Are You Risk Averse Over Other People's Money?

by

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January 2010

Abstract. Decisions with uncertain outcomes are often made by one party in settings where another party bears the consequences. Whenever an individual is delegated to make decisions that affect others, such as in the typical corporate structure, does the individual make decisions that reflect the risk preferences of the party bearing the consequences? We examine this question in two simple settings, lottery choices and sealed bid auctions, using controlled laboratory experiments. We find that when an individual makes a decision for an anonymous stranger, there is a tendency to exhibit less risk aversion. This reduction in risk aversion is relative to his own preferences, and also relative to his belief about the preferences of others. This result has significant implications for the design of contracts between principals and agents.

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Decisions with uncertain outcomes are often made by one party in settings where another party bears the consequences. Whenever an individual is delegated to make decisions that affect others, such as in the typical corporate structure, does the individual make decisions that reflect the risk preferences of the party bearing the consequences? If these two parties do not have the same risk attitude, efficiency loss could result unless the affected party has access to sufficiently flexible contracts and knowledge of the risk attitude of the individual making the decisions (e.g., Kreps [1990; p. 582/3] and Grossman and Hart [1983]).

We examine risk attitudes of individuals making decisions on behalf of others in simple settings using controlled laboratory experiments. This is an exploratory exercise in the spirit of those that examine preferences over risk to ones self or those that examine preferences that have a social dimension. Thus, we propose nothing beyond evaluating the possibility that subjective preferences over outcomes to self and outcomes to others may not be the same. One set of experiments involves choices over lotteries. Another involves sealed bid auctions. We find a remarkable result: *individuals tend to be significantly less risk averse when they make decisions over another person's money, compared to decisions that they make over their own money*. Decisions for self reflect a certain level of risk aversion, comparable to those reported elsewhere, and varying across individuals as one would expect. But when people are asked to make decisions for others, they tend to make decisions closer to risk neutral preferences. This is despite the fact that beliefs regarding the other person's preferences appear to be unbiased. We examine behavior in two unrelated experiments, and find that the effect is present in both, indicating some degree of robustness of the phenomena with respect to differences in institutions and procedures.

This result has significant implications for the analysis of behavior of principals and agents. If the principal and agent do not have the same risk preferences, in the sense that the agent does not exhibit the same risk preferences as the principal when acting on his behalf, there is an expected efficiency loss if they do not use elaborate contracts. Since elaborate contracts of this kind do not appear to be common, our results suggest that there could be some other advantage to using agents that compensates for such efficiency losses (e.g., Milgrom and Roberts [1992; ch.2]). Alternatively,

we expect to find settings in which principals tend not to use agents, whenever these other advantages do not outweigh the expected efficiency loss. Our objective is simply to note that the analysis of the use and motivation of agents should allow for the fact that the agent should not be expected to behave as if using the principal's risk preferences, quite apart from the importance of allowing for his own risk preferences over his own earnings.[1]

In section 1 we explain the two experiments and their respective procedures. Both were developed with the goal of identifying differences in the risk preferences of principals and agents. In section 2 we examine the results. We draw conclusions in section 3.

1. Experimental Design

A. Lottery Choice

Measures of risk aversion can be elicited using a lottery choice task known as a multiple price list (MPL), previously used by Holt and Laury [2002][2005] and Harrison, Johnson, McInnes and Rutström [2005]. Each subject is presented with a choice between two lotteries, which we call A or B. Table 1 illustrates the basic payoff matrix presented to subjects. The first row shows that lottery A offered a 10% chance of receiving 400 Indian Rupees (Rs) and a 90% chance of receiving Rs 500, since these experiments were conducted in India. The expected value of lottery A, EV^A, is shown in the third-last column as Rs 490, although the EV columns were not presented to subjects. Similarly, lottery B in the first row has chances of payoffs of Rs 960 and Rs 25, for an expected value, EV^B, of Rs 118. Thus the two lotteries have a relatively large difference in expected values, in this case Rs 372. As one proceeds down the matrix, the expected value of both lotteries increases, but the expected value of lottery B becomes greater relative to the expected value of lottery A.

The subject chooses A or B in each row, and one row is later selected at random for payout

[1] The role of the risk preferences of the agent over his *own* earnings has been extensively studied in the design of principal-agent contracting arrangements. See Milgrom and Roberts [1992; ch.7] for an excellent textbook exposition of the basic ideas, and Laffont and Martimort [2002] for a superb formal account (especially §2.11 and §6.5, on risk averse principals). The different risk preferences of principals and agents also enter prominently in a growing literature on the delegation of risk management to financial institutions (Hakenes [2004]) and portfolio managers (Baptista [2008]).

for that subject. The logic behind this test for risk aversion is that only risk-loving subjects would choose lottery B in the first row, and only risk-averse subjects would choose lottery A in the second last row. Assuming local non-satiation, the last row is simply a test that the subject understood the instructions. Most subjects would be expected to switch from A to B on some row in the table, and this switching point can then be used to infer their risk attitude. A risk neutral subject should switch from choosing A to B when the EV of each is about the same, so a risk-neutral subject would choose A for the first four rows and B thereafter.

The first set of experiments was conducted in India. The payoffs are in Indian Rupees. At the time of the experiment the official exchange rate was 1 U.S. dollar = Rs 44.8, implying prizes worth $8.90 and $11.12 in the "safe lottery" A, and worth $21.41 and $0.56 in the "risky lottery" B. These are approximately 5.5 times the baselines prizes offered in the experiments of Holt and Laury [2002]. However, India's official exchange rate does not properly reflect the purchasing power of the Rupee in India, in terms of goods and services. Using purchasing power data for 2000 from the *Penn World Tables* of Heston, Summers and Aten [2002], our payoffs can instead be calculated as $65, $52, $125 and $3.25, respectively, for a scaling of 32.5 times the baselines prizes of Holt and Laury [2002].[2] In general, the payments were significant compared to the subjects' earning power.[3] The conversion to US dollars at official exchange rates or purchasing power rates does not, of course, affect inferences about risk attitudes from observed choices. All subjects were paid in cash at the end of the session. In addition to earnings, each subject received Rs 25 for turning up as agreed.

The subjects were 74 students from classes at the Indian Institute of Management (IIM) in Ahmedabad, the premier Business School in India.[4] Subjects were generally representative of the student population at IIM in Ahmedabad in terms of family income levels (moderate to high, by average Indian standards), sex (predominantly male), ethnicity (predominantly Hindu) and

[2] The official exchange rate in 2000 was very close to the rate prevailing in mid-2005, when the experiments were conducted.

[3] Teaching assistants at the IIM in Ahmedabad received average annual salaries in 2005 of Rs 96,000 ($2,143), which converts to roughly Rs 50 per hour. The average starting salary for graduates in 2003 (2004) was Rs 588,000 (700,100) per year. This converts to roughly $13,125 ($15,548) at official exchange rates.

[4] The web site of the Institute, http://www.iimahd.ernet.in/ provides more information.

undergraduate major (engineering and computer sciences).

All subjects came to one room initially, where they were seated and received a randomly distributed instruction packet colored red or yellow. The instruction packet was initially sealed without revealing the color, so that subjects picked their color at random. They were presented with some general instructions, including an explanation of the role of a monitor who would ensure that all instructions and information were actually applied. The monitor was chosen at random from the subjects. Half of the subjects (those with red instruction packets) were then taken to another room, and a separate experimenter conducted the instructions in each room. The substantive task instructions were handed out sequentially: when performing the first task, subjects had no information about the nature of the subsequent tasks.

In the first room subjects were asked to make choices about the lotteries, and in the other room the subjects were told that they had no choices to make, but that they would receive the consequences of some choices made in the other room. In the first room, where the choices were made, subjects proceeded in one of two orders. Either they made decisions over their own money first, and then over another person's money, or *vice versa*. Thus we control for order effects, while obtaining in-sample responses. The subjects in the first room were told that they had been paired with one other person in the second room, but that they would never know each other's identity. The monitor verified the information provided in instructions in each room. All random draws were resolved using a physical device, a simple 10-sided die.[5]

In addition, and after the lottery choices had been made, each subject in the first room was asked to state the number of choices of lottery A that they believed the rest of the people in the room would make. They were asked to state their belief for each of the treatments, where beliefs and actual averages were rounded to the nearest integer. This belief was elicited under simple incentives.[6]

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[5] The complete instructions are available in an Appendix.

[6] If the estimate was exactly correct in one of the two treatments, they would receive Rs 25; if the estimates were exactly correct in both treatments they would receive Rs 50; if it was 1 off, on either side, they would receive Rs 10 for that column; if it was 1 off in both treatments, they would receive Rs 10 for each treatment; and if it was more than 1 off in both treatments they would not receive anything from this task. This incentive system effectively elicits the modal belief of the subjective distribution if one assumes that the subject is risk neutral for the purposes of the belief elicitation task.

The purpose of this additional task was to find out what risk attitudes each subject thought other people, drawn at random from the same population, would have. If the subject thought that everyone else was less risk averse than they were, they might choose a less risk averse outcome for the other person in the belief that they were selecting as they would. The data provide some checks on hypotheses of this kind.

