RAISING THE STAKES IN THE ULTIMATUM GAME:
EXPERIMENTAL EVIDENCE FROM INDONESIA

Implementing the ultimatum game experimentally in Indonesia makes it possible to raise the stakes to three times the monthly expenditure of the average participant. Contrary to predictions in the literature, the results show no evidence of approaching the sub-game perfect, selfish outcomes. Responders seem to be just as willing to reject a given percentage offer at high stakes as at low stakes, and Proposers make slightly less selfish offers as the stakes increase.

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Abstract

Implementing the ultimatum game experimentally in Indonesia makes it possible to raise the stakes to three times the monthly expenditure of the average participant. Contrary to predictions in the literature, the results show no evidence of approaching the sub-game perfect, selfish outcomes. Responders seem to be just as willing to reject a given percentage offer at high stakes as at low stakes, and Proposers make slightly less selfish offers as the stakes increase.

I. INTRODUCTION

This study investigates behavior in ultimatum games with very high stakes. The ultimatum game, where a Proposer nominates a dollar offer and the Responder merely accepts or rejects, has generated enormous interest recently because the standard game theory predictions are strongly falsified by the experimental evidence. A powerful objection to the empirical rejection of the game theory predictions, which is tested in this paper, is the contention that the existing experimental results are an artifact of the use of small, or sometimes even hypothetical, stakes².

The experiments reported in this paper were conducted in Indonesia, where 1994 gross domestic product per capita (US\$670³) is less than 3% of that found in the United States. By moving the experiments to Indonesia it is possible to increase the implied monetary stakes by as much as four times the stakes used in previous experiments in the U.S., and by a much larger factor relative to the average earnings of participants⁴.

² Harrison (1989) criticizes auction experiments that purport to find sub-optimal behavior when the difference between the expected utility from optimal behavior and behavior just slightly less than optimal is so small as to be insignificant. He points out that the payoff function needs to be steep enough to ensure that there is a sufficiently high opportunity cost of deviations from optimal behavior. Smith and Walker (1993) also look at the importance of the stakes in experiments. They conducted a survey of thirty-one studies that report data on the comparative effects of monetary rewards. They cite several studies that find that increasing the stakes moves the data in the direction of the predictions of rational theory. In conclusion they state that before experiments "can be judged to have falsified the theory, it is necessary to establish that increased payoffs fail to move the observations closer to the predicted boundary maxima [that predicted by rational theory]".

³The World Bank's "World Development Report 1994".

⁴The highest stakes that have been used in an ultimatum game before this study were \$100 in Hoffman, McCabe and Smith (1994). Using a sample of 25 pairs they found the importance of fairness in the \$100 games to be similar to that in \$10 games. Binswanger (1981) and Kachelmeier and Shehata (1991) have also played experimental games, although not the ultimatum game, with very high stakes in countries where the dollar is worth much more in terms of purchasing power and relative to average earnings. They conducted the experiments in India and the People's Republic of China respectively.

The real money stakes used varied from approximately US\$2.50 to US\$100. (US\$100 is approximately three times the average participant's monthly expenditure.) Hypothetical games were also played. This allows for a comparison of results of games played with drastically different stakes. The results show no evidence of movement towards the game theory prediction as the stakes increase. Increasing the stake size from small real stakes to large real stakes results in Proposer demands that are slightly *further* from the predicted sub-game perfect equilibrium outcomes. There is also no evidence to suggest that the willingness of Responders to accept a given percentage offer varies with the stake size. Proposer behavior in the real money games is also further from the game-theory prediction than the hypothetical outcomes, although Responder behavior in the real games is closer to the predictions. There are significantly more rejections of Proposer offers in the hypothetical games. Hypothetical behavior is also characterized by a significantly larger variance than is found in the real money games.

II. GAME DESCRIPTION AND PROCEDURAL DETAILS

The ultimatum game involves two players. The players are told the amount they are to allocate between themselves, A . The "Proposer" acts first and nominates the amount that she wants, X . The "Responder" then can either accept the offer in which case he receives $A-X$ and the Proposer receives X or he can reject the offer in which case both players receive 0 . There is only one offer made and the Responder only gets to respond once.

Standard game theory assumes that participants play with the sole aim of maximizing their payoffs and so it predicts that the Responder should be willing to accept any amount larger than 0 as he is a pure profit maximizer. Knowing this, the Proposer should take

just a little less than the whole pie for herself⁵. However, the standard result from ultimatum games played in the U.S. for moderate amounts of money (typically \$10 to \$15) is that the Proposer will often take a little more than half, for example 60%, of the pie and so leaves a sizeable chunk for the Responder to accept. There are many 50:50 splits and there are frequent rejections of small offers⁶.

The experiments were conducted with students in the Faculty of Sociology and Politics at Gadjah Mada University in Yogyakarta, Central Java. The desired sample sizes was 40 pairs in each trial, however, class sizes varied with the result that some trials fell a little short of this. A pretest of 15 pairs of students was run to guard against problems during the real games.

