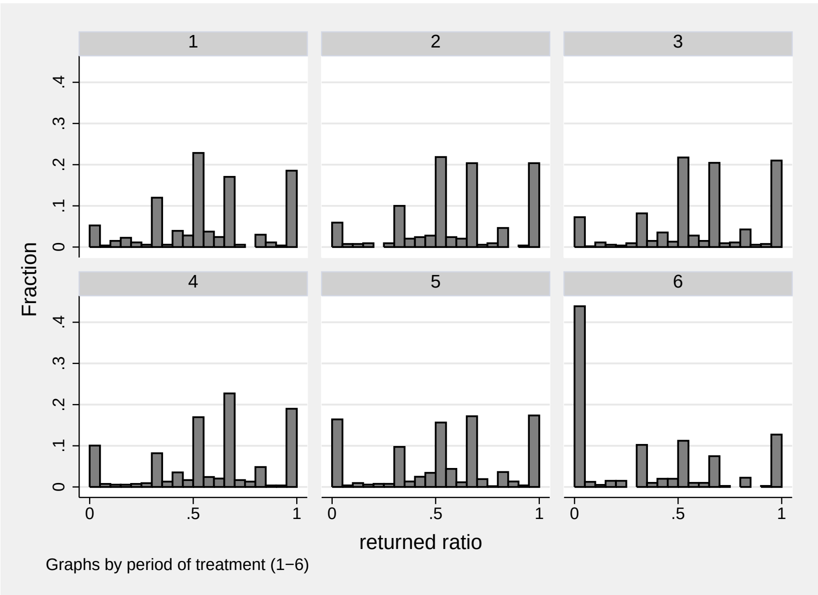


Figure A.3: Histogram of transfer, predetermined treatment, periodwise

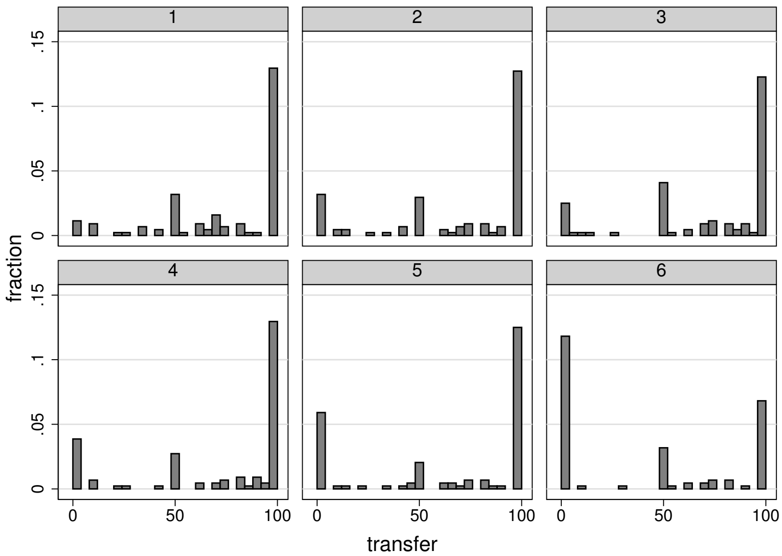
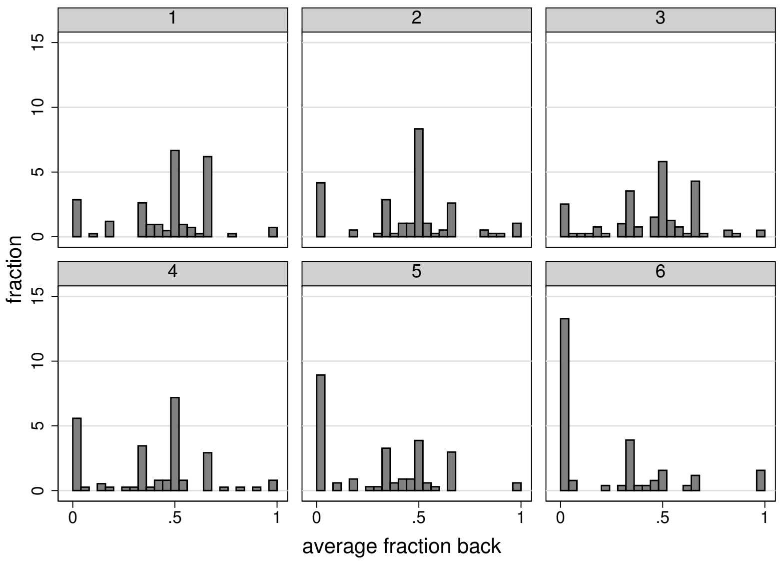


