# On-Line Appendix

Similarities and Differences when Building Trust:
the Role of Cultures

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# Appendix

## A Experimental Design

The experiment was conducted using a computerized setup[10] 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%). Participants 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 pool of participants was not experienced in playing games. For each session a multiple of five participants was recruited (session 0: 10, session 1: 30, session 2: 40, session 3: 30). The profit earned by participants ranged from €24 to €47.90, with an average of €36.34 (s.d. 4.89), including a €5 show-up fee paid to each candidate. Each session lasted for about 2 hours. Participants were recruited via email and were invited to sign up on a web site. Each session took place in 2 to 3 computer labs with 10 to 25 computers each, located in different buildings of the university campus. Upon arrival to an assigned computer lab, participants randomly drew a seat number and an account number. This account number was later used to identify participants 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.

Note that at no point in time were participants deceived. Participants 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.[11] The instructions were followed by a short quiz of three questions covering the crucial aspects of the game. Almost all participants appeared to have understood the game very well before playing. No major clarification questions were asked. After reading through the instructions,

[10] The z-Tree software is described in Fischbacher (2007)

[11] At `http://www.kirchkamp.de/pdf/trustInstructions.pdf` you can download a copy of the instructions

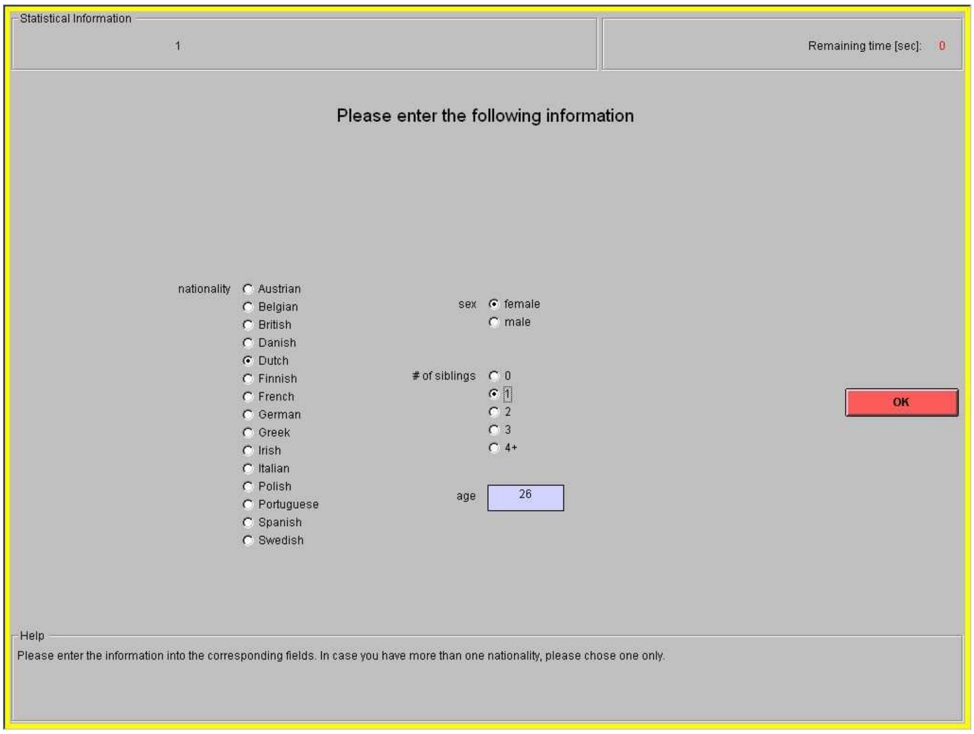


Figure 6: Screenshot of the CV information

participants were asked to enter information about their age, gender, nationality, and number of siblings.[12] 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.

Each session consisted of six repetitions in which participants were randomly matched in groups of five players. In this experiment we only use the first four repetitions.

