18th World IMACS / MODSIM Congress, Cairns, Australia 13-17 July 2009
http://mssanz.org.au/modsim09

Does giving a deposit increase trust and trustworthiness?

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Abstract: This paper reports on an experiment studying the effectiveness of a deposit mechanism on increasing trust and trustworthiness. The *deposit* mechanism is modeled as a monetary transfer from the trustee to the trustor prior to the transaction. If the deposit is implemented, it makes the trustor at least as well off as if no transaction ever took place, but does not give him any means of enforcing the contract.

Our experiment consists of a three treatments *Baseline, Deposit, and Endowment Control* implemented in an across subjects design. *Baseline* is the standard investment game by Berg *et al.* (1995). There are two players, A and B, both endowed with \$10 at the beginning of the game. The first mover, player A, decides on an amount whether to send a whole dollar amount $t \in \{0,1,2,...,10\}$ to her counterpart player B. The amount sent is tripled by the experimenter. The second mover, player B, then decides how much of the tripled amount, $r \in \{0,...,3t\}$ in whole dollar amounts to return to player A. *Deposit* involves the investment game as described in *Baseline* and a pre-game stage during which player B has an option to transfer his whole \$10 endowment to player A. In the actual game that follows player A can still send a maximum of \$10 even if player B decided to transfer his endowment to player A. *Endowment Control* treatment is analogous to Baseline and differs only in the endowment given to both players: Player A starts the game with \$20 and player B with \$0.

We observe that majority of trustees offer their endowment to trustors during a pre-game stage. Such deposit significantly increases the amounts sent by trustors when controlling for the differences in payoffs created by receiving a deposit. Trustees are, however, not better off by giving a deposit as the increase in the amount sent by trustors is not large enough to offset the trustees' loss. We also find that trustees do not change the amount returned after they have given a deposit.

Keywords: *Experimental economics, Trust, Trustworthiness, Deposit*

1. INTRODUCTION

Majority, if not all economic interactions rely on trust (Arrow (1974)). Whether it is a situation involving a hidden action or hidden information, the trusting party might get adversely affected if their counterpart decides to appropriate too much or even the entire monetary surplus. Dasgupta (2000) states that: *"Trust is important because its presence or absence can have a bearing on what we choose to do, and in many cases what we can do"* (p.330). Recent years have seen an explosion of work on the importance of trust and trustworthiness in economic transactions, their applications and implications, as well as studies exploring mechanisms trying to improve trust and trustworthiness.

If there exists a possibility for reputation building due to repeated interaction (Kreps *et al.* (1982), Kreps and Wilson (1982)) and/or if the contract between the transacting parties is verifiable and enforceable (Charness *et al.* (2008)), the problem whether to trust or not is easily mitigated because the parties face severe punishments on the off-equilibrium path. A competition among trustees is observed to have even stronger effects than reputation building (Huck *et al.* (2007)). However, if the interaction between parties is a one-shot game, such as most interactions within large cities or on the internet, people might rely on non-monetary mechanisms like promise (Charness and Dufwenberg (2006)) or gentleman's agreement which operate through various psychological incentives (for instance guilt as in Battigalli and Dufwenberg (2007)). But can a person encourage trust in a one-shot interaction by giving some type of guarantee?

In this paper we propose a *deposit* mechanism which is modeled as a monetary transfer from the trustee to the trustor prior to the transaction. If a deposit is implemented, it makes the trustor at least as well off as if no transaction ever took place, but does not give him any means of enforcing the contract. Life is full of situations which involve deposit-like scenarios. Take for example dating. A man often tries to illustrate/signal his trustworthiness as husband prior to marriage and fatherhood by being courteous and generous towards his future spouse, who if she chooses him to be the father of her children would bear serious consequences in case of his "defection". Arguably, in practice, most of these deposit-like scenarios involve more than one type of incentives and could be enforceable to a certain degree. It is therefore hard to clearly assess whether it is the deposit or some other mechanism which enhances the trust. We, therefore, design a laboratory experiment which enables us to study the effects of such deposit in a stylized environment and which allows to evaluate the importance of incentives it creates on trust and trustworthiness.

In our design giving a costly deposit insures the trustor against a possible loss and might "eliminate" the trustor's dilemma whether to trust or not and in a sense transfer it on to the trustee. It is plausible that since many people are unwilling to trust, the deposit should improve the chances of investment or foster relationships. However, there are two sides of the coin as giving a deposit might also have an unwanted signaling effect. That is, if I send a deposit, I might also be saying that: (i) I cannot be trusted (thus, signaling my low trustworthiness and strategic behavior); or (ii) You are not a trusting person. Either signal is not nice and hence might reduce the trustor's motivation to invest or transact. Therefore, giving a deposit can be viewed as a strong signal that the trustee is trustworthy; or as trustee's strategic move to induce higher amount sent and a preparation for defection.