Figure A.4: Histogram of returned ratio, predetermined treatment, periodwise



B Appendix B: Experimental design

B.1 Instructions

Screen 1

- You will randomly be matched with **4 other players** to play a **game**.

- Each game consists of **three stages** which will be described on the following screens.
- The game will be repeated **for 6 periods** with the **same** players.
- After the 6 periods, you will randomly be **re-matched** with four new players.
- This re-matching will be repeated **six times** (time permitting).

Screen 2

Stage 1 of 3

Your endowment in each period is **100 points**, equivalent to **0.35 Euros**
You can choose **if** you want to transfer any points to your fellow players or not. If so, you decide **to whom** and **how much**. You can choose **only one person** and you can transfer any amount between **0 and 100**. If you decided not to transfer points at all, just click the button.
Every transfer made in stage 1 will be **multiplied by the factor 3** as it arrives on the other player's account.

Screen 3

In stage 1 the other 4 players have simultaneously made a similar decision to yours. Due to the simultaneity their choice does not depend on your decision.

Stage 2 of 3

You will see **who** of the other players have chosen you and **how much** has been transferred to you. It might be that you were chosen by none, 1, 2, 3 or even all 4 players.
If you got a transfer from a player, you can decide **if** and **how much** you want to transfer back to **this player**. You can transfer back anything **between zero and three times** the initial transfer to you. If you were chosen by more than one player, you can choose different amounts for each of them.

Screen 4

Stage 3 of 3

In this stage you see the results of the period, how much you transferred and how much the player you have chosen initially **transferred back** to you.
You will also see the profit in Euro you made in this period.

Screen 5

Remember...

- After you finished playing the three stages, you will play this game six times with the same players.

- After the 6 periods, you will randomly be **re-matched** with four new players.
- This re-matching will be repeated **six times** (time permitting).

Do you want to read the instructions again or continue directly with a short quiz?

Screen before the predetermined treatment

The game you will play now is **slightly different** from the one you have played before.
Contrary to the previous game, in Stage 1 you will **not have the possibility to choose a player**. Instead, a **random choice** will be made for you. You can only **decide how much** you want to transfer to the player already determined. Notice that this also affects stage 2, as it is now random by how many players you were chosen.

B.2 Privacy Statement

The privacy and Anonymity statement reads as follows.
All information we collect undergoes a strict anonymization process, not only ensuring anonymity among players but also ensuring that you stay anonymous to us. No private information will be collected. During the experiment you will see some information about your fellow players. We have ensured that you cannot identify them personally, and vice versa, they cannot identify you. Remember that this experiment runs over different rooms, thus involving much more individuals than those seated in your room. At the end of the session, you will be asked to type in the account number you obtained before. Please keep this number, because after notification you can pick up an envelope with your payment at the porters lodge.

B.3 Screenshots

See figures B.1 to B.5 for some black and white screenshots of the game.