In each of these four repetitions participants played the following repeated version of the trust game. Figures 6 to 9 provide examples of the relevant screenshots seen by participants. At the beginning of the repetition, each player could see some information about the four other players in the own group, the information included the players' nationality, age, gender, and the number of siblings. The participants then decided to *whom* and *how much* of their initial endowment of 100 they were willing to transfer. No entry in any of the boxes corresponded to making no choice, which was also an option. In the next step participants saw *who* among the other players had chosen them and *how much* they had received from these partners. In addition, this amount was shown multiplied by three. For each player from whom a transfer was received, they could choose how much to return. Then, participants were presented a summary of all transfers and returns they had been involved with. These steps were repeated 6 times. Then, groups were reshuffled and a new repetition was played. Due to the limited amount of participants in each session and the large size of each group, the re-matching had to be

[12]During the recruitment process it was made sure that participants were recruited only from countries which have a substantial number of students at the university. This restriction was introduced to avoid identification of the participants during the game.

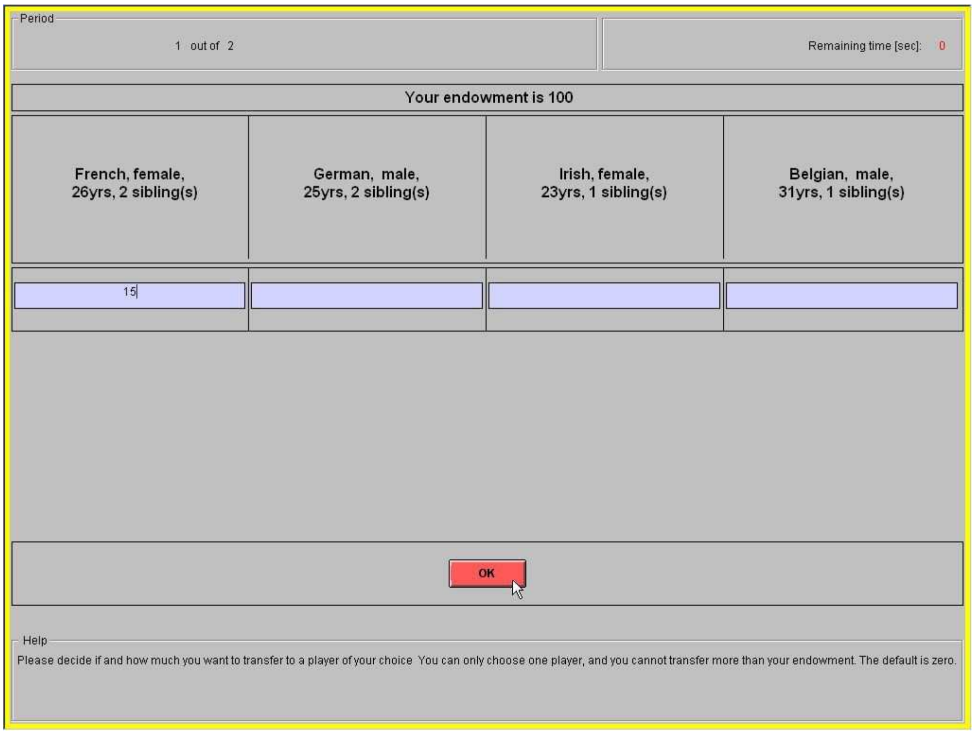


Figure 7: Screenshot of the first stage

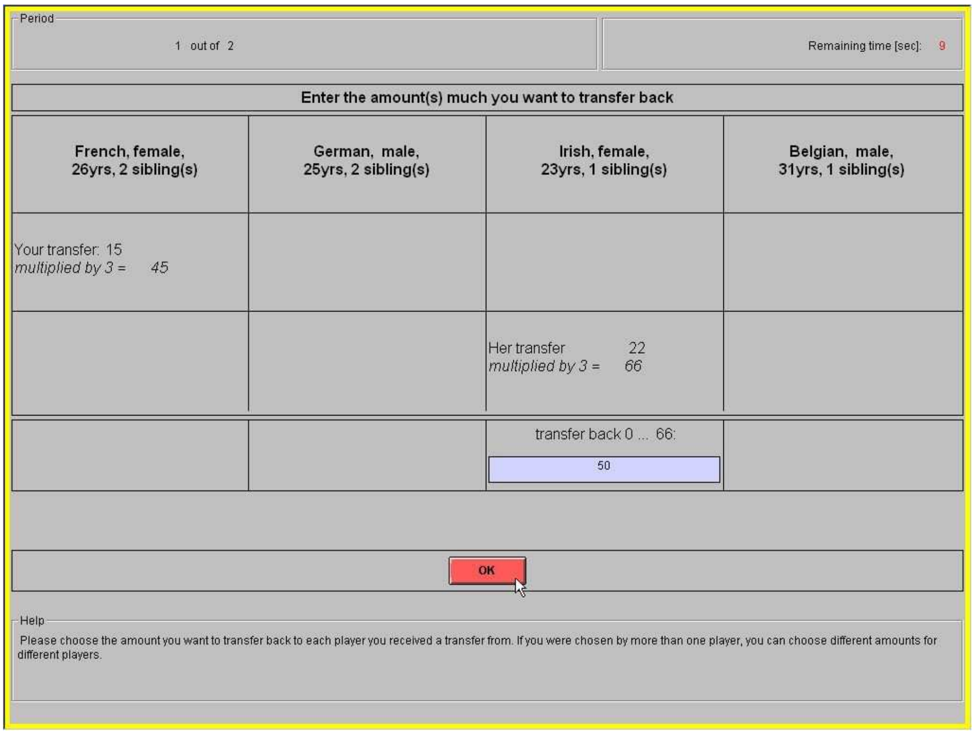


Figure 8: Screenshot of the second stage

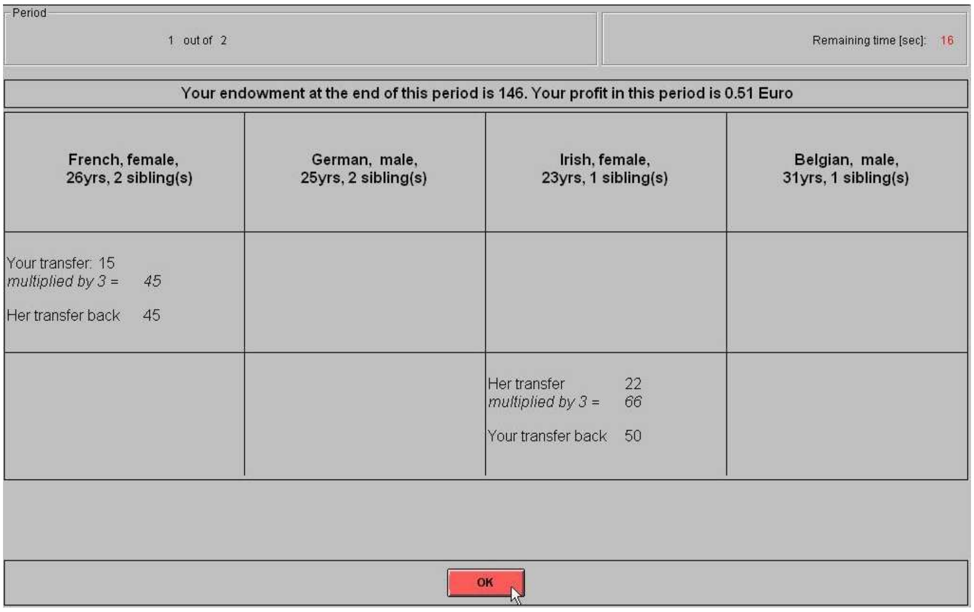


Figure 9: Screenshot of the third stage

done on a random basis, hence it is not ruled out that participants could meet again in subsequent groups. At the end of each repetition participants were also informed about their own profit made over all the periods of that repetition.

# B Regression Results

All regressions are based on models with mixed effects. Standard errors, $t$-statistics, $p$-values, and confidence intervals are based on a parametric bootstrap based in 1000 replications.

## B.1 Transfers and Returned Amounts

We assess the significance of our discussion of Figure 1 with the help of two mixed effects regressions.

