Trust, Communication and Contracts: Experimental Evidence

by

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Abstract

We introduce opportunities for pre-play communication and to enter binding or non-binding contracts in trust games, and find (a) communication increases trusting and trustworthiness, (b) contracts are unnecessary for trusting and trustworthy behaviors and are eschewed by many players, (c) more trusting leads to higher earnings, and (d) both trustors and trustees favor "fair and efficient" proposals over the unequal proposals predicted by theory.

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JEL codes: C72, C91, D63

1. Trust, Communication and Contracts

The trust or investment game of Berg, Dickhaut and McCabe (1995), gives two randomly assigned subjects endowments of 10 units, letting *A* send none, any or all of her 10 to *B*, tripling the amount sent, and letting *B* send none, any or all of the amount received back to *A*. The conventional economic prediction for this game is that *A* sends nothing since *B* would return nothing received.

In laboratory experiments, pre-play communication has been a powerful way of increasing cooperation (Ledyard, 1995; Sally, 1995). But two-way pre-play communication has yet to be made available to trust-game participants.[1] We let subjects play trust games with pre-play numerical proposals sometimes preceded by chat room communication. We also gave our subjects opportunities to enter into costly binding and

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[1] Existing studies either allow one player only to send a signal (see, for example, Charness and Dufwenberg, forthcoming) or investigate social distance effects of task-irrelevant communication (Buchan, Croson and Johnson, 2006). See our working paper for a summary and references.

non-binding contracts to investigate when subjects prefer trust over contracts, and to what effect (see Bohnet, Frey and Huck 2001 and Andreoni 2005 for related work).

2. Design and Predictions

Subjects were assigned to a room with typically 15-20 others with whom no communication was permitted, and were matched for each of a series of interactions with a new anonymous partner seated in a similar room in a different building.[2] Endowments and payouts were in units called experimental dollars (*E*$), which converted to real dollars at the rate *E*$1 = $0.14 at the end of the session, generating average earnings of $28.25. Four consecutive interactions are analyzed here.[3]

To facilitate communication of proposals and counterproposals, subjects were shown Figure 1, in which each row heading lists an amount that could be sent by *A* and each column heading lists a proportion of the amount received that could be returned by *B* (0, 1/6, 1/3, etc.). To make sure that subjects understood the implications of their choices for payouts, the table's cells list both the amount that *B* sends *A* and the implied payouts to *A* and *B*, including *B*'s $10 endowment (which *B* always retains). In their first interaction, subjects played a standard trust game, using the Figure 1 interaction table to register choices. In the second, new partner, interaction, each subject could make one pre-play proposal, with *A* first proposing (by clicking and highlighting) both a row and a column, then *B* proposing a row and column.

Subjects' third interactions resembled the second except that up to three proposals and counterproposals could be sent by each A and B, with the proposal stage ending either when two consecutive proposals were identical or following B's third proposal. Subjects' fourth interactions were like the second except that before exchanging numerical proposals they could exchange text messages for four minutes in private chat rooms, with prohibitions on disclosing their names and on making threats about actions to be carried out after the experiment (on penalty of forfeiting all payments).

In interactions 2, 3 and 4, subjects who reached agreement (clicked on the same proposal) were asked if they wanted a costly contract. If both said yes, they were asked if

[2] Subjects were recruited from the University of Minnesota undergraduate and graduate student population of several tens of thousands and reported directly to the assigned rooms.
[3] Sessions also included three later interactions to treat issues beyond this paper's scope.

they wanted a contract with (binding) penalties. Subjects learned whether a contract had been agreed to, but were not specifically told the reply of their counterpart. Payout-determining choices by A and B followed exchange of proposals and (in cases of agreement) choice of contract. A contract without penalties cost each party *E*$1 or *E*$2, depending on the experiment session, while one with penalties (equaling 110% of any stipulated amount not sent) cost each twice that amount (*E*$2 or *E*$4).

An example of exchanges for a session of the experiment including screen shots is at http://webpages.csom.umn.edu/hrir/abenner/web/papers/ep/ep-01.pdf.

