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Does stake size matter in trust games?

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Abstract

The proportion of money sent, which is typically assumed to reflect trust, decreased significantly as the stake size was increased in a trust game conducted in rural Bangladesh. Nevertheless, even with very large stakes, most senders and receivers sent substantial fractions.

Keywords: Trust; Trust game; Stake size; Social capital; Field experiment

JEL classification: C93; Z13

1. Introduction

The importance of trust and social capital is emphasised in the recent literature on economic and social development; see, e.g. Knack and Keefer (1997) and Zak and Knack (2001). However, the question of how to measure trust accurately and reliably is debated. In this paper we test whether the stake size matters in a trust game (Berg et al., 1995), which has become the most frequently used measure of individual trust other than using survey questions.

There is considerable evidence that stake size does not, in general, significantly affect the offers made in ultimatum games (Hoffman et al., 1996; Slonim and Roth, 1998; Cameron, 1999; Munier and Zaharia, 2002). Perhaps more surprisingly, Forsythe et al. (1994) and Carpenter et al. (2005) find that the stake

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size gives no significant effect in dictator games either. One might therefore suppose that the same would hold true for trust games as well. However, in this study, which, as far as we know, is the first study to test the effect of stake sizes in trust games, we found that the amount sent decreased significantly when the stake size was increased. This calls into question the validity of comparing point estimates from different trust games. Moreover, the results support evidence from other recent papers that the amount sent by the first player may be a poor measure of trust.

2. The trust game

Participants in the game are unknown to each other, divided into two groups and asked to act either as a 'sender' or as a 'receiver'. The sender is given a certain amount of money and decides how much of it to send to the receiver and how much to keep. Any positive amount sent is tripled before it reaches the receiver, who then decides how much of the tripled amount of money received is to be returned to the sender. With perfect information, the conventional (albeit Pareto-inefficient) sub-game perfect prediction of this game is that rational senders should send nothing, since they would realise that a purely self-interested receiver has no incentive to send anything back. The fractions sent and returned are typically regarded as measures of trust and trustworthiness, respectively. Empirically, virtually all studies so far (including this one) have strongly rejected the conventional theoretical prediction.

This trust game was conducted among rural household heads in the districts Manikganj, Mymensingh and Netrokona of the Dhaka division in Bangladesh, at the end of a household survey. We applied ex-ante matching of senders and receivers from different villages, and a random sample strategy based on every fourth household in the villages. The sample was divided into three groups with different initial endowments for the senders. We ended up with 64, 59 and 62 pairs for low (40 Taka), medium (200 Taka) and high stakes (1000 Taka), respectively. The highest amount is substantial and equals 4.8% of the GNI per capita; the same fraction in the US would correspond to 1683 USD. Each respondent also gets a participation fee of 100 Taka for completing the whole survey including the trust game.

The enumerators provided a private interview environment, free from any possible interruptions, and read the instructions to the sender. They also presented the outcomes of different examples of decisions, both related to the amount sent by the sender and the amount returned to them by the receiver, and took great care to make sure that the respondents understood the mechanisms involved.

The senders were given two thick envelopes, one containing their original endowment and one empty. The enumerator ensured confidentiality by turning his back to the sender while the sender put the chosen amount of money into the initially empty envelope. The sender was then asked to close the envelope and seal it with a stamp before returning it to the enumerator. The sender was instructed to do so even if he/she had decided to send nothing, and was informed that he/she would be paid within 3 days. At the end of the day, the enumerator handed the envelopes to the principal investigator, who opened them and put the tripled amount of money into new envelopes with a pre-matched household code.

The following day the enumerators were given these new envelopes ready to be delivered to the assigned receiver, and the enumerators followed similar procedures to those followed in the senders' households. The receiver put the chosen amount to be returned in the previously empty envelope while the enumerator turned his back. The enumerator then returned the envelope from the receiver to the

principal investigator, who checked and wrote down the amount to be transferred back by another enumerator the following day.[1]

3. Results

Table 1 reveals that the average proportion sent clearly decreases as the stake size increases. There is no equally clear pattern for receivers, although high-stake receivers on average sent back less.

To test whether the differences obtained are statistically significant or not we conduct pair-wise comparisons by stake size, using the non-parametric Wilcoxon–Mann–Whitney test. That the amounts sent in the high and the low stake treatments come from the same underlying statistical distribution is rejected at 0.1% significance level. The corresponding hypotheses are rejected for the amounts sent in the low- and the medium-stake treatments at 10% significance level, and the medium- and the high-stake treatments at 5% significance level. Similarly, based on the non-parametric Kruskal–Wallis test, we can reject at 0.1% significance level the hypothesis that the proportion sent for all stakes comes from populations with the same distribution. However, we cannot reject at 5% significance level that the proportions sent back in the different sub-samples come from populations with the same distribution, using either repeated pair-wise Wilcoxon–Mann–Whitney tests or the joint Kruskal–Wallis test (p-value = 0.22). The average proportions sent and returned are quite similar to many other trust games, such as Berg et al. (1995). Since the average return ratio is higher than one third, it is on average profitable for senders to send money to the receivers.