In the first one we investigate how trust as measured by the amount of tokens sent depends on other variables. The amount of tokens sent is denoted by $t^S_{ij}$ where $i$ refers to the identity of the participant and $j$ is a *period number* that uniquely identifies the period and the repetition, so $j = 1, .., 24$. In a second regression we investigate how the amount of tokens returned depends on the sum of transfers received and on other variables. The amount of tokens returned by participant $i$ to all those from whom tokens were received in that period is denoted by $r^S_{ij}$ where $j$ is the index of the period of a given repetition. The sum of transfers received by participant $i$ in the period numbered $j$ is denoted by $t^R_{ij}$. So $t^R_{ij}$ is the tripled amount of tokens sent by other players to participant $i$ in the period numbered $j$. The coefficient of $t^R_{ij}$ in the regression can be considered as a measure of

|  | $\beta$ | $\sigma$ | $t$ | $p$ value | 95% conf | interval |
|---|---|---|---|---|---|---|
| $d_1$ | 54 | 3.8 | 14.2 | 0.0000 | 46.5 | 61.4 |
| $d_{2-5}$ | 65 | 3.71 | 17.5 | 0.0000 | 57.7 | 72.3 |
| $d_6$ | 43.1 | 3.76 | 11.5 | 0.0000 | 35.7 | 50.5 |
| $T$ | 5.96 | 0.425 | 14 | 0.0000 | 5.13 | 6.79 |

Table 10: Estimation of equation (7), transfer $t^{\mathrm{S}}$

|  | $\beta$ | $\sigma$ | $t$ | $p$ value | 95% conf | interval |
|---|---|---|---|---|---|---|
| $d_1$ | -0.00893 | 11.8 | -0.000757 | 0.9994 | -23.1 | 23.1 |
| $d_{2-5}$ | -0.899 | 10.9 | -0.0827 | 0.9341 | -22.2 | 20.4 |
| $d_6$ | -3.14 | 11.6 | -0.27 | 0.7871 | -25.9 | 19.6 |
| $T$ | 2.41 | 1.86 | 1.29 | 0.1962 | -1.24 | 6.05 |
| $t_1^{\mathrm{R}}$ | 0.515 | 0.0242 | 21.3 | 0.0000 | 0.467 | 0.562 |
| $t_{2-5}^{\mathrm{R}}$ | 0.541 | 0.0181 | 29.8 | 0.0000 | 0.506 | 0.577 |
| $t_6^{\mathrm{R}}$ | 0.328 | 0.0242 | 13.6 | 0.0000 | 0.281 | 0.376 |
| $t_T^{\mathrm{R}}$ | 0.0136 | 0.00613 | 2.22 | 0.0262 | 0.00161 | 0.0257 |

Table 11: Estimation of equation (8), returned amount $r^{\mathrm{S}}$, this is the sum of potentially several amounts

marginal trustworthiness. Specifically we run the following regressions:

$$t^S = \beta_{d_1} \cdot d_1 + \beta_{d_{2-5}} \cdot d_{2-5} + \beta_{d_6} \cdot d_6 + \beta_T \cdot T + \epsilon_s + \epsilon_i + \epsilon_{ij} \quad (7)$$

$$r^S = \beta_{d_1} \cdot d_1 + \beta_{d_{2-5}} \cdot d_{2-5} + \beta_{d_6} \cdot d_6 + \beta_T \cdot T + \beta_{t_1^R} \cdot t_1^R + \beta_{t_{2-5}^R} \cdot t_{2-5}^R + \beta_{t_6^R} \cdot t_6^R + \beta_{t_T^R} \cdot t_T^R + \epsilon_s + \epsilon_i + \epsilon_{ij} \quad (8)$$