Predictions

Absent a binding contract, under the conventional assumption that subjects are rational payoff maximizers who know their counterparts to be of the same type, *B* should send no money to *A* regardless of how much he receives, and understanding this *A* should send nothing to *B*. *A* and *B* thus keep their initial endowments and earn *E*$10. Furthermore, (a) ability to make proposals, no matter how many, (b) concurring on the same proposal, (c) entering a contract without penalties, and (d) exchanging text messages, should make no difference. Only a binding contract can lead to positive sending and returning by *A* and *B*. The unambiguous prediction is that *A* should make a proposal that maximizes her surplus while giving *B* a little over his fallback.[4] With the restriction of *B*'s return proportion to multiples of 1/6, the prediction is that *A* proposes a contract-with-penalties in which *A* sends *E*$10 and *B* returns *E*$25, which gives net earnings after contract costs of *E*$1 or *E*$2 per player of either (*E*$24, *E*$14) or (*E*$23, *E*$13). Since the interaction is otherwise sure to yield only *E*$10, a rational payoff-maximizing *B* will accept this proposal, and both will proceed to select a contract in general and a contract-with-penalties in particular.

Behavioral economics, in contrast, suggests that some, perhaps most, people keep their promises, reciprocate, trust others' promises, and believe that there are many other people are like them (Sobel 2005). It predicts some positive sending and returning in interaction 1, presence of efficient and fair proposals and interactions, real effects of

[4] We ignore the proposal that *A* sends 10, *B* returns 30, which constitutes a formal but implausible equilibrium.

communication, at least occasional decisions to forego available contracts, and possible real effects of non-binding contracts.[5]

3. Results

Table 1 summarizes behaviors and payoffs in each of the four interactions. It shows that cooperation between *A*'s and *B*'s was on average smallest in the first interaction; that cooperation was higher in the two interactions allowing proposals but not verbal messages; and that cooperation was highest in the interaction with chat. Behavior by *B*'s does not seem to differ as much across the first three interactions, with the proportion returned being around 46%, but *B*'s average return proportion jumps to 59% after chat. We find that 12.6% of interactions 2 – 4 were without agreement, 71.8% with agreement but no contract, 9.5% with a non-binding contract, and 6.1% with a binding contract, contradicting the prediction that all would select binding contracts.

In Table 2 we investigate the statistical significance of the methods of communicating using GLS regressions (including individual fixed effects).[6] We also examine the impact of reaching agreement, taking possible endogeneity into account by controlling for proposal terms. The first two regressions show that *A*'s both sent and earned significantly more in interactions with chat and when their counterpart agreed to their proposal.[7,8] The last two regressions suggest that *B*'s sent more and thus earned less when they agreed to *A*'s proposal, and when they engaged in chat with their counterpart, while multiple proposals had the opposite effect on proportion returned. In sum, many *B*'s act as if committed to their agreements, especially if they have chatted.[9] Further analysis of the data shows that *A*'s who sent more earned significantly more (trust paid off), that A's sent and B's returned more with non-binding contracts than with agreement

[5] See our working paper.
[6] Tobit results are similar but the tobit version of column 1 has low χ^2 due to non-normality of errors and the high proportion of *A*'s who sent the maximum of 10—over 75% in rounds 2 and 3 and over 92% in round 4.
[7] The effect of chat is understated because chat also increased the likelihood of agreement.
[8] Because the four conditions occur in one order only in our experiment, disentangling treatment effects and order effects is difficult. We separately conducted sessions in which five one-shot interactions identical to interaction 1 preceded five interactions with exchange of proposals or chat and exchange of proposals. While sending also increased over time in the first four of those interactions, the rate of increase is substantially smaller, significant at the 0.1% level in a one-tailed Mann-Whitney test.
[9] Multiple proposals may have undermined good faith because they encouraged haggling.

but no contract, and that chat significantly increased sending and returning conditional on agreement and controlling for choice of contract.[10]

Contrary to the prediction that *A*'s would propose and *B*'s accept exchanges giving a disproportionate share of the total returns to *A*, in actuality *A*'s first proposal was the "fair and efficient" exchange in which *A* and *B* split equally the maximum earnings 79.6% of the time, and such proposals were agreed to 96.2% of the times when they were made, versus 53.3% of the time on average for other proposals.[11] Sending by *A* and returning by *B* equaled or exceeded the proposed levels 66.24% of the time when they were fair and efficient, versus 41.67% of the time when not.