B. Bidding in a First Price Sealed Bid Auction

The MPL task is a popular instrument that provides a *direct* elicitation of risk attitudes. An alternative mechanism can be found in a variant of the first-price sealed bid auction, with independent and private values. The task is simplified by reducing the number of bidders to 2, and computer-simulating the other bidder with a risk-neutral bidding strategy.[7] The subject was told the strategy that the computerized bidder would use, although it was not described as being consistent with risk-neutral bidding behavior. This task simplification reduces the decision to one of individual choice with no strategic consideration.

The subjects were 32 students recruited from the University of Texas at Dallas. They were each seated in front of a computer terminal, separated from other subjects by dividers. The instructions were provided in written form, and were then read aloud by the experimenter. The computer interface of the experiment was implemented using *Z-tree*, a software package developed by Fischbacher [2007].

Each participant played 25 rounds in the role of agent and 25 rounds in the role of self, for a total of 50 rounds. Half the participants played agent for 25 rounds, followed by 25 rounds of playing for themselves; the other half started playing for themselves for 25 rounds and then played as agent for another. A cohort in a session consisted of 4 participants and players remained in the same cohort for the full 50 rounds. Throughout the 50 rounds, each participant was matched with two other participants, one of whom was his client during 25 rounds and the other his agent during

[7] Computer simulation of N-1 bidders in first-price sealed bid auctions was introduced by Harrison [1989] to remove strategic considerations from the task facing subjects.

the other 25 rounds. The exact order in which each participant played each role is shown in Table 2.

When bidding as agent, it was explained, all earnings from one's bidding activity would go to a different participant in the room designated as one's client. Hence, the payoff of each participant consisted of his earnings from his own bidding choices in 25 rounds in the role of self and the earnings from 25 rounds of bidding of an anonymous other participant in the group designated as his "adviser." The roles were displayed prominently at the top of the screen. Participants were assured that the person playing their agent was different from the person assigned as their client. Participants were not told the identities or matches.

Valuations were drawn uniformly from 1 to 100 tokens.[8] It was explained to subjects that to win each auction, their bid would have to be higher than the computer bidder's bid. Their payoff in each auction they win would be their own valuation minus their bid. Subjects were told that the computer would bid a number between 1 and 50, with each bid between 1 and 50 being equally likely. This is, in fact, the risk neutral bid distribution of a bidder with the same valuation distribution as the participant. Ties would be broken arbitrarily.

The optimal bid for a risk-neutral subject in this setting is to bid half of one's valuation. This generates a win probability equal to the bid divided by 50. To help subjects with their bidding decisions, a calculator was made available to them on the computer screen which showed the probability of winning and the expected payoff for each bid. The idea with this display was to make the tradeoff between one's bid and the probability of winning salient, and not to test the mathematical or cognitive acumen of subjects.

After each round, whether as an agent or bidding for his own money, a subject saw his own bid, the computer's bid, the winning bid, and his profit in that auction round. In addition, subjects saw a table with their own earnings from all previous rounds.[9] A subject did not see his payoff from

[8] Tokens were exchanged for money at the rate of 40 tokens per dollar. Each subject also received a $5 show-up fee.

[9] Subjects did not see a total until the very end, although they could easily compute it given the information provided. This was done on purpose to allow them to learn from feedback but to minimize wealth effects.

being a client of someone else until the very end of the experiment. Thus, his agent's actions, and the outcomes of his agent's actions, did not enter his client's feedback and had no impact on his client's behavior in the experiment.

2. Results

A. Risk Attitudes Revealed by Lottery Choice

Figure 1 displays the main results from the MPL experiment. On the bottom axis we list each problem, corresponding to the rows in Table 1. The vertical axis shows the fraction of choices of the safe lottery, option A. The dashed line displays what a risk neutral subject would do: pick the safe lottery A until the EV of the risky lottery B is greater than the EV of lottery A, and then pick lottery B. The other lines show the observed responses, pooled over the task order, which we control for in a formal statistical analysis below. Subjects that pick the safe option more than the risk neutral prediction are risk averse, as discussed earlier. We will refer to the treatment where subjects make decisions about their own money as "Self," and to the treatment where subjects make decisions about other people's money as "Agent." So Figure 1 provides some evidence that subjects are risk averse in "Self," but are less risk averse in "Agent." Of course, these lines only reflect averages, and there is typically more noise around the "middle" of these pictures, so this conclusion must await a more formal statistical analysis. However, the average number of safe choices was 6.35 and 5.03 in the "Self" and "Agent" treatments, respectively. This difference is statistically significant using a two-sided *t*-test (p-value < 0.001) or a Wilcoxon Signed-Rank test (p-value < 0.001). The variance of the number of safe choice was 2.72 in "Self" vs. 3.20 in "Agent." The F test statistic for comparing variances indicates no significant difference in the variances ($F(36,36)=0.85$, $p=0.69$).

We examine the data using a structural maximum likelihood estimation of the expected utility difference between the choice of the riskier and the safer lottery. Each row in the MPL provides an observation on the binary choice between lottery A and B. We evaluate each lottery using a constant relative risk aversion (CRRA) characterization. Specifically, we assume that utility is defined as $U(y) = (y^{1-r})/(1-r)$, where r is the CRRA coefficient and $r \neq 1$. With this

parameterization, $r = 0$ denotes risk neutral behavior, $r > 0$ denotes risk aversion, and $r < 0$ denotes risk loving. The dependent variable is the binary choice between lottery A and B. A standard probit function links the difference in expected utility (conditional on a candidate value of r) to the observed binary choices; see Harrison and Rutström [2008; p.69ff.] for details of the econometric specification. We include a Fechner error term[10] to capture behavioral errors as a function of "Self" and "Agent." Since each subject provided multiple observations, there are corrections for the possible correlation of statistical errors associated with a given subject.[11]

Table 3 displays the maximum likelihood estimates of this structural model. The dependent variable is the discrete choice (lottery A or lottery B). The CRRA coefficient r is estimated as a linear function of the covariates listed. The covariates include a dummy variable for Agent (1=Agent, 0=Self) and a dummy variable for order of decision tasks. Other covariates are demographic variables deemed to be differentiating for the Indian student sample used for this study. Parental income and education are important in Indian society. Smoking is a prevalent and risky behavior and might be indicative of a risk preference. An age dummy was meant to separate college age students from older participants. Demographic variables primarily included to control for possible sampling effects and reflect those included in other studies (Andersen et al. [2008]).

The most important result is the estimate for the binary dummy (agent) picking out the risk aversion responses over other people's money. It shows that CRRA is 0.44 lower when making decisions over other people's money, and that this effect is statistically significant with a p-value less than 0.001. There does not appear to be a significant effect from task order, sex or age. But the educational levels of parents do matter, as do income level. Controlling for any other differences, we estimate CRRA to be 0.69 over own money and 0.25 over other people's money. We also find that decisions over other people's money *are* associated with a larger Fechner error, and that this is a

[10] See, for example, Hey and Orme [1994].

[11] The use of clustering to allow for "panel effects" from unobserved individual effects is common in the statistical survey literature. The procedures for allowing for clustering allow heteroskedasticity between and within clusters, as well as autocorrelation within clusters. Wooldridge [2003] reviews some issues in the use of clustering for panel effects, in particular noting that significant inferential problems may arise with small numbers of panels.

statistically significant effect, implying that there is *less* sensitivity to differences in expected utility when acting for others than when acting for self.

How do we know that this shift is not an attempt to pick risk attitudes that match those of the people they will be applied to? This is the role of our additional task, where we elicited beliefs about the average responses of others in the room. The results indicate that risk attitudes about one's own money and beliefs about the own risk aversion of others are virtually the same. The average number of safe choices observed were 6.35 and 5.95, respectively for "Self" and "beliefs about others own attitudes," which is not significantly different using a two-sided *t*-test (*p*-value = 0.13) or a Wilcoxon Signed-Rank test (*p*-value = 0.26). Thus the differences observed in Figure 1 and Table 3 are not due to subjects having beliefs that their risk attitudes were un-representative on average, but appear to reflect a genuine preference difference.[12]

Finally, we can exploit the in-sample nature of our responses, and construct a measure of the change in risk attitudes for each subject. Define a variable for each individual which is equal to +1 if the subject makes *more* choices of the *safe* lottery when we compare his choices for others compared to his choices for himself, -1 if he makes more choices of the *risky* lottery, and 0 if there is no change for that subject.[13] Thus each subject is classified, by this measure, as a -1, a 0, or a +1. Controlling for the task itself (a dummy variable for Agent) and allowing for the effect of task order (a dummy variable for order), but no other explanatory variables, we then estimate an ordered logit model on these summary measures. The results allow us to predict that the probability that a subject would be less risk averse when making choices for others is 0.57, the probability that a subject would exhibit the same degree of risk aversion is 0.38, and that the probability that a subject would be more risk averse when making choices for others is only 0.05. This confirms our between-subjects conclusions.

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[12] We further find that the beliefs about what others making "choices as agents" are not significantly different from what others actually make (p=0.28), while the difference between the two sets of beliefs is (weakly) significantly different (p=0.06) and in the same direction as the choice differences. Thus the observed difference in risk attitudes is also reflected in the difference in the beliefs subjects are stating.