Sessions are indexed with $s$, participants are indexed with $i$, and $j$ is the period number. To simplify notation we do not write indices $_{ij}$ for variables. Throughout the paper and unless specified otherwise we estimate mixed effect models with random effects $\epsilon_s$, $\epsilon_i$ and $\epsilon_{ij}$ for session $s$, participant $i$, and participant $i$ in period $j$, respectively. We assume that error terms $\epsilon_s$, $\epsilon_i$ and $\epsilon_{ij}$ are independent and follow a normal distribution with mean zero. With this specification, we allow behavior of the same participant in different repetitions to be correlated as well as different participants from the same session to be correlated. This is important as participants within the same session are randomly assigned to groups in each repetition and thereby potentially influence each other. Note that each participant belongs to a unique session and, hence, session indices are only needed in the error terms. Dummies $d_1$, $d_{2-5}$ and $d_6$ are one in period 1, periods 2-5 and period 6, respectively, and zero otherwise. We let $t_1^R$, $t_{2-5}^R$ and $t_6^R$ specify the transfer received in period 1, periods 2-5 and period 6, respectively, so $t_k^R$ is short for $t^R \cdot d_k$ for $k \in \{$"1","2-5","6"$\}$. Since behavior might change over time we include the repetition $T \in \{1, 2, 3, 4\}$ of the experiment. Results are presented in Tables 10 and 11.

The Tables 10 and 11 confirm what we see in Figure 1. Trust increases during the initial stage of a repetition ($\beta_{d_1}$ is significantly smaller than $\beta_{d_{2-5}}$ in equation (7), $p < 0.0001$) and decreases at the end ($\beta_{d_{2-5}}$ is significantly larger than $\beta_{d_6}$, $p < 0.0001$). In fact, trust

| | $\beta$ | $\sigma$ | $t$ | $p$ value | 95% conf | interval | pmvd |
|---|---|---|---|---|---|---|---|
| 1 | 115 | 55.5 | 2.07 | 0.0407 | 4.96 | 225 | |
| $\phi$ | 2.05 | 0.775 | 2.64 | 0.0096 | 0.511 | 3.59 | 0.847 |
| $\lambda$ | 0.125 | 0.591 | 0.211 | 0.8336 | -1.05 | 1.3 | 0.005 |
| $d_{♂}$ | -3.7 | 10 | -0.369 | 0.7128 | -23.6 | 16.2 | 0.014 |
| $A$ | 1.01 | 1.7 | 0.593 | 0.5542 | -2.36 | 4.37 | 0.050 |
| $d_{S_1}$ | 8.2 | 15.2 | 0.538 | 0.5919 | -22 | 38.4 | 0.023 |
| $d_{S_2}$ | 13.8 | 16.3 | 0.852 | 0.3965 | -18.4 | 46.1 | 0.061 |

Table 12: Determinants of success — estimation of equation (9) payoff $\pi$

in the final period is lower than in the first period ($\beta_{d_1}$ is significantly larger than $\beta_{d_6}$, $p < 0.0001$). Trust increases during the experiment ($\beta_T$ is significantly positive).

Consider now trustworthiness. The sum of total returns $r^S$ reacts mainly to the sum of transfers $t^R$ received. Marginal trustworthiness, measured as coefficients of $t_1^R$, $t_{2-5}^R$ and $t_6^R$, is significantly positive during all periods. Neither $\beta_T$ nor the intercepts $\beta_{d_1}$, $\beta_{d_{2-5}}$, $\beta_{d_6}$ are significant.

The coefficients $\hat{\beta}_{t_1^R} = 0.515$ and $\hat{\beta}_{t_{2-5}^R} = 0.541$ capture the estimated marginal trustworthiness in periods 1 and 2-5, respectively. Both coefficients are significantly above 1/3 ($p < 0.0001$).[13] Thus, we find strong evidence that participants are trustworthy (at the margin). There is no significant evidence that trustworthiness differs in the period 1 from periods 2-5 ($p = 0.1592$) but we do find a significant endgame effect. Trustworthiness decreases in the last period to $\hat{\beta}_{t_6^R} = 0.328$ which is significantly different from $\beta_{t_{2-5}^R}$ ($p < 0.0001$). Trustworthiness in the final period is so low that there is no longer significant evidence, as in periods 1-5, that senders get back more than they sent ($\beta_{t_6^R}$ is not significantly different from 1/3, $p = 0.8450$). Finally, note that trustworthiness increases significantly between repetitions as $\beta_{t_T^R}$ is significantly positive.