In order to ensure a controlled experimental environment and to minimize cross-cultural problems the procedural methods of Kachelmeier and Shehata (1992) who ran experiments in the People's Republic of China were followed as closely as possible. Among other things, this involved having the English language instructions translated into Indonesian and then having them translated back into English to check for any errors. All instructions and explanations were written, thus minimizing the amount of verbal communication.

Each student received two pages of instructions. The English language versions

⁵Game-theorists have started developing game-theoretic solutions that try to incorporate fairness and other emotions. Rabin (1994) constructs a game-theoretic model in which each player puts a premium on fairness. The outcome is a set of "mutual-max" and "mutual-min" outcomes, or "fairness equilibria" which involve punishing someone who is unfair and rewarding someone who is fair. However, Rabin also predicts that "if material payoffs are large, then, roughly, an outcome is a fairness equilibrium if and only if it is a Nash equilibrium." This is because the material cost to the individual of being concerned with fairness increases as the stakes increase. Eventually the cost is judged to be too high, fairness is abandoned and the standard game-theoretic predictions will still hold.

⁶Thaler (1988) and Camerer and Thaler (1995) provide detailed reviews of the literature on the ultimatum game.

are shown in the appendix. The first sheet set out the rules of conduct while playing the game. For example, no talking was permitted, the participants were told how to fill in their demands and how to indicate their responses. They were also told whether the game was for real money or hypothetical. The second page explained the structure of the game. The games were played in almost complete silence with the students sitting at least one seat apart from one another. At the start of each game, two examples were given and the students were asked to respond as a group as to how much each player would receive if the Responder accepted the offer and how much if the offer was rejected. The same two examples were given in all sessions.

The instructions stated that the game was anonymous and that they would never play the same person twice. The Proposers sat on one side of the room and the Responders on the other. No player played in more than one session and each session consisted of two rounds. The Indonesian currency is the Rupiah and all players received a flat rate of Rp5000 (\$US=Rp2160) for playing in addition to any takings in the real money games. Three real money sessions were conducted. The first round in each session was always for Rp5000 and the second round was for the same or an increased amount. The advantage of allowing players to play twice is that it allows one to compare individuals' behavior across rounds and so, unlike many similar analyses of experiments, it is possible to control for the large amount of player heterogeneity that is typical of such experiments. The one game in which players played for the same amount, Rp5000, is used as a control and so makes it possible to separate out the effect of experience and the effect of the increase in the stakes. In addition to the real money games, one hypothetical game was played. Table 1 shows the details of the different sessions.

The Proposers received a form as is shown in the appendix. Attached to the top

corner were two slips. The top slip showed the "sign" for the Proposer and the bottom slip showed that for the Responder. The Proposer filled in the amount she wished to claim and removed and kept the top slip. The forms were then collected, shuffled and handed out randomly to the Responders. The Responders were asked to fill in the amount they would receive if they accepted the offer. This was used to check whether the game was understood. They then indicated whether they accepted or rejected the offer. They kept the bottom slip. The forms were then returned to the Proposers so they could see the outcome of the game. Fresh forms and slips were distributed to the Proposers for the second round. When these were redistributed to the Responders the first round slips were checked to ensure that no one played the same person twice. At the end of this round a questionnaire was circulated on which the students were asked to fill in their "signs" for the two rounds (in this way players can be tracked through different rounds of the games). They then filled in details about their average monthly expenditure and answered questions about their cultural background and other demographic variables. (These variables are not used in this paper.) A copy of the questionnaire is included in the appendix. After the questionnaires were collected the students came up to the front desk one at a time with their slips of paper identifying which games they had played and then they were paid.

According to the answers to the questionnaire, the largest stake used, Rp200,000, is about three times the average monthly expenditure of the participants. Even the second highest stake of Rp40,000 is a significant amount of money and relative to monthly income it is of much more value than the previously highest amount used of US\$100 (in the United States) in an ultimatum game.

III. RESULTS

A. PROPOSER BEHAVIOR

(i) Real Money Games

The results of the games are shown in Graphs 1, 2, 3 and 4 below. The graphs show the distribution of Proposer demands and indicate whether the demands were accepted or rejected. Acceptances are shown in black and rejections by the striped area. In a small number of cases the Responder filled in an incorrect answer to the question "How much will you receive if you accept?". In these cases it was assumed that the Responder did not understand the game fully and so the response is marked as a problem (cross-hatched area) rather than as an acceptance or rejection.