[13] In fact only one subject had offsetting gross changes such that the net effect was no change.

B. Risk Attitudes Revealed by Bidding Behavior

Optimal bids in the first-price auction depend on risk attitudes. Using the same CRRA utility function that we used to evaluate the risk attitudes implied by the lottery task, we can infer the risk attitudes that the subjects used in the auction task by assuming that they were bidding optimally conditional on those risk attitudes (e.g., Harrison [1990]). This assumption may be more tenuous in the auction task than in the lottery task, for reasons that have been much debated in the older literature (e.g., Harrison [1989][1992]), but this is why we simplified the auction task to make it a relatively simple, non-strategic decision. Moreover, the purpose of our auction task is precisely to see if the qualitative results from the direct lottery task carry over into a more natural task, such as bidding behavior, so to some extent this added structure is necessary no matter what alternative task we choose.

Optimal bids for the auction task imply that the CRRA coefficient is equal to r = 1 - (valuation-bid)/bid. Figure 2 displays the density of values for each treatment. The risk attitudes revealed by bidders acting on behalf of another person imply *less risk aversion* than the bids entered for themselves, and a marked tendency for some subjects to actually act in a risk loving manner with the other person's expected profit. Figure 2 also shows that we have two modes when individuals bid on their own behalf: one is risk averse (r>0) and the other is approximately risk-neutral (r≈0). This conclusion from Figure 2 is reinforced by a random-effects regression, reported in Table 4, of implied risk attitudes on a binary indicator of the treatment. Relative risk aversion is lower by 0.132 when bidding for others, and this estimate has a standard error of 0.040 (*p*-value = 0.001, 95% confidence interval between -0.21 and -0.05).[14] We find that the residual variance of risk attitudes is *not* significantly greater when bidding for others.[15]

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[14] Virtually the same estimates are obtained with a fixed-effects model. We also obtain the same qualitative results if we exclude some extreme risk-loving responses (e.g., one subject bid 1 when his principal had a valuation of 95, and one subject bid 10 when his principal had a valuation of 95). Dropping such responses leads to an estimated reduction in the difference in risk aversion of 0.08, with a 95% confidence interval between -0.14 and -0.03. We hesitate to drop such responses, however, because it is precisely this sort of change in behavior that one *might* expect when individuals take actions for others instead of themselves, and uncovering that possible behavior is the whole point of the design.

[15] This finding employs a multiplicative heteroskedasticity regression model with clustering for individuals. We verify that all coefficients of interest for the baseline regression here, with no multiplicative

3. Conclusions

We explored the relationship between risk averse behavior, making decisions on behalf of others, and beliefs regarding others' risk attitudes. We find that, consistent with extant research, individuals are generally risk averse for the domain of income represented in our experiments. However, individuals appear less risk averse when making decisions over other people's money, and some are actually risk-loving. This general pattern is statistically significant. The difference does not appear to be driven by an attempt to pick risk attitudes that reflect the risk attitudes of others.

There are other possible explanations. We want to draw attention to some possibilities that have received attention in the literature, although we leave it to future research to evaluate their validity.

One possibility arises from the observation in the literature that when risky decisions are hypothetical, lower risk aversion is observed. There is extensive evidence, presented in Holt and Laury [2002][2005] and Harrison [2006], that measures of risk aversion in hypothetical choices indicate significantly lower risk aversion than choices that entail real consequences. Indeed, the qualitative pattern matches ours: subjects are moderately risk averse over their own money, and less risk averse when the decisions have no monetary consequences for them. The similarity between the results suggests that the underlying explanation might be similar. However, this is not just indifference over the outcomes to others. Even though we see an increase in the behavioral error term that is significant, controlling for this effect the risk aversion coefficient is reduced but still significantly different from risk neutrality.

Another possibility, consistent with the evidence of a systematic choice pattern for others, builds on the social dimension of the decision over other people's money involves subjects exhibiting some form of "social preference" in their decisions. We know from our follow-up questions about the choices of others that this is not because they believed that others were less risk averse than they were. However, it is entirely possible that they were viewing this as a social risk

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heteroskedasticity, are virtually identical to those reported in Table 4. The effect of giving advice over other's money is to increase the residual variance, but the effect is not statistically significant (p-value = 0.17).

decision, and employing different preferences over social risk than they do over individual risk. Direct tests of this hypothesis in group tasks, and with a wide range of social choice mechanisms, are reported by Baker, Laury and Williams [2008], Colombier, Denant-Boemont, Loheac and Masclat [2009], Harrison, Lau, Rutström and Tarazona-Gómez [2005], Rockenbach, Sadrieh and Mathauschek [2007] and Shupp and Williams [2008].[16] The evidence from these studies is mixed, but that could be due to the diverse social choice procedures employed across the different studies. The main difference between those settings and ours is that here the individual is completely removed from the consequences of his or her decision.

Whatever the explanation for the behavior found here, there is a need for a better understanding of what motivates agents acting on behalf of others. It would also be of great interest to identify the factors that motivate individuals to hire agents (brokers, financial advisors, insurance agents, doctors) to make risky decisions on their behalf. It may very well be that some level of detachment is beneficial and even desired by the impacted party.

[16] A related experimental literature examines the role of advice in learning environments, and the possible influence of social learning on individual decision-making (e.g., Ballinger, Palumbo and Wilcox [2003], Schotter and Sopher [2003], and Kuang, Weber and Dana [2007]). A key difference between our environment and theirs is that our agents make choices for the principals, rather than just giving them advice and letting them make the final choice. These differences are worthy of careful study, since each environment has important field counterparts.

Table 1: Payoff Table for Risk Aversion Experiments

All currency units are Indian Rupees (Rs). At the time of the experiment 1 USD = 44.8 Rs using the official exchange rate.

Lottery A				Lottery B				EV^A	EV^B	Difference
p(400)		p(500)		p(960)		p(25)				
0.1	400	0.9	500	0.1	960	0.9	25	490	118.5	372
0.2	400	0.8	500	0.2	960	0.8	25	480	212	268
0.3	400	0.7	500	0.3	960	0.7	25	470	305.5	164.5
0.4	400	0.6	500	0.4	960	0.6	25	460	399	61
0.5	400	0.5	500	0.5	960	0.5	25	450	492.5	-42.5
0.6	400	0.4	500	0.6	960	0.4	25	440	586	-146
0.7	400	0.3	500	0.7	960	0.3	25	430	679.5	-249.5
0.8	400	0.2	500	0.8	960	0.2	25	420	773	-353
0.9	400	0.1	500	0.9	960	0.1	25	410	866.5	-456.5
1	400	0	500	1	960	0	25	400	960	-560

Note: The last three columns in this table, showing the expected values of the lotteries, were not shown to subjects.

Table 2: Matching Scheme for First Price Sealed Bid Auction Experiment

Rounds	Subject 1	Subject 2	Subject 3	Subject 4
1-25	Self	Agent for Subject 1	Self	Agent for Subject 3
26-50	Agent for Subject 4	Self	Agent for Subject 2	Self

Figure 1: Agent Lottery Choices

Fraction choosing safe option A in each choice problem

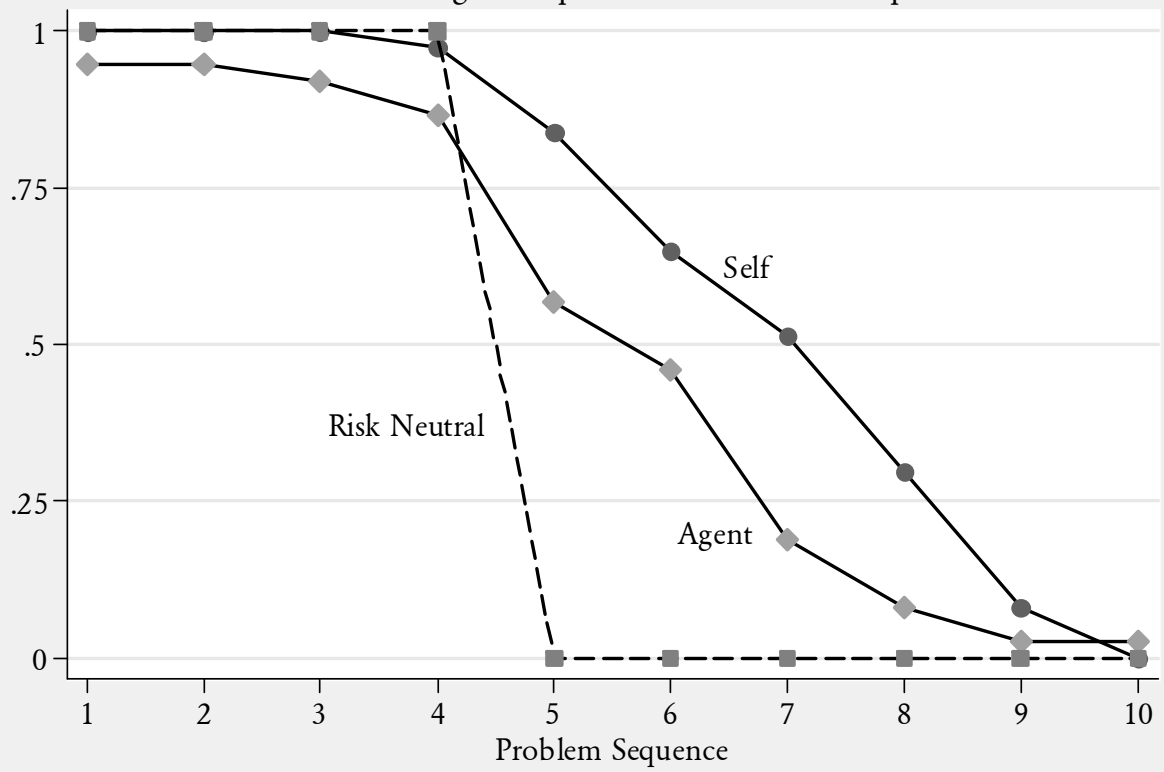

Table 3: Statistical Model of Risk Aversion Responses in Lottery Choices

Structural Maximum-likelihood estimate of CRRA utility function.
N=740 binary choices by 37 subjects.
Estimates corrected for clustering on the individual.