## B.2 Robustness of the Results Presented in Section 3.3

In section 3.3 we discuss determinants of success. We find that participants from the North earn significantly more in our experiment than participants from the south. How much do these results depend on our categorization. To check this we present the following two exercises. First we drop $d_N$ in (1) and include instead latitude $\phi$ and longitude $\lambda$ of the respective countries from the CIA database. This leads to the following regression:

$$\begin{aligned} \pi_i &= \beta_1 + \beta_\phi \cdot \phi + \beta_\lambda \cdot \lambda + \beta_{d_{♂}} \cdot d_{♂} + \beta_A \cdot A \\ &\quad + \beta_{d_{S_1}} \cdot d_{S_1} + \beta_{d_{S_2}} \cdot d_{S_2} + \epsilon_s + \epsilon_i \end{aligned} \tag{9}$$

Results are shown in Table 12.

While latitude might be a rather naïve predictor for success it is still the only significant coefficient. Note that it is also the coefficient with the largest pmvd value of 0.847. It

[13]Recall that tokens received is equal to the tripled amount of tokens sent. So if $\beta_{t_{2-5}^R} \geq 1/3$ then the sender gets back more than she sent if she decides to send marginally more tokens.

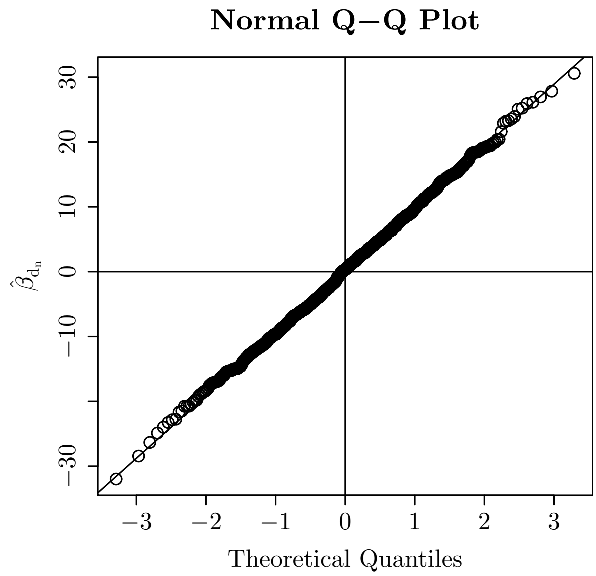


Figure 10: Q-Q plot for 1000 estimates of $\beta_{d_N}$ of equation (1) with a random $d_N$ dummy

is remarkable that latitude as a very crude measure of difference between participants captures some differences in success while longitude does not. This regression remains only a robustness check as we do not expect that latitude matters per se but instead that the cultural similarities among the countries further north and further south could play a role. The mean latitude remains an arbitrary albeit focal divide between these regions. As a second exercise we do an approximate permutation test, i.e. we estimate (1) again, but replace $d_N$ with a random dummy. This dummy has the same number of zeros and ones as the original dummy $d_N$.

We estimate equation (1) 1000 times, each time with a new random $d_N$ dummy. Each time we get a different estimate for $\beta_{d_N}$. A Q-Q plot for $\hat{\beta}_{d_N}$ is shown in figure 10. We find that it is rather unlikely ($p = 0.0040$) to accidentally get an estimate for $\beta_{d_N}$ that is greater than the value of 25.5 determined by the data and indicated in Table 1.

## B.3 Payoff Comparison North and South, per Period

To support our discussion of figure 5 in section 3.4, and to come to point 4 from the introduction, we run the following regression

$$\pi_i = \beta_1 + \beta_{d_N} \cdot d_N + \beta_P \cdot P + \beta_{PN} \cdot d_N \cdot P + \beta_6 \cdot d_6 + \epsilon_s + \epsilon_i \,. \tag{10}$$

In this estimation we capture the trend of South in $\beta_P$, the trend of North in $\beta_{PN}$ and control for a constant effect in the last period by adding $d_6$. Results are shown in Table 13.