The first thing to notice is that the low stakes (Rp5000) Indonesian games are not noticeably different from the results commonly observed in the United States. The mode of the pooled Round One Indonesian demands is 60%, the mean is 57% and there are frequent rejections of small offers. Table 2 compares the Indonesian low stakes Round One real money results with the US\$10 round one results found in Roth, Prasnikar, Okuno-Fujiwara and Zamir (1991) and Hoffman, McCabe and Smith(1994). The Rp5000 amount was chosen because it has approximately the same purchasing power as \$10 to \$15 in the U.S. (although relative to average earnings it is worth much more)⁷. Mann-Whitney non-parametric tests could not reject the hypothesis that the distribution of Indonesian Proposer demands in the Round One Rp5000

⁷In terms of purchasing power, the World Bank's Development Report 1994" estimates that US\$1 in Indonesia buys as much as \$4.40 in the U.S.

games is insignificantly different from the U.S. \$10 results (p-values of 0.2511 and 0.6249)⁸. T-tests of the acceptance rates also fail to find significant differences between the Indonesian and U.S. acceptance rates (p-values of 0.6980 and 0.1437).⁹

Returning to the Indonesian results, Graphs 2 and 3 show the results for Games Two and Three and show a swing away from the sub-game perfect prediction in the higher stakes round. However, when comparing the results of Rounds One and Two within games we are really looking at the effect of two factors: the increase in the stakes *and* the learning or experience effect. For that reason, in Game One the students played for the same amount Rp5000 in both rounds. The results of Game One can then be used as a control to isolate the effect of learning.

Inspecting Graph 1 for the results of Rounds One and Two of Game One, one can see that as a result of learning or experience the second round demands tend to be further from the game-theoretic prediction than the first round demands, even without an increase in stakes. This makes it difficult to know if the fairer demands in Round Two of Games Two and Three are due to the higher stakes or to the experience effects.

Table 3 reports summary statistics from the graphs. A straight comparison across the games in each round is not very informative. The number of percentage demands greater than

⁸The Mann-Whitney test tests whether the distributions come from the same population distribution. The test is conducted by pooling the data from the two games being compared and ranking the demands by magnitude in ascending order. The ranks are then summed for each round separately and the two sums are tested to see if they are significantly different from one another. If the distributions in the two rounds are drawn from the same population distribution, then the two sums should not differ significantly from one another.

⁹Those interested in such cross-cultural comparisons should see Roth, Prasnikar, Okuno-Fujiwara and Zamir (1991) which reports the results of playing the ultimatum game and another experiment that looks at market behavior in four different countries. They found some differences in bargaining behavior but no differences in market behavior.

80 per cent is the only summary statistic of Proposer behavior that is significantly different across the real money games in Round Two. There are few significant differences in Round One when the treatments across the games are identical as expected. However, the existence of differences across the groups in the face of identical treatments in Round One suggests that there may be considerable heterogeneity among subjects¹⁰. In this case comparing the behavior of the same individuals under different treatments may provide a more powerful test of the treatment effects. Table 3 indicates which figures are statistically significantly different across rounds within games and gives the p-value in these cases. There is a statistically significant decrease in high demands from Round One to Round Two in the games in which the stakes increased. In Game One where the stakes are constant across the two rounds there is no such decrease in the number of demands at the high end of the range. In Game Two, where the second round is played for Rp40,000, the number of demands greater than 80% fell statistically significantly from 5 (14.3%) to zero (p-value=0.0204). The pattern is similar and more dramatic in Game Three, the highest stakes game in which the number of demands for amounts greater than 60% decreased significantly from 25 (67.6%) to 15 (40.5%), (p-value=0.0104), and demands greater than 80% fell significantly from 9 (24.3%) to 3(8.1%), (p-value=0.022).

Table 4 shows the results of differences-in-differences tests across the three games. These test whether changes in Proposer demands from Round One to Round Two differ across the different games. The average difference and the standard deviation of changes in Proposer percentage demands are tested. Table 4 shows that the mean differences in Proposer

¹⁰For example, in Round One when the treatments are identical Game Two has a significantly smaller standard deviation than Games One and Three, p-value of 0.0032 and 0.0496 respectively.

percentage demands are negative in both Games Two and Three indicating a mean decrease in demands from Round One to Round Two. The Game One mean difference is positive. The difference in mean differences in Games One and Three is statistically significant ($p\text{-value}=0.0533$) whereas the difference between Games One and Two is not ($p\text{-value}=0.1419$). The F-test of equality across all three games cannot be rejected. The standard deviation of differences between Round One and Round Two demands is found to be significantly lower in both Games Two and Three relative to Game One. This indicates that there is a much greater variation in changes in percentage demands between rounds when the stakes remain constant and low than when they increase.

Due to the relatively small sample sizes the above tests of significance rely to some degree on the assumption of normality of the underlying distributions. For this reason a non-parametric Mann-Whitney test for differences between rounds in each game was also conducted. Table 5 reports the results of these tests. In Games One and Two the hypothesis that the distributions of demands in Round Two came from the same population distribution as the Round One distribution could not be rejected. In Game Three however, the hypothesis that the results from the two rounds come from the same distribution is rejected and it is found instead that the higher stakes round comes from a distribution significantly *further* from the game theory predictions.