Variable	Description	Estimate	Standard Error	*p*-value	Lower 95% Confidence Interval	Upper 95% Confidence Interval
CRRA Coefficient r						
Constant		0.689	0.243	0.005	0.213	1.165
Agent	Responses as Agent	-0.441	0.117	0.000	-0.670	-0.212
Order	Agent comes first	0.053	0.118	0.655	-0.178	0.283
Male	Male	0.074	0.162	0.644	-0.242	0.392
Over22	Years over 22 in age	-0.001	0.036	0.980	-0.071	0.069
ParentsEd	Some post-grad education of parents	-0.296	0.121	14.000	-0.532	-0.059
IncMed	Parents earned ≥2.5 and ≤7.5 lakhs	0.353	0.162	0.030	0.035	0.671
IncHigh	Parents earned >7.5 lakhs	0.254	0.205	0.216	-0.149	0.656
Smoker	Current smoker	-0.141	0.152	0.355	-0.439	0.158
Fechner Error						
Constant		0.701	0.075	0.000	0.554	0.848
Agent	Effect on error term from being Agent	0.621	0.276	0.024	0.080	1.162

Note: Wald test for the null hypothesis that all coefficients are zero has a χ^2_{14} value of 30.8, implying *p*-value = 0.0002
We include controls for several observable demographic characteristics not included in this table. These include sex, age, parent education, income level and smoking status.

Figure 2: Bidding on Behalf of Others

Density of implied risk aversion in each treatment
Data from all periods; N=32 bidders

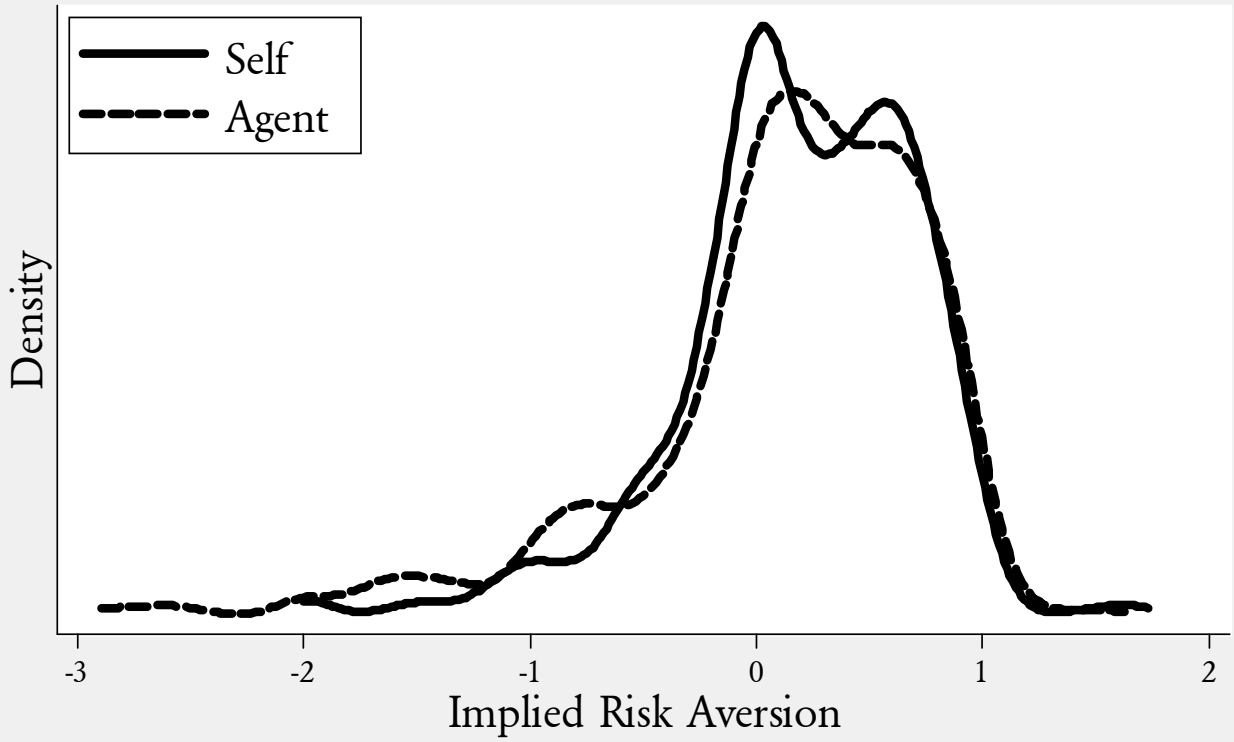

Table 4: Statistical Model of Implied Risk Aversion in Auction Bids

Maximum-likelihood "random effects" estimates of CRRA utility function.
N=1,593 bids by 32 subjects.

Variable	Description	Estimate	Standard Error	*p*-value	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Constant		0.062	0.300	0.835	-0.525	0.650
Agent	Responses as agent	-0.132	0.040	0.001	-0.212	-0.053
Order	Agent comes second	-0.109	0.131	0.402	-0.365	0.147
Male	Male	0.003	0.142	0.985	-0.276	0.281
Age	Age over 18 in years	-0.023	0.019	0.244	-0.062	0.016
Asian	Asian ethnicity	-0.212	0.202	0.293	-0.608	0.183
Hispanic	Hispanic ethnicity	-0.031	0.152	0.838	-0.328	0.266
Business	Business major	-0.100	0.122	0.412	-0.340	0.139
Graduate	Graduate student	0.487	0.178	0.006	0.137	0.838
Aid	Receives student aid	0.279	0.130	0.033	0.023	0.534
Citizen	U.S. citizen	0.035	0.193	0.857	-0.344	0.414
Married	Ever married	0.171	0.195	0.380	-0.210	0.551
GPAhi	GPA ≥ 3.75	-0.166	0.172	0.332	-0.503	0.170
Work	Part-time or full-time work	0.018	0.123	0.886	-0.223	0.259
Session	Experimental session	0.041	0.121	0.730	-0.195	0.278

Note: Wald test for the null hypothesis that all coefficients are zero has a χ^2_{14} value of 31.9, implying *p*-value = 0.0041.

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Appendix: Experimental Instructions for MPL (NOT FOR PUBLICATION)

WELCOME TO THE RESEARCH STUDY
DESCRIPTION

This is a study of economic decision making. We think you will find it interesting, you will be paid 25 Rupees for your participation *and* you could earn additional money. How much you earn will depend partly on chance. For some of you, earnings will also be based partly on the choice you make in decision problems which you will be presented with. For the rest of you earnings will be based partly on the choice made by another participant. The instructions are simple and you will benefit from following them carefully.

The problems are not designed to test you. What we want to know is what choices you would make in them. The only right answer is what you really would choose. That is why the problems give you the chance of earning real money. You will be paid in cash today, at the end of the session.

The tasks will proceed in several short parts.

Three of the parts are short decision problems in which chance may play a part. Each decision problem requires some of you to make a choice. This is described in more detail in a moment. All three of these parts may result in additional earnings over and above the 25 Rupees participation fee.

The remaining parts consist of a few questions about you. This information is for research use only. The published results of our research will not identify you, or the choice you made in any way. Nor will we give this identifying information to anyone else. In fact, we will only identify you on these sheets by a numeric ID, and that ID will not appear on the sheet that has your name for our payment records.

We expect the entire task to take less than 60 minutes. You are free to leave at any time, but if you do not complete all tasks you will not receive the participation fee or your earnings.

ID: _____

INSTRUCTIONS

At this stage we will split everyone into two groups. Some of you will be going to a different room, and some of you will be staying here. Please do not talk as we move between rooms. As you may have noticed, the instruction pages you received in the envelope you selected are either red or yellow.

Those with a red sheet should come now with my assistant, who will take you into a room next door. The rest of you, with yellow sheets, will stay here. Before we separate into different rooms we will select one of you as a monitor who will go between the rooms and verify to the other participants that the descriptions of what happens in the other room are accurate. The monitor will be paid a fixed fee for doing this, with no relation to the earnings from the tasks. One of you has a sheet inside your instruction package that says “You are the Monitor.” Please identify yourself at this point.