While we find no significant change in the success of South we observe a significant increase in success of North across periods. The average drop in success in period 6 is strongly significant and substantial (estimated to be $-54.8$ tokens).

|  | $\beta$ | $\sigma$ | $t$ | $p$ value | 95% conf | interval | pmvd |
|---|---|---|---|---|---|---|---|
| 1 | 238 | 11.5 | 20.6 | 0.0000 | 215 | 260 |  |
| $d_N$ | 4.27 | 14.4 | 0.297 | 0.7662 | -23.9 | 32.5 | 0.007 |
| $P$ | 2.09 | 2.68 | 0.779 | 0.4361 | -3.16 | 7.33 | 0.012 |
| $P \cdot d_N$ | 6.27 | 3.21 | 1.95 | 0.0507 | -0.02 | 12.6 | 0.411 |
| $d_6$ | -54.8 | 9.54 | -5.75 | 0.0000 | -73.5 | -36.1 | 0.570 |

Table 13: Determinants of success — estimation of equation (10) payoff $\pi$

## B.4 Details of the Calcuations in Section 3.5

The estimated increase in marginal trustworthiness among North is $\beta_{t^R_{t_{TN}}} + \beta_{t^R_{t_T}} = 0.0467 + (-0.0109) = 0.0358, \mathrm{CI}_{95} = [0.0193, 0.0522]$

The average transfer in period 1 is $54 + 2.5 \cdot 5.96 = 68.9$ where the multiplier 2.5 is the average number of repetitions.

North returns on average $(12.2 + (-5.97) + 2.5 \cdot (5.74 + (-6.71)) + (54 + 2.5 \cdot 5.96) \cdot 3 \cdot ((0.543 + (-0.0517)) + 2.5 \cdot (0.0467 + (-0.0109)))) = 124, \mathrm{CI}_{95} = [96.4, 151]$ in period 1. Hence, the return ratio is $(12.2+(-5.97)+2.5\cdot(5.74+(-6.71))+(54+2.5\cdot5.96)\cdot3\cdot((0.543+(-0.0517)) + 2.5 \cdot (0.0467 + (-0.0109))))/3/(54 + 2.5 \cdot 5.96) = 0.599, \mathrm{CI}_{95} = [0.48, 0.717]$. Similarly we estimate the return ratio for South in period 1 to be $((-5.97) + 2.5 \cdot 5.74 + (54+2.5\cdot5.96)\cdot3\cdot(0.543+2.5\cdot((-0.0109))))/3/(54+2.5\cdot5.96) = 0.556, \mathrm{CI}_{95} = [0.432, 0.68]$. For periods 2-5 we find analogously an estimated return ratio of North and of South equal to $0.601, \mathrm{CI}_{95} = [0.502, 0.699]$ and $0.592, \mathrm{CI}_{95} = [0.493, 0.69]$, respectively. For period 6 we find $0.351, \mathrm{CI}_{95} = [0.203, 0.499]$ and $0.408, \mathrm{CI}_{95} = [0.262, 0.555]$, respectively.

## B.5 Details of the Calcuations in Section 3.6

Based on Table 2 we determine that North sends on average $8.84 + 2.5 \cdot (-0.274) = 8.15$ more tokens than South in periods 2-5 (The number 2.5 is again the average number of repetitions). This means that those selected by North obtain $(8.84+2.5\cdot(-0.274))\cdot3 = 24.5$ more tokens. Following Table 11, $24.5 \cdot 0.544 = 13.4$ tokens are returned. Hence, the difference in transfer between North and South in periods 2-5 generates a net gain of $(8.84 + 2.5 \cdot (-0.274)) \cdot (3 \cdot 0.541 - 1) = 5.08, \mathrm{CI}_{95} = [0.707, 9.46]$ more tokens for North.