To summarize, the examination of Proposer behavior in the real money games does not show the predicted movement towards the sub-game perfect Nash equilibrium outcome as the stakes increase. In fact, the changes in behavior from Round One to Round Two when the

stakes increase are either statistically insignificantly different from that observed when the stakes are held constant or they are statistically significant and indicate movement *away* from the predicted outcomes when the stakes are higher. The changes in percentage demands between Rounds One and Two are also significantly more uniform when the stakes increase than when the stakes are constant, perhaps signifying a somewhat shared reaction of Proposers to the increase in stakes.

(ii) Real Money versus Hypothetical Money

Graphs 3 and 4 can be used to examine the effect of using real money as opposed to playing hypothetically. The graphs show no obvious differences in the distribution of demands when the stakes are low. However, in Round Two when the stakes are increased, the hypothetical Proposer behavior appears to be somewhat greedier, or closer to the game-theory predictions, than when real money is used. The most striking difference between the hypothetical and real money games is the Responder behavior. Many more offers are rejected in the hypothetical game and this behavior seems to be even more extreme when the hypothetical stakes are high. Fewer demands of over 50% are accepted when the hypothetical stakes are Rp200,000 than when they are Rp5000. This will be examined in more detail in the section on Responder behavior.

Looking at Table 3, the change in the distribution of Proposer demands from Round One to Round Two is very similar in the hypothetical and the real game with the exception of the number of very high demands. In the hypothetical case these do not fall away as sharply when the stakes rise as in the real money games. Unlike the real money game, the number of demands greater than 80% is not significantly different than in the first round. The

difference-in-differences tests in Table 4 show that although there is no significant difference between the mean difference between Round One and Round Two demands in the real and hypothetical games, the standard deviation of the differences is much greater in the hypothetical game than in the real money game. The Mann-Whitney test in Table 5 does not find the Round Two offers to be significantly fairer than the Round One offers when the stakes are hypothetical, whereas it does when the stakes are real.

Thus, the above analysis of Proposer behavior produces the following results:

- 1) With respect to the real money results, the evidence strongly rejects the claim that outcomes move closer to the game-theoretic outcome as the stakes increase. The results in fact suggest that if Proposer behavior changes at all, it tends to move away from the game-theoretic solution as the stakes increase.
- 2) With respect to the hypothetical results, it seems that the Proposer behavior is a little closer to the game-theoretic outcome when the stakes are hypothetical. There is less evidence of changing Proposer behavior as the hypothetical stakes increase than when the real stakes increase. This means that not only are there differences between the real and hypothetical games, but using hypothetical games to assess the effect of increasing stakes gives different results than those obtained from the use of real stakes.
- 3) The variance of changes in Proposer percentage demands between Rounds One and Two is significantly smaller when the stakes are large compared to when the stakes are small and also significantly smaller when the stakes are real compared to when the stakes are hypothetical.

B. RESPONDER BEHAVIOR

It has been suggested in the literature that as the stakes increase the Responder should be willing to accept a smaller percentage offer because those offers are now worth greater absolute amounts. This paper shows no evidence to support this hypothesis. Responder behavior is found to be invariant to the change in real stakes.

Table 3 shows the acceptance rates in each round of each game¹¹. The acceptance rate is defined to be the percentage of offers that are accepted by the Responders. The acceptance rates are a measure of the efficiency of the outcomes, because every rejection is an inefficient outcome in the sense that both players would have been at least as well off if the offer had been accepted. Even though the inefficiencies are much smaller in the higher stakes rounds, there were still some surprising rejections in the high stakes games that show a significant divergence from game-theoretic behavior. For example, one individual in Game Three gave up Rp41,000 by rejecting an offer. His response to the expenditure question on the questionnaire identifies him as someone in the lowest expenditure category which makes the Rp41,000 approximately equivalent to his average monthly expenditure. Note also that the money lost by the players as a result of rejections is higher in the high stakes games than in the low stakes games.

The differences between the real money and hypothetical games are quite marked. In the hypothetical game the Round One and Round Two acceptance rates are both much lower than the real money counterparts.

Table 6 presents linear regression results that test the significance of these

¹¹ Only participants who were perceived to fully understand the game were included in the sample in this section.

differences in rejection behavior¹². The dependent variable equals 1 if the offer was accepted, 0 if it was rejected. In Column 1 it is regressed on the dummy variables, A1, A2, A3, HYP1 and HYP2 which are defined as follows:

$$A_j = \begin{cases} 1 & \text{in the second round of Game } j \\ 0 & \text{otherwise} \end{cases}$$

$$HYP_t = \begin{cases} 1 & \text{in Round } t \text{ if the game is hypothetical} \\ 0 & \text{otherwise} \end{cases}$$

The coefficients on the variables A1, A2 and A3 represent the average probability of acceptance in Round Two of each of Games One, Two and Three relative to a first round real money game. For example, an offer was 11.67% more likely to be rejected in Round Two of Game One than in a Round One real money game. The results of an F-test of these coefficients finds that the differences between the acceptance rates across the three real money games are significant at the 10 per cent level with Responders being more likely to accept in the higher stakes games. The coefficients on HYP1 and HYP2 capture the probability of acceptance in Rounds One and Two respectively of the hypothetical game relative to the first round real money game. They show that the acceptance rates are significantly lower in the hypothetical game than in the real money games in both Round One and Round Two.