We will now read out the instructions for the monitor.

You have been randomly selected to be the monitor in this experiment. Instead of receiving earnings from the task, you will be paid a fixed fee for being the monitor. We will tell you later how much this fee is. You will simply be asked to visit both of the rooms in which the experiment is conducted to listen to the instructions read out there, and to verify to the other room that what is being said is in fact accurate. When visiting a room, you should ask any questions you need to in order to perform this job well. Nevertheless, you may not in any way identify any of the people in the room to each other. You will also not be able to see any of the decisions made.

After the decisions have been made, the decision sheets will be put into an envelope, which is then closed. You will then accompany an experimenter to the other room to deliver them there, but you will not see the content of them. Do you have any questions about what you are to do?

We now ask all of you who have red sheets in your instruction package to accompany my assistant.

Rr1

Part 1 Decision Task

Your decision sheet shows ten decisions listed on the left. Each decision is a paired choice between “Option A” and “Option B.” You will make a choice on each row and record these in the final column. Your decisions will determine your payoffs from this decision task.

Here is a ten-sided die that will be used to determine payoffs. The faces are numbered from 0 to 9, and we will use the 0 face of the die to serve as 10. Look at Decision 1 at the top. Option A pays 400 Rupees if the throw of the ten sided die is 1, and it pays 500 Rupees if the throw is 2-10. Option B yields 960 Rupees if the throw of the die is 1, and it pays 25 Rupees if the throw is 2-10.

The other Decisions are similar, except that as you move down the table, the chances of the higher payoff for each option increase. In fact, for Decision 10 in the bottom row, the die will not be needed since each option pays the highest payoff for sure, so your choice here is between 400 Rupees or 960 Rupees.

After you have made all of your choices, you will throw this die twice, once to select one of the ten decisions to be used, and a second time to determine what your payoff is for the option you chose, A or B, for the particular decision selected. Even though you will make ten decisions, only one of these will end up affecting your earnings, but you will not know in advance which decision will be used.

We will go around the room and let you perform the die rolls after you have completed the next three short tasks. We will then pay each of you in private and you will be free to go.

Please fill in the decision sheets now. Fill in the subject ID number that you can see on the yellow instruction pages you received inside the envelope. This goes in the top left corner of the decision sheet.

OVER

ID: Rr1 _____

Decision	**Option A**	**Option B**	**Your Choice** (Circle A or B)
1	400 if throw of die is 1 500 if throw of die is 2-10	960 if throw of die is 1 25 if throw of die is 2-10	A B
2	400 if throw of die is 1-2 500 if throw of die is 3-10	960 if throw of die is 1-2 25 if throw of die is 3-10	A B
3	400 if throw of die is 1-3 500 if throw of die is 4-10	960 if throw of die is 1-3 25 if throw of die is 4-10	A B
4	400 if throw of die is 1-4 500 if throw of die is 5-10	960 if throw of die is 1-4 25 if throw of die is 5-10	A B
5	400 if throw of die is 1-5 500 if throw of die is 6-10	960 if throw of die is 1-5 25 if throw of die is 6-10	A B
6	400 if throw of die is 1-6 500 if throw of die is 7-10	960 if throw of die is 1-6 25 if throw of die is 7-10	A B
7	400 if throw of die is 1-7 500 if throw of die is 8-10	960 if throw of die is 1-7 25 if throw of die is 8-10	A B
8	400 if throw of die is 1-8 500 if throw of die is 9-10	960 if throw of die is 1-8 25 if throw of die is 9-10	A B
9	400 if throw of die is 1-9 500 if throw of die is 10	960 if throw of die is 1-9 25 if throw of die is 10	A B
10	400 if throw of die is 1-10	960 if throw of die is 1-10	A B

DECISION ROW CHOSEN BY FIRST THROW OF THE DIE: _____

THROW OF THE DIE TO DETERMINE PAYMENT: _____

YOUR EARNINGS: _____

Rr3

Part 3 Decision Task

Your decision sheet shows ten decisions listed on the left. Notice that this decision sheet is quite similar to the one you used before, although the decision you are asked to make is quite different. Each decision is a paired choice between “Option A” and “Option B”, like before. You will make a choice on each row and record these in the final column. Contrary to the previous task, here your decisions will determine the payoffs to one person in the other room, picked at random. The person in this other room is not given a task at all. Apart from the participation fee of 25 Rupees, his or her earnings depend only on your decision.

To verify this we will now take the monitor to the other room. We will wait for the monitor to return before proceeding.

The monitor has now returned. We will now ask the monitor to read out the instructions given in the other room.

Are there any questions regarding the other room?

We will now perform the next task, where your decisions will determine the payoff to one of the people in the other room. You will be matched to one person in the other room, picked at random.

As we started the experiment you received your instructions packages in a random order. This ensures that the ID number that you have received, and that is listed in the top left corner of your decision sheet, was given to you randomly. You may recall that everyone who left the room received a red instruction package and everyone who remained here received yellow ones. The two sets of instructions, the red and the yellow, have matching ID numbers. Thus, there is one person in the other room who has a red instruction package with the same ID number as yours. You will be matched with this person. We will not reveal to you who this person is, however, to guarantee that person’s anonymity. This is the person whose payoffs depend on your decisions.

Here is a ten-sided die that will be used to determine payoffs. The faces are numbered from 0 to 9, and we will use the 0 face of the die to serve as 10. Look at Decision 1 at the top. Option A pays 400 Rupees if the throw of the ten sided die is 1, and it pays 500 Rupees if the throw is 2-10. Option B yields 960 Rupees if the throw of the die is 1, and it pays 25 Rupees if the throw is 2-10.

The other Decisions are similar, except that as you move down the table, the chances of the higher payoff for each option increase. In fact, for Decision 10 in the bottom row, the die will not be needed since each option pays the highest payoff for sure, so your choice here is between 400 Rupees or 960 Rupees.

After you have made all of your choices, you will throw this die twice, once to select one of the ten decisions to be used, and a second time to determine what the payoff is for the option you chose, A or B, for the particular decision selected. Even though you will make ten decisions, only one of these will end up affecting the earnings of the other person, but you will not know in advance which decision will be used.

When you are finished, we will come around and hand out the instructions for the final task. After that we will let you perform the die rolls. We will then pay each of you in private and you will be free to go.

After you have finished filling in the decision sheet, please write your ID number on the outside of the envelope.

Please fill in the decision sheets now. Fill in the subject ID number that you can see on the yellow instruction pages you received inside the envelope. This goes in the top left corner of the decision sheet.

ID: Rr3 _____

Decision	**Option A**	**Option B**	**Your Choice** (Circle A or B)
1	400 if throw of die is 1 500 if throw of die is 2-10	960 if throw of die is 1 25 if throw of die is 2-10	A B
2	400 if throw of die is 1-2 500 if throw of die is 3-10	960 if throw of die is 1-2 25 if throw of die is 3-10	A B
3	400 if throw of die is 1-3 500 if throw of die is 4-10	960 if throw of die is 1-3 25 if throw of die is 4-10	A B
4	400 if throw of die is 1-4 500 if throw of die is 5-10	960 if throw of die is 1-4 25 if throw of die is 5-10	A B
5	400 if throw of die is 1-5 500 if throw of die is 6-10	960 if throw of die is 1-5 25 if throw of die is 6-10	A B
6	400 if throw of die is 1-6 500 if throw of die is 7-10	960 if throw of die is 1-6 25 if throw of die is 7-10	A B
7	400 if throw of die is 1-7 500 if throw of die is 8-10	960 if throw of die is 1-7 25 if throw of die is 8-10	A B
8	400 if throw of die is 1-8 500 if throw of die is 9-10	960 if throw of die is 1-8 25 if throw of die is 9-10	A B
9	400 if throw of die is 1-9 500 if throw of die is 10	960 if throw of die is 1-9 25 if throw of die is 10	A B
10	400 if throw of die is 1-10	960 if throw of die is 1-10	A B

DECISION ROW CHOSEN BY FIRST THROW OF THE DIE: _____

THROW OF THE DIE TO DETERMINE PAYMENT: _____

EARNINGS TO THE OTHER PERSON: _____

rR1

Part 1 Decision Task

Your decision sheet shows ten decisions listed on the left. Each decision is a paired choice between “Option A” and “Option B.” You will make a choice on each row and record these in the final column. Your decisions will determine the payoffs from this task to one person in the other room, picked at random. The person in this other room is not given a task at all. Apart from the participation fee of 25 Rupees, his or her earnings depend only on your decision.

To verify this we will now take the monitor to the other room. We will wait for the monitor to return before proceeding.

The monitor has now returned. We will now ask the monitor to read out the instructions given in the other room.

Are there any questions regarding the other room?

We will now perform the next task, where your decisions will determine the payoff to one of the people in the other room. You will be matched to one person in the other room, picked at random.