Probably the most related experimental work to ours is the recent study by Andreoni (2005) who examines satisfaction guaranteed which explicit promises to refund the price to the buyer. In reality, not honoring satisfaction guarantee can have legal consequences for sellers, but suing over small transaction can be too costly and thus this trust building contract device can be seen as nonbinding for some sellers. In his experimental design Andreoni combines an investment game (Berg *et al.* (1995)) with an ultimatum game (Güth *et al.* (1982)) thus giving the trustor an option to annul the transaction if he is not satisfied with the outcome. If satisfaction guaranteed is voluntary and non-binding, the trust of buyers is greatly reduced comparing to when it is binding. The decrease in trust is well justified as only 17% of experimental sellers choose to honor the guarantees. The main difference between our study and Andreoni's (other than the deposit and satisfaction guaranteed not being strategically equivalent) is the fact that deposit is given before the transaction takes place and hence there is no way to reverse the deposit if the trustee defects whereas in satisfaction guaranteed sellers can renege if a refund is requested.

Bracht and Feltovich (2007) study a simple precommitment mechanism in the investment game. Similarly to our experiment, they also add a pre-game stage during which the trustee has an opportunity to place some amount of money into an escrow account. The entire sum money from the escrow account is returned to him if the trustor does not invest any money or if the trustors invests and the trustee splits the surplus. However, if the trustor invests and trustee appropriates the surplus, the entire escrow amount gets forfeited but the trustor does not receive anything. Bracht and Feltovich find that the efficiency of the mechanism depends on amount

which is deposited into an escrow account but not so much on whether it is chosen voluntarily or imposed by the experimenter.

The common feature of satisfaction guaranteed and escrow account is that they both enhance "trust" when they are enforceable. Thus, the punishment mechanism drives the behavior of trustors and trustees as the investment can be recouped and escrow forfeited. However, enforceable satisfaction guaranteed and escrow accounts are not always available to the transacting parties. Therefore, it is important to understand what other monetary mechanisms can increase trust when the enforceability is not an option.

2. EXPERIMENTAL DESIGN AND PROCEDURES

Our experiment consists of a three treatments *Baseline, Deposit, and Endowment Control* implemented in an across subjects design. *Baseline* is the standard investment game by Berg *et al.* (1995). There are two players, A and B, both endowed with \$10 at the beginning of the game. The first mover, player A, decides on an amount whether to send a whole dollar amount $t \in \{0,1,2,...,10\}$ to her counterpart player B. The amount sent is tripled by the experimenter. The second mover, player B, then decides how much of the tripled amount, $r \in \{0,...,3t\}$ in whole dollar amounts to return to player A.

Deposit involves the investment game as described in *Baseline* and a pre-game stage during which player B has an option to transfer his whole \$10 endowment to player A. In the actual game that follows player A can still send a maximum of \$10 even if player B decided to transfer his endowment to player A. *Endowment Control* treatment is analogous to Baseline and differs only in the endowment given to both players: Player A starts the game with \$20 and player B with \$0.

The experiment was conducted at the University of Canterbury, Christchurch, New Zealand in 2007 and 2008. A total of 206 subjects participated in the study. Most of the students had previously participated in economics experiments, and some (but not a majority) had experience with an investment-game-like-scenario. Each subject only participated in a single session of the study. On average, a session lasted 50 minutes including initial instructional period and payment of subjects. Subjects earned on average 15.66 NZD (The adult minimum wage in New Zealand at the time of the experiment was 10.25 NZD per hour). All sessions were hand run in a classroom under a single-blind social distance protocol

Each session included a minimum of 12 subjects who were randomly assigned to be either player A or player B and randomly matched into pairs. The instructions were projected on the screen and read aloud. In the Deposit treatment, the investment game and general procedures were explained first. Only then the experimenters announced that before the described game is played, player B have an opportunity to send their endowment to their counterpart player A and projected as well as read aloud the instructions for the pre-game stage. At the end the experimenters privately answered subjects' questions (if any). Players B then made their decisions on the provided decision sheets which were afterwards collected by the experimenters. The decision of players B was provided to players A on players' A decision sheets in the following form:

> *Player B has transferred \$____ to you before the start of the game. This amount is yours to keep and will be added to your earnings.*

Players A were then asked to answer a question why they believed that player B transferred or did not transfer their \$10 endowment to them in the pre-game and then make the game decision of how much money to transfer to players B which was to be tripled. Players' A decision sheets were collected and their decisions transferred to players' B decision sheets and handed out. Upon the completion of the last stage the experimenters collected all decision sheets transferred the decision information of players B to their player A counterparts' decision sheet, and returned the decision sheets to all players to reveal their earnings. Then subjects completed a short survey on the experiment and general demographic information and were privately paid their experimental earnings.