The above finding of higher acceptance rates when the stakes are higher is not however the same as finding that any percentage offer is more likely to be accepted when the absolute stakes are higher. The above analysis does not control for the offers being received. As

¹²Table 6 reports results obtained from a linear probability model. This model has the advantage of producing coefficients that can be interpreted in terms of probabilities but it has the disadvantage of being heteroscedastic and being able to predict outside the 0-1 range and heteroscedasticity. A probit model was also run and its results were not significantly different from those of the linear probability model.

we have seen above, there is some evidence that offers become more generous as the stakes increase which may explain why we see more acceptances as the stakes increase. In other words, it may be that the more generous offers (and not a greater willingness of Responders to accept a given percentage offer) explain the higher acceptance rates in the higher stakes games.

Column 2 shows the results of a regression that controls for the offers received. The coefficient on the percentage demand is negative and highly significant and shows that as expected, the lower the percentage offer, the higher is the chance of rejection. The coefficients on A1, A2 and A3 now indicate the probability of acceptance of a *given percentage offer* in each of the games relative to a first round real money game. The F-test of equality of the coefficients on A1, A2 and A3 shows that once one controls for the offer received the differences between the acceptance rates in the real money games are no longer statistically significant. This indicates that the higher acceptance rates in the high stakes games are to a large extent the result of the more generous offers being made in those games and not of a greater willingness of the Responders to accept per se. Seventy-seven percent of the difference between Round Two acceptance rates in Games One and Two can be explained by the difference in mean Proposer demands between the two games. Seventy per cent of the difference between Round Two acceptance rates in Games One and Three can be explained by the difference in mean demands. The difference in Round Two acceptance rates between Games Two and Three is overpredicted by fifty-seven per cent¹³. The differences between the acceptance rates as predicted by the mean demands and the actual acceptance rates are insignificantly different from zero (p-values of

¹³These figures were obtained by regressing all Round 1 real money game accept/reject decisions on the percentage offer received. The coefficient on percentage offer is then used to predict the difference in acceptance rates due to the difference in the mean percentage demands across games in Round Two.

0.2289, 0.2715 and 0.9626 for comparisons between Games One and Two, One and Three and Two and Three respectively).

The rate of acceptance is still significantly lower in the hypothetical game and there is not a significant difference between the hypothetical effect in Round One and Round Two.

So, once one controls for the offer received there is no significant difference between rejection behavior as the stakes increase once the stakes are real but the acceptance rates are still significantly lower when the game is hypothetical. One possible problem with the regression results in Columns 1 and 2 of Table 6 is that they do not control for individual effects. What we really want to test is whether any individual is willing to accept a percentage offer in a higher stakes game that he would have rejected in a lower stakes game. We are only interested in what happens to rejection rates of the group as a whole under the different treatments in as far as what we can then deduce about individual behavior. Column 3 controls for individual effects through the use of random effects¹⁴. Adding random effects does not significantly alter the coefficients or their standard errors and does not alter the conclusions of any of the tests of the coefficients. There is still no significant difference between the acceptance rates under the different real money treatments.

In summary, Responder behavior can be characterized as follows:

- 1) There is a dramatic difference in the Responder behavior when the stakes are hypothetical

¹⁴ Ideally we could also control for individual effects by using fixed effects. However, there are too few responders who change their response from Round One to Round Two to use fixed effects as a method for analyzing rejection behavior. See Hsiao (1986) for an explanation of the use of random effects.

as opposed to when they are real. There is a significantly higher rate of rejection when the stakes are hypothetical. There is no significant difference in the rejection rate across the two hypothetical games.

2) There is no evidence that rejection rates decrease as the stakes increase from being low and real to high and real. There are no significant differences in rejection rates across the real money games once one controls for the offers being received. This is a surprising result and may in part be due to the lack of data points from which we can deduce such behavior. There are not many Responders who receive a smaller percentage offer when the stakes are high because Proposer offers are if anything becoming more generous as the stakes increase.

V. CONCLUSIONS

The experiments in this paper provide no evidence that the rejection of game-theory predictions in the experimental setting of the ultimatum game is an artifact of small stakes. Moreover, there is no evidence of any movement towards the predicted game-theoretic outcomes of the ultimatum game as the real money stakes increase. There is no statistically significant increase in the Responders' willingness to accept a given percentage offer as the stakes increase and the evidence on Proposer behavior points tentatively in the direction of movement *away* from the game-theoretic outcome as the stakes increase.