4. Conclusions

Trusting was significantly increased in our experiment by opportunities to exchange proposals and counterproposals, and trustworthiness was increased and trusting further increased when verbal messages could also be sent. The modal agreement was to the most equitable of the efficient sets of actions, and such agreements were carried out by both parties significantly more often than were other agreements. Trust "paid off" under all conditions in our experiment, with more trusting seeming to engender more trustworthiness.

We provided the first laboratory illustration of the familiar proposition that the presence of trust can save on transactions costs: a great deal of mutually profitable trusting and trustworthiness took place without contracts even though the alternative of costly contracts was available, and many individuals were able to commit themselves to courses of action that were not *ex post* materially profitable, contrary to the assumption of standard theory. The large majority of instances of trusting and trustworthiness in those interactions in which contracts could be opted for took place without contracts.

[10] Contract choice is not included in Table 2 due to its endogeneity but is studied instead in regressions for interactions with agreement. To check that the effect of agreement in Table 2 is not due to inclusion of interactions under contract, all Table 2 regressions were also run excluding cases that led to contracts, with qualitatively the same results.

[11] The difference is significant at the 0.1% level in a two-tailed Mann-Whitney test.

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Table 1. Average outcomes by interaction

Interaction Type	***A* sends *E*$ (1)**	***A's* payoff[2] *E*$ (2)**	***B* sends[3]**		***B*'s payoff[2,5] *E*$ (5)**
			% (3)	***E*$[4] (4)**	
Simple (1)	5.47 (3.16) [1]	11.52 (5.71)	0.42 (0.26)	7.45 (6.86)	19.42 (7.97)
One proposal (2)	7.69 (3.42)	13.89 (6.44)	0.49 (0.26)	12.70 (8.15)	20.86 (7.64)
≤ three proposals (3)	8.06 (3.28)	13.18 (7.41)	0.46 (0.28)	12.60 (8.57)	22.37 (8.68)
Chat + one proposal (4)	9.20 (2.47)	16.63 (6.26)	0.59 (0.22)	17.18 (6.77)	20.96 (6.65)

Notes:
[1] Numbers in parentheses are standard deviations.
[2] Earnings after deduction of contract costs, where applicable.
[3] Refers to cases in which *A* sends positive amount.
[4] After tripling *A*'s sending.
[5] Includes cases in which *A* sends zero.

Table 2. Effects of agreement, communication type, and proposal terms

	Dependent Variable			
	***A* sends *E*$** **(1)**	***A's* payoff *E*$** **(2)**	***B* sends %** **(3)**	***B's* payoff *E*$** **(4)**
Sending by A			-0.011 (0.068)	1.639*** (0.316)
Agreement dummy	3.161*** (0.606)	4.370*** (1.621)	1.051** (0.428)	-3.804* (1.993)
A's row proposal^{+}	0.221* (0.117)	-0.063 (0312)	-0.033 (0.084)	0.180 (-.389)
A's column proposal^{+}	0.702*** (0.258)	0.985 (0.690)	0.417** (0.195)	-1.516* (0.909)
Interaction 3 dummy (multiple proposals)	-0.302 (0.343)	-1.473 (0.918)	-0.353* (0.218)	1.543 (1.015)
Interaction 4 dummy (chat + proposal)	0.812** (0.812)	2.171** (0.925)	0.382* (0.225)	-1.807* (1.047)
# obs.	294	294	275	275
Wald χ^2	352.61	180.33	166.63	176.27
Prob. > χ^2	<0.001	<0.001	<0.001	<0.001

Notes. GLS regressions. Numbers in parentheses are standard errors. All estimates include individual fixed effects. *, ** and *** indicate significance at the 1%, 5%, and 10% levels, respectively. *B's* sending and payoff are contingent on *A*'s sending more than 0. + In multiple-proposal interactions, *A*'s final proposals.