As we started the experiment you received your instructions packages in a random order. This ensures that the ID number that you have received, and that is listed in the top left corner of your decision sheet, was given to you randomly. You may recall that everyone who left the room received a red instruction package and everyone who remained here received yellow ones. The two sets of instructions, the red and the yellow, have matching ID numbers. Thus, there is one person in the other room who has a red instruction package with the same ID number as yours. You will be matched with this person. We will not reveal to you who this person is, however, to guarantee that person’s anonymity. This is the person whose payoffs depend on your decisions.

Here is a ten-sided die that will be used to determine payoffs. The faces are numbered from 0 to 9, and we will use the 0 face of the die to serve as 10. Look at Decision 1 at the top. Option A pays 400 Rupees if the throw of the ten sided die is 1, and it pays 500 Rupees if the throw is 2-10. Option B yields 960 Rupees if the throw of the die is 1, and it pays 25 Rupees if the throw is 2-10.

The other Decisions are similar, except that as you move down the table, the chances of the higher payoff for each option increase. In fact, for Decision 10 in the bottom row, the die will not be needed since each option pays the highest payoff for sure, so your choice here is between 400 Rupees or 960 Rupees.

After you have made all of your choices, you will throw this die twice, once to select one of the ten decisions to be used, and a second time to determine what the payoff is for the option you chose, A or B, for the particular decision selected. Even though you will make ten decisions, only one of these will end up affecting the earnings of the other person, but you will not know in advance which decision will be used.

We will go around the room and let you perform the die rolls after you have completed the next three short tasks. We will then pay each of you in private and you will be free to go.

After you have finished filling in the decision sheet, please write your ID number on the outside of the envelope.

Please fill in the decision sheets now. Fill in the subject ID number that you can see on the yellow instruction pages you received inside the envelope. This goes in the top left corner of the decision sheet.

ID: rR1 _____

Decision	**Option A**	**Option B**	**Your Choice** (Circle A or B)
1	400 if throw of die is 1 500 if throw of die is 2-10	960 if throw of die is 1 25 if throw of die is 2-10	A B
2	400 if throw of die is 1-2 500 if throw of die is 3-10	960 if throw of die is 1-2 25 if throw of die is 3-10	A B
3	400 if throw of die is 1-3 500 if throw of die is 4-10	960 if throw of die is 1-3 25 if throw of die is 4-10	A B
4	400 if throw of die is 1-4 500 if throw of die is 5-10	960 if throw of die is 1-4 25 if throw of die is 5-10	A B
5	400 if throw of die is 1-5 500 if throw of die is 6-10	960 if throw of die is 1-5 25 if throw of die is 6-10	A B
6	400 if throw of die is 1-6 500 if throw of die is 7-10	960 if throw of die is 1-6 25 if throw of die is 7-10	A B
7	400 if throw of die is 1-7 500 if throw of die is 8-10	960 if throw of die is 1-7 25 if throw of die is 8-10	A B
8	400 if throw of die is 1-8 500 if throw of die is 9-10	960 if throw of die is 1-8 25 if throw of die is 9-10	A B
9	400 if throw of die is 1-9 500 if throw of die is 10	960 if throw of die is 1-9 25 if throw of die is 10	A B
10	400 if throw of die is 1-10	960 if throw of die is 1-10	A B

DECISION ROW CHOSEN BY FIRST THROW OF THE DIE: _____

THROW OF THE DIE TO DETERMINE PAYMENT: _____

EARNINGS TO THE OTHER PERSON: _____

rR3

Part 3 Decision Task

Your decision sheet shows ten decisions listed on the left. Notice that this decision sheet is quite similar to the one you used before, although the decision you are asked to make is quite different. Each decision is a paired choice between “Option A” and “Option B.” You will make a choice on each row and record these in the final column. Contrary to the previous task, here your decisions will determine your own payoffs from this decision task.

Here is a ten-sided die that will be used to determine payoffs. The faces are numbered from 0 to 9, and we will use the 0 face of the die to serve as 10. Look at Decision 1 at the top. Option A pays 400 Rupees if the throw of the ten sided die is 1, and it pays 500 Rupees if the throw is 2-10. Option B yields 960 Rupees if the throw of the die is 1, and it pays 25 Rupees if the throw is 2-10.

The other Decisions are similar, except that as you move down the table, the chances of the higher payoff for each option increase. In fact, for Decision 10 in the bottom row, the die will not be needed since each option pays the highest payoff for sure, so your choice here is between 400 Rupees or 960 Rupees.

After you have made all of your choices, you will throw this die twice, once to select one of the ten decisions to be used, and a second time to determine what your payoff is for the option you chose, A or B, for the particular decision selected. Even though you will make ten decisions, only one of these will end up affecting your earnings, but you will not know in advance which decision will be used.

When you are finished, we will come around and hand out the instructions for the final task. After that we will let you perform the die rolls. We will then pay each of you in private and you will be free to go.

Please fill in the decision sheets now. Fill in the subject ID number that you can see on the yellow instruction pages you received inside the envelope. This goes in the top left corner of the decision sheet.

OVER

ID: rR3 _____

Decision	**Option A**	**Option B**	**Your Choice** (Circle A or B)
1	400 if throw of die is 1 500 if throw of die is 2-10	960 if throw of die is 1 25 if throw of die is 2-10	A B
2	400 if throw of die is 1-2 500 if throw of die is 3-10	960 if throw of die is 1-2 25 if throw of die is 3-10	A B
3	400 if throw of die is 1-3 500 if throw of die is 4-10	960 if throw of die is 1-3 25 if throw of die is 4-10	A B
4	400 if throw of die is 1-4 500 if throw of die is 5-10	960 if throw of die is 1-4 25 if throw of die is 5-10	A B
5	400 if throw of die is 1-5 500 if throw of die is 6-10	960 if throw of die is 1-5 25 if throw of die is 6-10	A B
6	400 if throw of die is 1-6 500 if throw of die is 7-10	960 if throw of die is 1-6 25 if throw of die is 7-10	A B
7	400 if throw of die is 1-7 500 if throw of die is 8-10	960 if throw of die is 1-7 25 if throw of die is 8-10	A B
8	400 if throw of die is 1-8 500 if throw of die is 9-10	960 if throw of die is 1-8 25 if throw of die is 9-10	A B
9	400 if throw of die is 1-9 500 if throw of die is 10	960 if throw of die is 1-9 25 if throw of die is 10	A B
10	400 if throw of die is 1-10	960 if throw of die is 1-10	A B

DECISION ROW CHOSEN BY FIRST THROW OF THE DIE: _____

THROW OF THE DIE TO DETERMINE PAYMENT: _____

YOUR EARNINGS: _____

Rr4 _____ **Part 4 Decision Task**

In this final task we want you to tell us how often you believe that option A was chosen by everyone else in this room. We want you to tell us your belief about the average number of times option A was chosen by everyone else. We will reward you for your accuracy. Remember, your choice does not count here. Please circle one number below in each column, to tell us what you believe:

Number of times option A was picked on average WHEN THEY PAYOFFS WERE FOR THE PERSON MAKING THE CHOICE	**Number of times option A was picked on average WHEN THE PAYOFFS WERE FOR A PERSON IN THE OTHER ROOM**
0	**0**
1	**1**
2	**2**
3	**3**
4	**4**
5	**5**
6	**6**
7	**7**
8	**8**
9	**9**
10	**10**

We will calculate the average for everyone else in the room, and round that to the nearest integer. If your estimate is exactly correct in one of the columns, you will receive 25 Rupees. If your estimates are exactly correct in both columns you will receive 50 Rupees. If it is 1 off, on either side, you will receive 10 Rupees for that column. If it is 1 off in both columns, you will receive10 Rupees for each of them. If it is more than 1 off in both columns you will not receive anything from this task.

rR4 _____ **Part 4 Decision Task**

In this final task we want you to tell us how often you believe that option A was chosen by everyone else in this room. We want you to tell us your belief about the average number of times option A was chosen by everyone else. We will reward you for your accuracy. Remember, your choice does not count here. Please circle one number below in each column, to tell us what you believe:

Number of times option A was picked on average WHEN THE PAYOFFS WERE FOR A PERSON IN THE OTHER ROOM	**Number of times option A was picked on average WHEN THE PAYOFFS WERE FOR THE PERSON MAKING THE CHOICE**
0	**0**
1	**1**
2	**2**
3	**3**
4	**4**
5	**5**
6	**6**
7	**7**
8	**8**
9	**9**
10	**10**

We will calculate the average for everyone else in the room, and round that to the nearest integer. If your estimate is exactly correct in one of the columns, you will receive 25 Rupees. If your estimates are exactly correct in both columns you will receive 50 Rupees. If it is 1 off, on either side, you will receive 10 Rupees for that column. If it is 1 off in both columns, you will receive10 Rupees for each of them. If it is more than 1 off in both columns you will not receive anything from this task.

ID: Rr _____

YOUR INSTRUCTIONS

We will wait for the monitor to arrive from the other room before we start reading these instructions. You may take out a book to read while we are waiting, but we ask that you do not talk to each other.