3. RESULTS

To see whether giving a deposit increases trust and trustworthiness we would want to compare the behavior of subjects between Baseline and Deposit treatments. However, giving a deposit changes the payoffs of players A and B from (\$10, \$10) to (\$20, \$0). It is therefore possible, that any changes in amounts sent by players A and returned players B are due to (or confounded with) this endowment effect rather than a pure effect of giving the deposit. This reason is the main motivation behind the inclusion of Endowment Control treatment in the experimental design.

Table 1. Behavior of Players A

Data	Mean Amount Sent	Median Amount Sent	Frequency of Sending $10	Mean Amount Returned	Median Amount Returned
Baseline	5.50 [4.07] {33}	5	36%	4.88 [6.35] {33}	2
Deposit	6.50 [4.17] {34}	9.50	50%	3.38 [5.09] {34}	0
Deposit: If Deposit Given	7.31 [3.82] {26}	10	58%	3.58 [4.50] {26}	0
Deposit: If Deposit Not Given	3.75 [4.33] {8}	2	25%	2.75 [7.00] {8}	0
Endowment Control	4.73 [4.49] {26}	5	35%	2.38 [4.27] {26}	0

Standard deviations in brackets. Number of subjects in braces.

Subjects' behavior from all three treatments is summarized in Table 1. Players A sent the lowest average amount of 4.73 in Endowment Control, slightly higher of 5.50 in Baseline, while in Deposit the average amount was equal to of 6.50 (7.31 if the deposit was actually received and 3.75 if not). This difference is even more pronounced when looking at medians: While in Baseline and Endowment Control the median amount sent was equal to 5, in Deposit it was 9.50 (10 if the deposit was actually received and 2 if not).

Players A are better off when they receive a deposit. But is there clear evidence that a deposit increases the amounts sent by players A? The 2-sided Means and Mann-Whitney tests presented in Table 2 break up the behavior of players A into an endowment effect and a deposit effect. It might be somewhat surprising that players A sent on average less money when they were endowed with $20 than when they were endowed with $10. The endowment effect, however, is not statistically significant. Similarly, neither Means nor Mann-Whitney tests detect a statistical significance for the amount sent in Deposit versus Endowment Control and for the amount sent in Deposit versus Baseline at the treatment level. So just having a chance to receive a deposit or having a larger endowment does not change player's A behavior.

But what happens if the deposit is actually received? Twenty-six out of thirty-four players A who received a deposit from players B sent on average 7.31 (with a median of 10), whereas the remaining eight who did not receive a deposit sent on average only 3.75 (with a median of 2). The appropriate point of reference for a comparison is the Endowment Control treatment data. When we control for the endowment differences, receiving a deposit is responsible for an increase in the amount sent by player A (p = 0.030 and 0.043, respectively) as reported by both Means and Mann-Whitney tests presented in row 4 of Table 2.

A combination of the deposit effect and an endowment effect (i.e., the comparison of the data when a deposit was received with Baseline) is also (weakly) statistically significant as reported in row 3 of the same table (p

= 0.093 and 0.087). Thus, we conclude that receiving a deposit caused players A to send higher amounts in our experiment.

Table 2. Tests for Deposit and Income Effects on the Behavior of Players A

Data [a]	Effects Tested	Means Test	Mann-Whitney Test
Deposit vs. Baseline	-	0.92 (.361)	0.99 (.323)
Deposit vs. Endowment Control	-	1.53 (.131)	1.53 (.127)
Deposit given vs. Baseline	deposit effect endowment effect	1.71 (.093)	1.71 (.087)
Deposit given vs. Endowment Control	deposit effect	2.23 (.030)	2.03 (.043)
Baseline vs. Endowment Control	endowment effect	0.72 (.474)	0.65 (.519)

p-values in parentheses, [a] amounts sent in the respective treatments

Behavior of Players B

In this subsection we analyze whether players B are (i) made better off by giving a deposit; and (ii) how does giving a deposit affect the amounts they return back to players A.