Several hypotheses have been offered in the literature to explain the difference between the game-theory predictions and the observed outcomes. Rabin (1994) for example develops a model that produces "fairness equilibria" which involves rewarding someone who is

fair and punishing someone who is unfair¹⁵. However, even Rabin's model predicts that as stakes increase the selfish desire for payoff-maximization will overcome the players' tastes for fairness and the outcomes will revert to the Nash equilibria of the game. Further work is needed to satisfactorily explain the persisting taste for fairness that is in evidence here¹⁶.

In addition to looking at the effect of increasing the stakes from small amounts of real money to larger amounts of real money, the difference between playing with real stakes and playing for hypothetical stakes was examined. When the stakes are hypothetical, Proposer behavior was significantly closer to the game theory predictions and Responders rejected proposals significantly more often. Putting the analysis of hypothetical behavior together with the analysis using real stakes, the data in this paper suggest that in experimental work it is necessary to use real stakes in order to elicit serious behavior from the participants, but increasing the stakes beyond small amounts does not alter behavior by much.

¹⁵ See Note 5.

¹⁶ Responder behavior is more revealing of tastes for fairness than Proposer behavior. Proposer behavior could be motivated by both tastes for fairness and risk-aversion. Proposers may prefer to reduce the risk of rejection when the stakes are higher, a condition known as *Increasing Partial Risk Aversion*, see Menezes and Hanson(1970). Note however that the uncertainty the Proposer faces is itself generated by the Responders unknown taste for fairness. The dictator game, in which the Responder must accept the Proposer's offer, is an easy way to examine the Proposers' tastes for fairness directly. Playing the dictator game with very high stakes would be an interesting area for further research.

REFERENCES

- Binswanger, H. (1981), "Attitudes Toward Risk: Theoretical Implications of an Experiment in Rural India", *The Economic Journal*, Dec, 91, 867-890.
- Camerer, C. and R. Thaler (1995), "Anomalies: More Ultimatum and Dictator Games", forthcoming in the *Journal of Economic Perspectives*.
- Harrison, G. (1989), "Theory and Misbehavior in First Price Auctions" *American Economic Review*, September, 749-62.
- Hoffman, E., McCabe, K. and V. Smith (1994), "On Expectations and the Monetary Stakes in Ultimatum Games", forthcoming, *International Journal of Game Theory*.
- Hsiao, C. (1986), "Analysis of Panel Data", *Econometric Society Monographs* No. 11, Cambridge University Press, U.K.
- Kachelmeier, S.J. and M. Shehata (1992), "Examining Risk Preferences Under High Monetary Incentives: Experimental Evidence from the People's Republic of China", *American Economic Review*, Dec, 1120-1141.
- Menezes, C.F. and D.L. Hanson (1970), "On the Theory of Risk-Aversion", *International Economic Review*, 11(3), Oct, 481-487.
- Rabin, M. (1994), "Incorporating Fairness into Game Theory and Economics", *American Economic Review*, Vol. 83, No. 5 pp 1281-1302.
- Roth, A., Prasnikar, V., Okuno-Fujiwara, M. and S. Zamir (1991), "Bargaining and Market Behavior in Jerusalem, Ljubljana, Pittsburg and Tokyo: An Experimental Study", *American Economic Review*, December, 1068-1095.
- Smith, V. and J. Walker (1993), "Monetary Rewards and Decision Costs", *Economic Inquiry*, April, 245-61.
- Thaler, R. (1988), "Anomalies: The Ultimatum Game", *Journal of Economic Perspectives*, 2(4), Fall, 195-206.
- World Bank (1994), "World Development Report 1994", Oxford University Press, New York.

TABLE 1. SUMMARY OF GAMES PLAYED

GAME 1	GAME 2	GAME 3	GAME 4
Real Money	Real Money	Real Money	Hypothetical
I. Rp5000 II. Rp5000	I. Rp5000 II. Rp40,000	I. Rp5000 II. Rp200,000	I. Rp5000 II. Rp 200,000
N=29 pairs	N=35 pairs	N=37 pairs	N=40 pairs

TABLE 2 : COMPARISONS OF RESULTS FROM INDONESIA AND THE UNITED STATES

	Indonesian Results (Pooled Round 1, real money Rp5000 games)	Roth, Prasnikar, Okuno-Fujiwara, Zamir (1991)	Hoffman, McCabe, Smith (1994)
Amount	Rp5000 (=\$2.32)	US\$10	US\$10
Mean	0.5734	0.55	0.5625
Median	0.60	0.525	0.55
Mode	0.60	0.50	0.5
Std. Deviation	0.1866	0.0975	0.0719
No. of Demands < 50%	15 (14.9%)	2 (7.4%)	0 (0%)
No. of demands = 50%	27 (26.7%)	14 (51.9%)	12 (50%)
No. of demands > 50%	59 (58.4%)	11 (40.7%)	12 (50%)
No. of Demands >=60%	54 (53.5%)	10 (37.0%)	4 (16.7%)
No. of Demands >=80%	19 (18.8%)	1 (3.70%)	0 (0%)
Acceptance Rate (p-value of test against Indonesian results)	81.3%	77.8% (p-value=0.6980)	91.6% (p-value=0.1436)
Mann-Whitney Test Against Indonesian Results		p-value = 0.2511	p-value = 0.6249
N	101	27	24