Following Table 3 we observe that North returns initially 16.2 tokens more than South, but at the margin (for each token received) $-0.105$ fewer tokens than South. We take the estimate of the average transfer in periods 2-5 from Table 10 which is 65 and, thus, estimate that in periods 2-5 North earn due to the difference in their return behavior $-(-0.105) \cdot 65 \cdot 3 - 16.2 = 4.35, \mathrm{CI}_{95} = [-16.4, 25.1]$ more tokens on average than South. The combined effect for periods 2-5 is, thus, $5.08 + 4.35 = 9.43, \mathrm{CI}_{95} = [-11.8, 30.6]$. Similarly, we calculate the effect for period 1 as $3.21, \mathrm{CI}_{95} = [-21.1, 27.5]$ and for period 6 as $6.05, \mathrm{CI}_{95} = [-19.6, 31.7]$. The average effect for all 6 periods is, hence, $7.83, \mathrm{CI}_{95} = [-13, 28.7]$ which is considerably, although not significantly, below the estimated difference in payoffs of 25.5 in Table 1.

# C Conditional Logit Model

The estimates of Table 6 are computed using the conditional logit model proposed by McFadden (1973). This model is applied to our setting in the following way. Define $U_{ikp}$ as the utility of $i$ if $i$ chooses $k$ in period $p$, and

$$d_{ikp} = \begin{cases} 1 & \text{if } i \text{ chooses } k \text{ in } p, \\ 0 & \text{otherwise.} \end{cases}$$

The time index $p$ stands for the six periods of the game. Conditional on participating in the game (*i.e.* not making a zero transfer), each player can choose one among four possible partners, $k = \{1, 2, 3, 4\}$ in each period. The four choices are mutually exclusive and exhaustive. The random utility corresponding to each choice is assumed to be:

$$U_{ikp} = \alpha d_{ikp-1} + \delta d_{kip-1} + \nu X_{ik} + \epsilon_{ikp}$$

for $k = \{1, 2, 3, 4\}$. Using the above notation, $d_{ikp-1}$ means that player $i$ has chosen $k$ in the previous period. Similarly, $d_{kip-1}$ means that player $k$ has chosen player $i$ in the previous period. The omitted variable is that player $i$ and $k$ had no interaction in the previous period. The other covariates $X_{ik}$ include the remaining choice specific characteristics such as gender, nationality (both interacted with the corresponding attributes of $i$), age, and siblings. Note that the fact that $k$ was previously chosen by $i$ (or not) is interpreted as a characteristic of the choice $k$ in $p$. By the same token, the fact that $i$ was chosen by $k$ (or not) in period $p - 1$ becomes a characteristic of $k$ in $p$. Hence, previous playing behavior can be seen as generating observable choice specific attributes in $p$.

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

$$\Pr(d_{ikp} = 1) = \Pr(U_{ikp} > U_{ilp}) : \forall : l \neq k.$$

The estimates from this model are reported in column 1 of Table 6. All estimated coefficients are reported in the form of odds ratios.

In column 2 of Table 6 we add dummies that account for whether North has chosen a participant from North and similarly whether South has chosen someone from South.

This random utility model can be augmented by adding variables which characterize the effect of previous behavior in more detail. In column 3 of Table 6 we interact the dummy indicating whether $i$ transferred to $k$ in the previous period with a dummy indicating whether $k$ returned more than the median return ratio in the sample. Similarly, we interact the dummy indicating whether $k$ transferred to $i$ in the previous period with a dummy indicating whether $k$ transferred more than the median transfer in the sample.

Tables 7 and 9 redo the previous analysis to the sample restricted to choices in periods 2 and 6, respectively. Table 9 includes interactions with whether the participant belonged to region North.

Table 14: Nationalities: frequencies and average latitude

| country | av. latitude | participants |
|---|---|---|
| *Southern countries* | | |
| Greece | 39 | 9 |
| Portugal | 39.3 | 1 |
| Spain | 40 | 11 |
| Italy | 42.5 | 17 |
| France | 46 | 12 |
| Austria | 47.2 | 6 |
| *Northern countries* | | |
| Belgium | 50.5 | 5 |
| Germany | 51 | 16 |
| Poland | 52 | 3 |
| Netherlands | 52.3 | 8 |
| Ireland | 53 | 5 |
| United Kingdom | 54 | 8 |
| Denmark | 56 | 3 |
| Sweden | 62 | 4 |
| Finland | 64 | 2 |

Source: CIA (2003).