Giving a deposit is costly to player B as he might be forgoing $10 if player A decides not to send anything. In order to find out whether players B are made better off by giving a deposit we compare the payoffs of players B who give a deposit with those who do not (within treatment comparison) and also with those who participate in Baseline (across subjects comparison). Twenty-six players B who gave a deposit earned on average $18.00 while those eight who did not made on average $19.00. This difference is not statistically significant according to Mann-Whitney test (p = 0.525). On the other hand, thirty-three players B who participated in Baseline and thus did not have an option to give a deposit made on average $21.80. Albeit higher, this amount is not statistically significantly different from payoffs of players B who gave a deposit according to Mann-Whitney test (p = 0.639). Nevertheless, when comparing means the increase in the amounts sent by players A was too low to offset the reduction in players' B payoffs due to the giving a deposit.

To address the effect of giving a deposit in the pre-game stage on players' B' decisions of how much to return, we estimate the following Tobit relation between amounts sent, S_t, and a dummy, D^D, indicating whether the deposit was given (D^D = 1) or not (D^D = 0), and the amounts returned, R_t:

$$R_t = \alpha + \beta_1 S_t + \beta_2 D^D + \beta_3 D^D S_t + \varepsilon_t .$$

The bounds for the Tobit estimation were imposed by the experimental design:

$$R_t \in [0, 3S_t] .$$

We report the results from the estimation in Table 4. The only significant variables were the amount sent by players A and a constant. Because of a relatively small sample and large variation, giving a deposit does not seem to influence the behavior of players B neither directly (β_2) nor through the interaction term (β_3).

Table 4: Tobit Regression Estimates for the Effect of Giving a Deposit on Players' B Behavior

R_t	Coefficient	St. Error	t	P>|t|
S_t	1.78	0.87	2.04	.050
D^D	-38.67	39.29	-0.98	.333
$D^D S_t$	3.62	4.03	0.90	.375
Constant	-10.85	6.19	-1.75	.090

Next we turn our attention to whether the amount in possession of players B when making their decision of how much to return affected their behavior. Because there are qualitative differences in whether they had \$0 (\$10) because they gave (did not give) a deposit or because they were endowed with \$0 (\$10) at the start of the game, we explore this question by comparing the amounts returned in Baseline and Endowment Control only. We estimate the following relation between amounts sent, S_t, and a dummy, D^E, indicating whether player B had \$10 ($D^E = 1$) or \$0 ($D^E = 0$) when making their decision, and the amounts returned, R_t:

$$R_t = \delta + \gamma_1 S_t + \gamma_2 D^E + \gamma_3 D^E S_t + \varepsilon_t \ ,$$

where the bounds were imposed by the experimental design in the same way as before. The results or the estimation are detailed in Table 5. As before, the only significant variables explaining the behavior of players B in Baseline and Endowment Control were the amount sent by players A and a constant. The variation in endowments has marginally insignificant direct effect as reported by γ_2.

Table 5: Tobit Regression Estimates for the Endowment Effect on Players' B Behavior

R_t	Coefficient	St. Error	t	P>|t|
S_t	2.25	0.79	2.86	.006
D^E	11.73	7.31	1.60	.114
$D^E S_t$	-0.85	0.87	-0.97	.335
Constant	-17.83	6.94	-2.57	.013

4. DISCUSSION

This paper reports on an experiment that studies the effectiveness of a deposit mechanism on increasing trust and trustworthiness. We have nested our findings in the standard version of the investment game to clearly observe the directional changes. We observe that when controlling for the endowment differences, receiving a deposit significantly increases the amount sent by players A in the investment game. Players B are, however, not better off by giving a deposit as the increase in the amount sent is not large enough and does not offset the loss to players B. The Tobit analysis of data also shows that players B do not change the amount returned after they have given a deposit.

Our finding thus suggests that giving a deposit might increase trust. However, our data is still to be interpreted with caution as it is not obvious how important it the size of the deposit. Our primary goal of this paper is not to give exact recommendation when and how to use a deposit in order to maximize trust but rather to provide evidence, that a deposit mechanism has a potential to increase it.

Because it was common knowledge in the experiment that giving a deposit was an option, not giving a deposit could have had some consequences as well. Therefore, we think that an interesting extension of our work would be to give players B an option to send a deposit but not letting players A know that player B can do so. Such design would reflect situations where the option is less pronounced and it is therefore possible that a deposit would have different behavioral implications. We leave this line of research for future explorations.

ACKNOWLEDGMENTS

We are grateful to the University of Canterbury, College of Business and Economics for financial support. We thank Andrea Menclová for helpful comments.

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