TABLE 3 : SUMMARY STATISTICS OF PROPOSER AND RESPONDER BEHAVIOR

	GAME 1	GAME 2	GAME 3	GAME 4	P-values
ROUND 1					for
Amount	Rp5000	Rp5000	Rp5000	Rp5000 Hypothetical	Equality in Games 1,2&3.
Mean	0.5328	0.5629	0.6151	0.6373	0.1896
Median	0.52	0.5	0.6	0.65	
Mode	0.60	0.50	0.60	0.65	
Std. Devn	0.2291	0.1395	0.1853	0.1954	
No. of demands < 50%	8 (27.6%)	4 (11.4%)	3 (8.11%)	4 (10.0%)	0.0686
No. of demands =50%	5 (17.2%)	15 (42.9%)	7 (18.9%)	7 (17.5%)	0.0276
No. of demands >50%	16 (55.2%)	16 (45.7%)	27 (73.0%)	29 (72.5%)	0.0587
No. of demands ≥60%	13 (33.3%)	16 (45.7%)	25 (67.6%)	28 (70.0%)	0.0982
No. of demands ≥80%	5 (17.2%)	5 (14.3%)	9 (24.3%)	11 (27.5%)	0.5426
RESPONDER ACCEPTANCE RATES	76.9%	85.3%	79.3%	47.4%	0.6989
AVERAGE MONEY FOREGONE PER PAIR	Rp1,111	Rp735	Rp1,000	Rp2,435	
ROUND 2					
Amount	Rp5000	Rp40,000	Rp200,000	Rp200,000 (Hypothetical)	
Mean	0.6010	0.5525	0.5808	0.6039	0.3631
Median	0.55	0.5	0.55	0.5875	
Mode	0.50	0.50	0.50	0.50	
Std. Devn	0.1846	0.1024	0.1204	0.2135	
No. of demands < 50%	3 (10.3%)** (p=0.0939)	1 (2.86%)	1 (2.70%)	4 (10.0%)	0.2904
No. of demands of 50%	10 (34.5%)	20 (57.1%)	15 (40.5%)** (p=0.0419)	15 (37.5%)** (p=0.04518)	0.1625
No. of demands >50%	16 (55.2%)	14 (40.0%)	21 (56.8%)	21 (52.5%)** (p=0.0646)	0.3114
No. of demands ≥60%	14 (48.3%)	11 (31.4%)	15 (40.5%)** (p=0.0104)	20 (50%)** (p=0.0679)	0.3916
No. of demands ≥80%	5 (17.2%)	0 (0%)** (p=0.0203)	2 (5.4%)** (p=0.0222)	7 (17.5%)	0.0226
RESPONDER ACCEPTANCE RATES	69.2%	91.2%	89.7%	55.3%	0.0427
AVERAGE MONEY FOREGONE PER PAIR	Rp1,481	Rp3,428	Rp23,529	Rp78,947	
N	29	35	37	40	

** indicates that the figure is significantly different from the corresponding figure in Round One of the same game at the 10% level.

TABLE 4 : DIFFERENCE IN DIFFERENCES TESTS
Difference Across Games Of Differences Between First And Second Round Proposer Demands
Table Entry is the p-value for the null hypothesis of no difference across games.

	GAME 2 versus game indicated in row	GAME 3 versus game indicated in row
GAME 1 : Mean = 0.0683	0.1419	0.0533 ***
Std. Deviation = 0.3150	0.0000 ***	0.0001 ***
GAME 2 : Mean = -0.0104		0.6318
Std. Deviation = 0.1424		0.2547
GAME 3 : Mean = -0.0343		
Std. Deviation = 0.1595		
GAME 4 : Mean = -0.0333		0.9814
Std. Deviation = 0.2353		0.0102 ***
Test of Equality of Mean Differences in Games 1, 2 and 3: 0.1372		

*** indicates a significant difference across the games at the 10% level.

TABLE 5 : MANN-WHITNEY NON-PARAMETRIC TESTS OF DIFFERENCES IN THE DISTRIBUTION OF DEMANDS
ACROSS ROUNDS WITHIN GAMES

	GAME 1	GAME 2	GAME 3	GAME 4
Test Statistic (z)	-0.86	0.16	1.72 ***	0.90

*** indicates significance at the 10% level

TABLE 6 : LINEAR REGRESSIONS OF RESPONDER BEHAVIOR

Dependent Variable = 1 if accepted, 0 if rejected. t-statistics are shown in parentheses