Figure B.1: Screenshot of the CV information

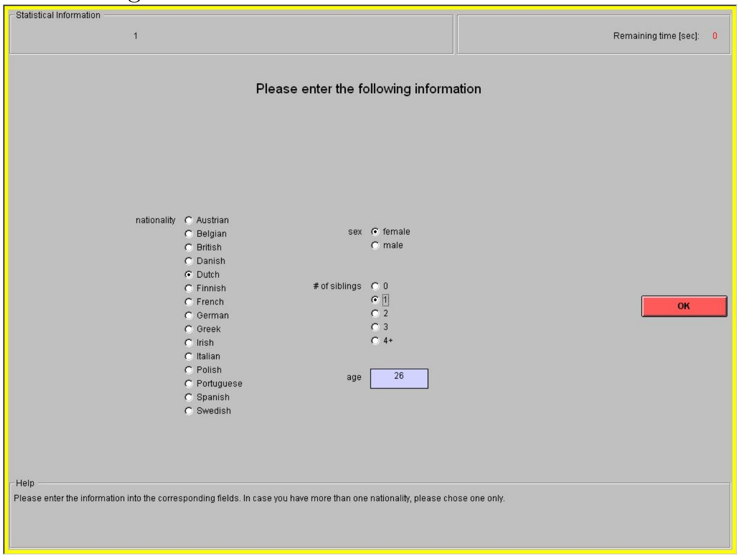


Figure B.2: Screenshot of the first stage

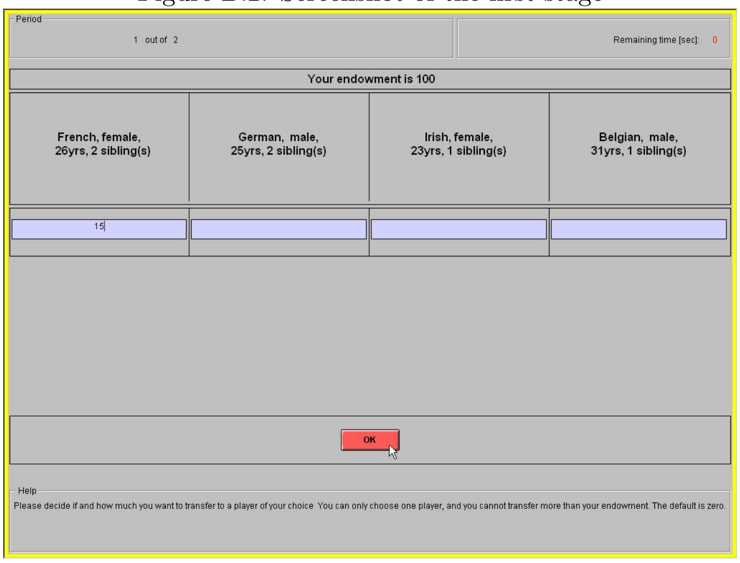


Figure B.3: Screenshot of the second stage

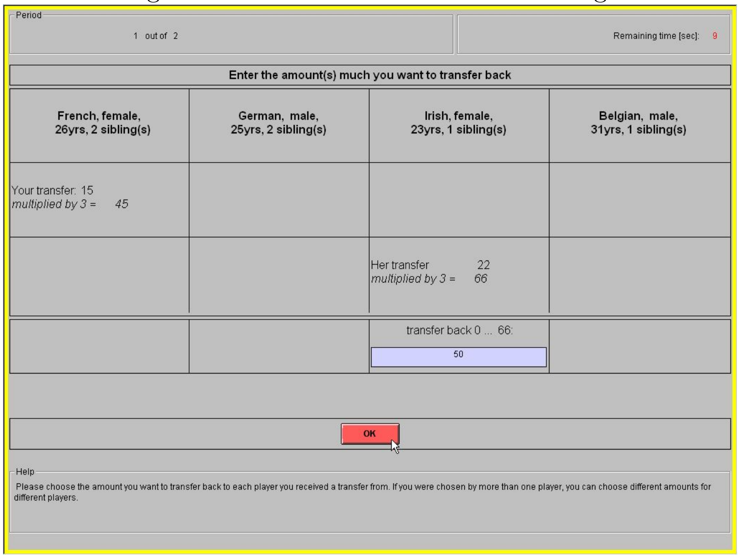


Figure B.4: Screenshot of the third stage

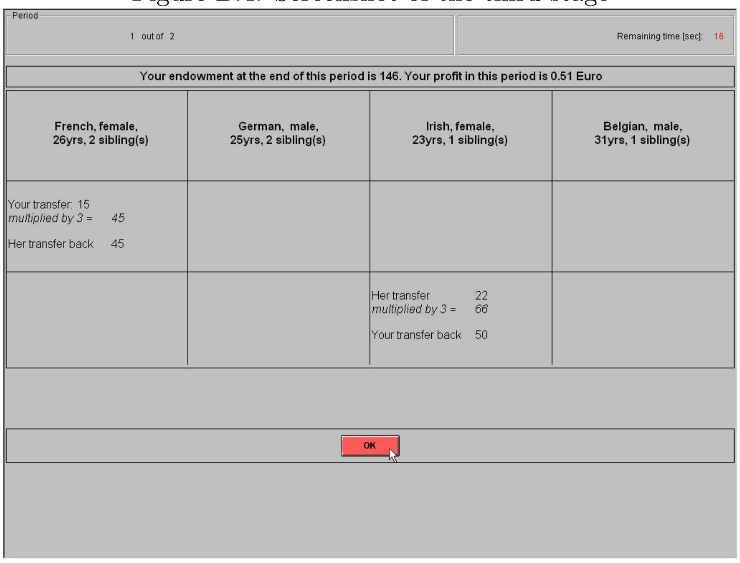


Figure B.5: Screenshot of the first stage of the predetermined treatment

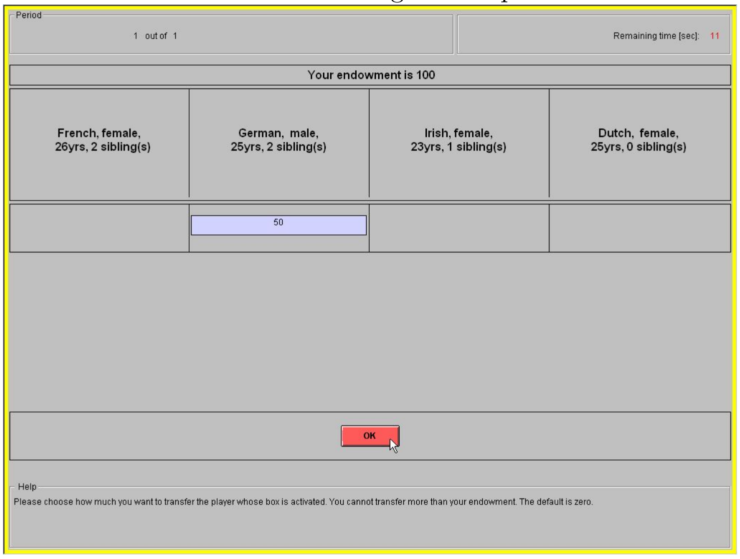


Table B.1: Results of the quiz: percent of all answers

	Question		
Answer	1	2	3
A	19	1	1
B	21	95*	5
C	60*	4	94*

Note: * denotes the correct answer.

B.4 Quiz

Note: Subjects always saw the actual values of the expressions involving X, Y, Z. Question 1: [Subjects had to choose an amount X between 1 and 100.] "Imagine you transferred X points to player two in stage 1. Assume further that she made no transfer to you in stage 1. How many points can you transfer back to her in stage 2 at most?"

A: $3X$ B: X C: 0

Question 2: [Subjects drew random number Y between 0 and 100 by clicking on a button.] "Your drew the number Y. Assume you transferred this amount to one player in stage one. How much can the other player transfer back to you at most?"

A: 0 B: $3Y$ C: Y

Question 3: "Please press the button below to determine randomly how much you will be paid back. Remember that this number can be between 0 and $3Y$." [next screen] "Summary Question: Initially, from your 100 points you transferred Y to the player. Let us assume the player transferred you back Z in the next stage. You had no interaction with other players. Based on this, what is the balance on your account?"

A: 0 B: $3Y$ C: $100 - Y + Z$

Table B.4 summarizes the results. Subjects got a feedback screen after each answer indicating if they were correct or mistaken and stating the correct answer. While in the first question many subjects made mistakes, in questions 2 and 3 almost all subject answered correctly.

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