The regression results in Table 2 show again a significant effect of the size of the stake on the proportion sent, i.e. also after correcting for other variables.[2] The amount sent also strongly increases with equivalence-scaled household income.[3]

26% of the sample had experienced at least one recent misfortune in terms of robbery/theft, mugging, personal assault, home attacked, land fraud, false accusation of a criminal offence or political harassment during the previous year. Such an experience significantly decreases the amount sent. However, it is possible that this effect largely reflects a reduction in wealth resulting from the crime.

Stated trust was measured on a six-point scale as the level of agreement with the statement "most people can be trusted," where "strongly disagree" is quantified as 0 and "strongly agree" is quantified as 5. The average score equals 2.3, indicating a low level of average stated trust. As in Glaeser et al. (2000), there is no significant effect of stated trust on the amount sent. Confidence in public institutions was measured as a summation index for the following institutions: banks, NGOs, the military, the police, the judiciary, the government (executive branch), the local government, educational institutions, political parties, and rural power elites. "Hardly any confidence at all" is quantified as 0, "only some confidence" is quantified as 1, and "a great deal of confidence" is quantified as 2. The sample mean equals 14.1 (out of 20). Such confidence does not increase, but rather reduces, the amount sent. Neither illiteracy (35% of the sample) nor an education above high school (13% of the sample) affects the amount sent. Being a member of any voluntary association (30% of the sample) does not affect the amount sent.

[1] The complete questionnaire is available from the authors upon request.

[2] Since several enumerators were used to run the experiment, we tested for enumerator effects and we cannot reject the hypothesis of 'no enumerator effects' in all three regressions in Table 2 (p-value 0.21, 0.60, and 0.13 respectively for Model 1, Model 2, and Model 3).

[3] Calculated as [Household income/(adults + 0.5 * children)$^{0.75}$]. Sample mean = 21,100 Taka/year.

Table 1
Average proportion sent and average proportion returned in the trust game

	Low stake	Medium stake	High stake	Total
Proportion sent	0.55	0.46	0.38	0.46
Proportion returned	0.46	0.46	0.38	0.43
Proportion of zero sent	0.06	0.06	0.03	0.05
Proportion of zero returned	0.07	0.03	0.09	0.06

For the proportion sent back, none of the parameters associated with the explanatory variables, including the stake-size dummy variables, are statistically significant at conventional levels. The latter is consistent with the results of Forsythe et al. (1994) and Carpenter et al. (2005) mentioned earlier, since this part of the trust game can be seen as a conditional dictator game. The result of the interaction effect in the last reported model implies that when lower levels are sent, relatively more is returned in the low- and medium-stake cases, and vice versa. Thus, senders seem to be rewarded for sending a large proportion in the high-stake case. However, since the model explains very little of the observed variation, these results should be treated cautiously.

4. Conclusion

One possible explanation for our finding that the amount sent significantly decreases as the stake size increases is linked to the suggestion made in Karlan (in press) that the first part of the trust game largely measures risk preferences, rather than trust. That higher stakes induce people to send lower amounts in trust games is then consistent with Binswanger (1980) and Holt and Laury (2002), who found that

Table 2
Trust and trustworthiness: OLS estimates

Dependent variable	Proportion sent	Proportion returned	Proportion returned
Medium-stake endowment (200 Taka)	− 0.076 (0.054)	− 0.012 (0.064)	− 0.075 (0.138)
High-stake endowment (1000 Taka)	− 0.178*** (0.056)	− 0.100 (0.067)	− 0.318** (0.131)
Most people can be trusted	− 0.003 (0.016)	0.013 (0.020)	0.012 (0.020)
Confidence in public institution index	− 0.014** (0.006)	0.010 (0.010)	0.010 (0.010)
Has experienced a recent misfortune	− 0.104** (0.051)	− 0.080 (0.062)	− 0.100 (0.061)
Member of voluntary association	− 0.030 (0.052)	0.010 (0.060)	0.010 (0.100)
Age	0.002 (0.002)	0.003 (0.002)	0.003 (0.002)
Illiterate	0.012 (0.052)	− 0.020 (0.063)	− 0.010 (0.062)
Educated above high school level	− 0.038 (0.078)	− 0.018 (0.075)	− 0.020 (0.074)
Equivalence-scaled income per capita	0.270** (0.120)	0.167 (0.111)	0.120 (0.112)
Proportion sent by the senders		− 0.022 (0.092)	− 0.230 (0.170)
Proportion sent × medium stake			0.010 (0.230)
Proportion sent × high stake			0.480** (0.230)
Constant	0.660*** (0.136)	0.190 (0.160)	0.330* (0.178)
R squared	0.127	0.100	0.100
Number of observations	182	172	172

Standard errors are in parentheses. Superscripts *, **, *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

people tend to become more risk averse with higher stakes. Moreover, we found that the amount sent increases significantly with the respondent's income, implying that the amount sent decreases when the stake size as a fraction of income increases.

Finally, using very large financial incentives offers no rescue for the conventional economic predictions. The majority of both senders and receivers sent substantial fractions also with very high stakes.

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