In today's experiment the earnings you will receive in addition to the participation fee of 25 Rupees is determined by decisions made by one other person in the other room and by the roll of a 10-sided die. The decisions made by the other person concerns a choice over two lotteries differing in the payoffs and risk. The person will pick one lottery, and this lottery will then be played out using the 10-sided die to determine how much additional earnings you will receive.

As we started the experiment you received your instructions packages in a random order. This ensures that the ID number that you have received, and that is listed in the top left corner of the instruction page, was given to you randomly. You may recall that everyone who came with us to this room received a red instruction package and everyone who remained in the other room received yellow ones. The two sets of instructions, the red and the yellow, have matching ID numbers. Thus, there is one person in the other room who has a yellow instruction package with the same ID number as yours. You will be matched with this person. We will not reveal to you who this person is, however, to guarantee that person's anonymity. This is the person who will make the choice between the lotteries that will determine your additional earnings.

You have received a copy of the instructions for the tasks given to the other people, that you may read through to understand how your earnings are determined. We ask that the monitor views one of these copies of the instructions to verify that these are indeed the same ones used in the other room. Do you have any questions at this point?

The monitor is also here to verify to the people in the other room that the instructions we give there are accurate. First, we need for the monitor to verify to the other room that we have ____ people in this room, and that nobody has an ID number bigger than that. Please raise your hand if you do have an ID number that is bigger.

When all of the decisions in the other room has been made we will be able to tell you what additional earnings you will receive. When you have completed the survey questions that you will find in the instruction package, you may quietly read. We do ask that you not talk until everyone has completed their survey. We will tell you when everyone has completed their survey, and you can talk then if you want to.

Please answer the enclosed survey now. When you are finished please indicate to an experimenter who will then pick it up from you.

ID: rR _____

YOUR INSTRUCTIONS

We will wait for the monitor to arrive from the other room before we start reading these instructions. You may take out a book to read while we are waiting, but we ask that you do not talk to each other.

In today's experiment the earnings you will receive in addition to the participation fee of 25 Rupees is determined by decisions made by one other person in the other room and by the roll of a 10-sided die. The decisions made by the other person concerns a choice over two lotteries differing in the payoffs and risk. The person will pick one lottery, and this lottery will then be played out using the 10-sided die to determine how much additional earnings you will receive.

As we started the experiment you received your instructions packages in a random order. This ensures that the ID number that you have received, and that is listed in the top left corner of the instruction page, was given to you randomly. You may recall that everyone who came with us to this room received a red instruction package and everyone who remained in the other room received yellow ones. The two sets of instructions, the red and the yellow, have matching ID numbers. Thus, there is one person in the other room who has a yellow instruction package with the same ID number as yours. You will be matched with this person. We will not reveal to you who this person is, however, to guarantee that person's anonymity. This is the person who will make the choice between the lotteries that will determine your additional earnings.

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Please answer the enclosed survey now. When you are finished please indicate to an experimenter who will then pick it up from you.

ID: Rr _____

Part 2: Some Questions About You

In this survey most of the questions asked are descriptive. We will not be grading your answers and your responses are completely confidential. Please think carefully about each question and give your best answers.

1. What is your AGE? _____ years

2. What is your sex? (Circle one number.)

   01 Male
   02 Female

3. Which of the following categories best describes you? (Circle one number.)

   01 Hindu
   02 Muslim
   03 Christian
   04 Jain
   05 Sikh
   06 Zoroastrian
   07 Buddhist
   08 Bahai
   08 Scheduled Caste (SC)
   09 Scheduled Tribe (ST)
   10 Other Backward Class (OBC)
   11 None of the above
   12 Do not wish to answer

4. What was your undergraduate major? (Circle one number.)

   01 Accounting
   02 Economics
   03 Finance
   04 Business Administration, other than Accounting, Economics, or Finance
   05 Education
   06 Engineering
   07 Health Professions
   08 Public Affairs or Social Services
   09 Biological Sciences
   10 Math, Computer Sciences, or Physical Sciences
   11 Social Sciences or History
   12 Humanities
   13 Psychology
   14 Other Fields

5. What is your class standing? (Circle one number.)

   01 First year Masters
   02 Second year Masters
   03 Doctoral student

6. What was the **highest** level of education that your **father** (or male guardian) completed? (Circle one number)

   01 Std. XII or less
   02 Vocational Diploma
   03 Bachelors Degree
   04 Post Graduate Degree

7. What was the **highest** level of education that your **mother** (or female guardian) completed? (Circle one number)

   01 Std. XII or less
   02 Vocational Diploma
   03 Bachelors Degree
   04 Post Graduate Degree

8. Are you currently... (Circle one number.)

   01 Single and never married?
   02 Married?
   03 Separated, divorced or widowed?

9. On a 4-point scale, what is your current CGPA? This CGPA should refer to all of your coursework, not just the current year. (Circle one number:)

   01 Between 3.75 and 4.0 CGPA
   02 Between 3.25 and 3.74 CGPA
   03 Between 2.75 and 3.24 CGPA
   04 Between 2.25 and 2.74 CGPA
   05 Between 1.75 and 2.24 CGPA
   06 Between 1.25 and 1.74 CGPA
   07 Less than 1.25
   08 Have not taken courses for which grades are given.

10. Please circle the category below that describes the total amount of gross (pre-tax) INCOME earned in 2004 by your parents. (Circle one number.)

    01 Less than 1 lakh
    02 Between 1 and 2.5 lakhs
    03 Between 2.5 and 5 lakhs
    04 Between 5 and 7.5 lakhs
    05 Between 7.5 and 10 lakhs
    06 Above 10 lakhs

11. Do you currently smoke cigarettes? (Circle one number.)

    01 Yes
    02 No

    If yes, approximately how much do you smoke in one day?

    _____ packs

RECEIPT

I verify that I have participated in an economics experiment on _____

and received the following earnings in compensation:

Part 1: _____

Part 3: _____

Part 4: _____

Fee: 25

Total: _____

Signature: _____

Print Name: _____

ID Number : _____ (<u>not</u> your experiment ID)

INSTRUCTIONS FOR AUCTION STUDY

This is a study of economic decision making. You will be paid $5 for your participation *and* you could earn additional money, depending on the choices you make, the choices made by another participant, and on chance. You will be paid in cash today, at the end of the session. Please follow the instructions carefully.

We expect the entire set of tasks to take less than 60 minutes. You are free to leave at any time, but if you do not complete all tasks you will not receive the participation fee or your earnings.

Instructions for Task 1

In the first part, you will be answering a few short questions about yourself. This information is for research use only. The published results of our research will not identify you, or the choice you made in any way. Nor will we give this identifying information to anyone else. In fact, we will only identify you by a numeric ID, and that ID will not appear on the sheet that has your name for our payment records.

Instructions for Task 2

Your role: In this task, there are 50 rounds. In 25 of these rounds, you will be in the role of agent. As an agent, you make decisions on behalf of another subject in this experiment. In the other 25 rounds, you will be making decisions for yourself. Your role will be indicated clearly under Your Information, where it will say: '**Your role is: Agent'** or '**Your role is: Self'**. If you are 'self' you keep all the profits. If you are "agent", you will get none of the profits made in the round. They will all go to the other subject who is your 'client.' Accordingly, profits for all decisions you make as "agent" will be labeled as 'Client's profit', whereas profits you make in decisions you make as "self" will be labeled as 'Your profit'. The person who is your 'client' is somebody in this room. A different person in this room will serve as agent to you, and you will also receive profits from that person's decisions. The person who is your agent and the person who is your client are different people. In summary, your own earnings will consist of the earnings from the 25 rounds as "self" and the earnings that your agent makes over 25 rounds.

The task: In this task, you are a buyer competing against a computerized buyer for the purchase of a virtual asset. You will have 50 rounds in which you submit a bid for this asset. Your bid and the bid submitted by the computer in each round determine whether you win or not in that round.

How to win: You win when your bid exceeds the bid submitted by the computer.

How much will you win? If you win in a round, you will receive your valuation for this asset minus

your bid. Your valuation is shown at the top of the screen under the heading Your Information. This valuation will change each round. If you lose, you will receive 0 tokens. Earnings are cumulative. That is, your token earnings will be added up over the rounds in which your role is 'self'. To this amount, we will add the cumulative earnings over the rounds your agent made decisions in the role of agent. Your token earnings will then be converted to dollars at an exchange rate of 40 tokens to $1.

What bid will the computer buyer submit? The computer's bid is uniformly distributed between 1 and 50. That means that all integer values from 1 to 50 are equally likely to be the computer's bid.

Calculations: When you enter your bid in the 'Enter Bid' box and press Calculate, the computer will automatically compute useful information for you as shown below. You can make as many computations as you wish. The variables displayed following each time you press 'Calculate' are as follows:

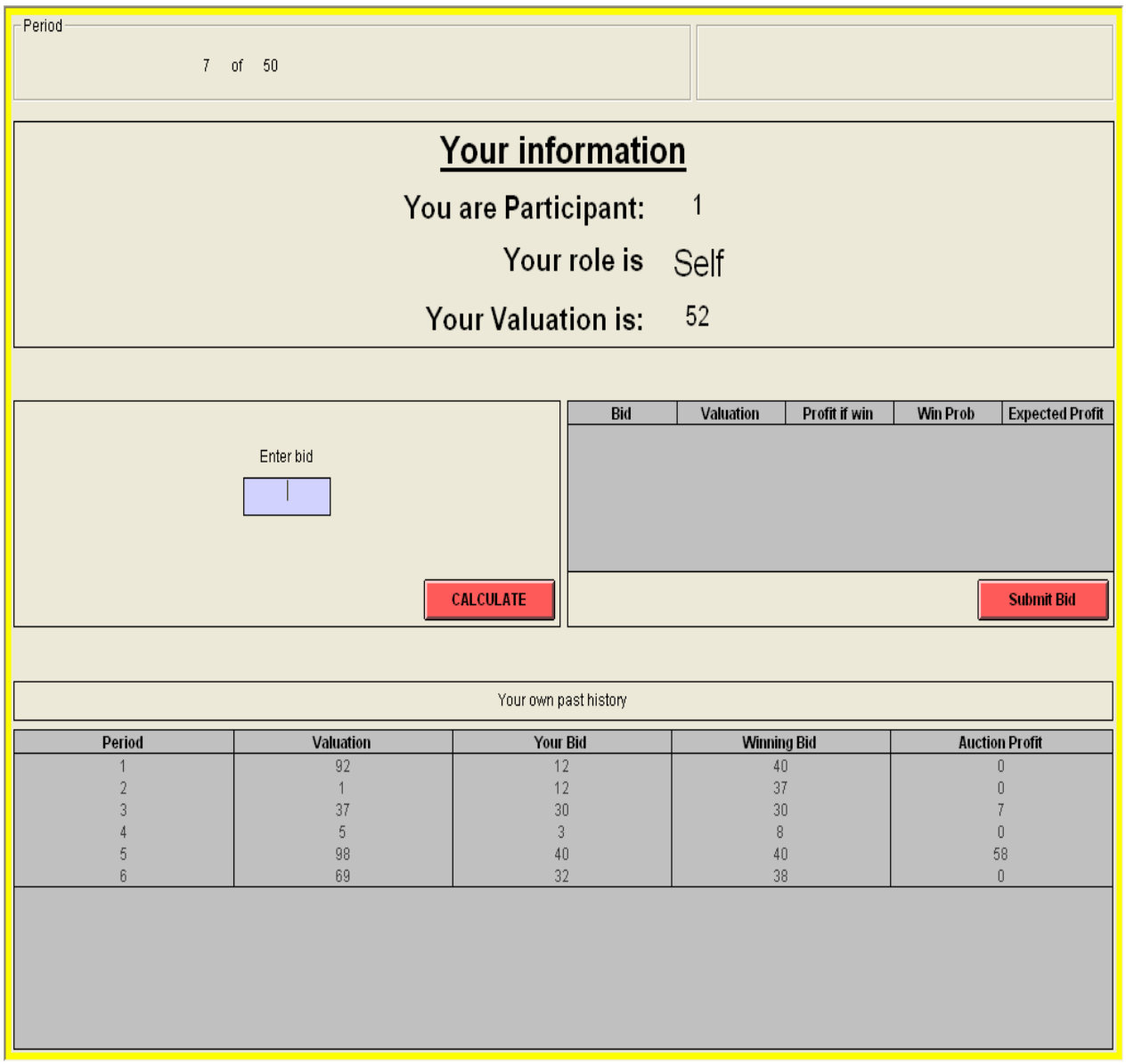
Bid. This is the bid you entered.
Valuation. This is your valuation
Profit if you win. This is the amount you will receive if you win. It is computed as

Profit if you win = Valuation – Bid

Win Prob. This is the probability that you win the auction with the present bid. This is a number between 0 and 1. The higher this number, the more likely you are to win. If this probability is 1, you will win for sure. If this probability is 0, you will lose for sure. If this probability is 0.5, you are equally likely to win or lose.
Expected Profit. This number if computed as

Expected Profit = (Win Prob) x (Profit if you win)

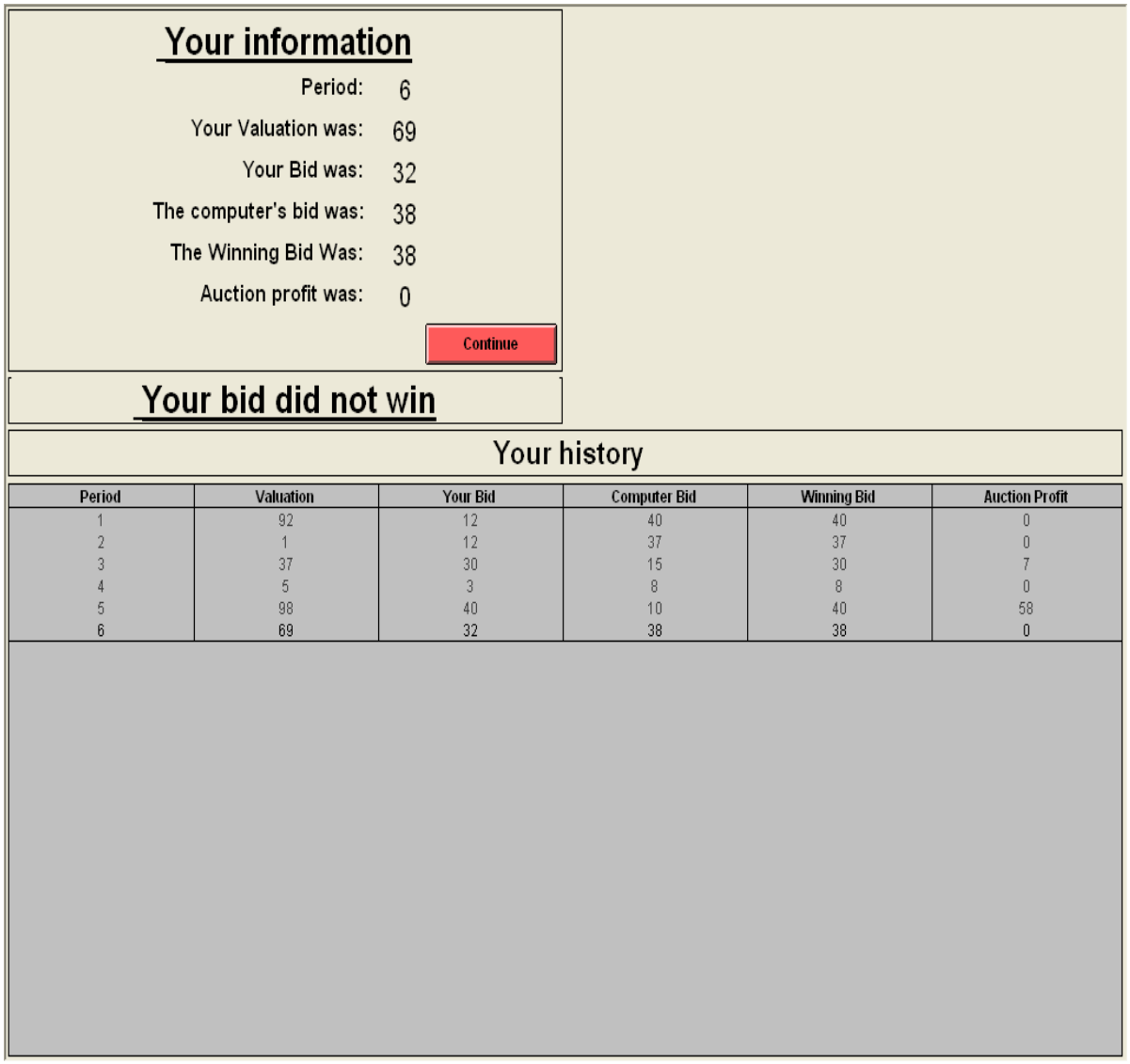
Submitting a Bid: When you are ready to submit a bid, highlight the bid you wish to submit by clicking on its row and press 'Submit Bid.'


Period
7 of 50
Your information
You are Participant: 1
Your role is Self
Your Valuation is: 52
Enter bid
CALCULATE
Bid
Valuation
Profit if win
Win Prob
Expected Profit
Submit Bid
Your own past history
Period
Valuation
Your Bid
Winning Bid
Auction Profit
1 92 12 40 0
2 1 12 37 0
3 37 30 30 7
4 5 3 8 0
5 98 40 40 58
6 69 32 38 0

Feedback after each round: After each round, you will find out what happened in that round. This information, as shown in the screen below, includes:

The period number
Your valuation
Your bid
The computer's bid
The winning bid – the highest of your bid and the computer's bid.
Auction profit - If your bid wins, this is valuation - bid. If you lose, this is zero.

Below that, you see the same information for all previous rounds.



Your information

Period: 6
Your Valuation was: 69
Your Bid was: 32
The computer's bid was: 38
The Winning Bid Was: 38
Auction profit was: 0

Continue

Your bid did not win

Your history

Period	Valuation	Your Bid	Computer Bid	Winning Bid	Auction Profit
1	92	12	40	40	0
2	1	12	37	37	0
3	37	30	15	30	7
4	5	3	8	8	0
5	98	40	10	40	58
6	69	32	38	38	0