	1	2	3 RANDOM EFFECTS
A1	-0.1167 (-1.249)	-0.0730 (-0.872)	-0.0635 (-0.779)
A2	0.1028 (1.216)	0.0888 (1.176)	0.0855 (1.168)
A3	0.0875 (0.977)	0.1121 (1.400)	0.1077 (1.384)
HYP1	-0.3353 (-4.127)	-0.2618 (-3.579)	-0.2615 (-3.576)
HYP2	-0.2563 (-3.156)	-0.2279 (-3.135)	-0.2277 (-3.134)
DEMAND SHARE		-1.133 (-7.991)	-1.137 (-8.088)
σ^2			0.0143
constant	0.8089 (18.205)	1.4504 (16.197)	1.4529 (16.332)
Test : A1=A2=A3	Pr>F = 0.0952	Pr>F = 0.1405	Pr>chi ² (2)=0.1822
Test : HYP1=HYP2	Pr>F = 0.4125	Pr>F = 0.6932	Pr>chi ² (1)=0.6784
Test : A3=HYP2	Pr>F = 0.0010	Pr>F = 0.0003	Pr>chi ² (1)=0.0003
Adjusted R-squared	0.1071	0.2876	0.3045
N	254	254	254

A_j = 1 in the second round of Game j, 0 otherwise.HYP_t = 1 in Round t if the game is hypothetical, 0 otherwise.

GRAPH 1

GRAPH 2

GRAPH 3

APPENDIX

RULES WHILE PLAYING THE GAME

1. The game you are about to play is being conducted as part of a project at Princeton University in the U.S. Thank you very much for participating.
2. Please do not talk with the other participants until the end of the session.
3. For your participation you will all be paid a flat rate of 5000Rp. However, in addition to this you have the opportunity to earn more money through playing the game. You are playing for **real money** which you will be paid to you in cash at the end of the session. The game is anonymous in that you will not find out who you are playing and noone playing the game will be told how much you earn. You will never play the same person twice.
4. Please read the sheet with the title "THE GAME".
5. A ticket on the desk tells you if you are player 1 of player 2. Please read the appropriate section below.

a) PLAYERS 1

Those of you who are Player 1 have a sheet in front of you with the title "Experiment Form". This is what you will fill out to indicate your choices in the game. Please detach the top ticket which tells you your "sign" for the game and which you will need to be able to collect your money at the end of the game. The form also tells you how much money you have to divide up and gives you a space to fill in your demand. You are also told the amount your demand must be divisible by so that we don't end up having to deal with very small amounts of rupiahs.

Are there any questions about the structure of the game or how to fill in the form?

b)PLAYERS 2

Those of you who are Player 2 will soon be given a form on which Player 1 has filled in his/her demand. You will calculate the amount you will receive if you accept the offer and then you will either tick that you accept the offer or that you refuse the offer. Please also take your identification ticket that is attached at the top of the form because you will need this to collect your money at the end of the game.

Are there any questions about the structure of the game or how to fill in the form?

THE GAME

This experiment is part of a project being carried out at Princeton University in the United States. You will all be paid Rp 5000 for participating but you have the opportunity to earn more money through playing the game described below. You are playing the game for **real money** which will be paid to you at the end of the session according to the results of the game. Thank you for your assistance.

The Game

You will be faced with a simple bargaining problem with only 2 bargainers. You will be either player 1 or player 2. In each bargaining game the players have to distribute a given amount, say Rp XX between the two of them. The rules of the bargaining game are as follows.

First, player 1 can determine any amount Rp A between Rp 0 and Rp XX which he/she demands for his/herself. The difference, $Rp(XX - A)$ is what player 1 offers to player 2.

Second, player 2 will be informed about player 1's decision. Knowing player 1's proposal player 2 can either accept or reject the offer.

Payoffs

If player 2 accepts player 1's offer, player 1 gets Rp A in *real money* and player 2 gets what is left over in *real money*, which is $Rp XX - Rp A$.

If player 2 refuses player 1's offer, both players get zero.

Example

If the players are playing for Rp 1000, and if player 1 demands Rp 900 and player 2 accepts the offer, then player 1 receives Rp 900 and player 2 receives Rp 100. If player 2 refuses the offer, then both players get zero.

PLEASE NOTE:

Player 1 can only make just one offer and this offer may not be withdrawn, and Player 2 can give only one response which cannot be changed. In other words, bargaining is not permitted.

You have been randomly selected to be either player 1 or player 2. You will play the game a number of times but you will never play the same person twice *and* you will never be told the identity of the person you are playing. You will be playing for **real money** and you will keep whatever money you get as a result of the game. At the end of the experiment you will be paid this amount.

EXPERIMENT FORM

The amount to be distributed is Rp5000.

So, player 1 can demand anything up to Rp5000.

Sign of Player 1: A1

Please make your demand an amount that is divisible by Rp100, if not it will be rounded to the closest Rp100 amount.

Decision of Player 1: I demand Rp_____

Sign of Player 2: A2

If I accepted the offer I would receive Rp_____

I accept Player 1's offer: _____

I refuse Player 2's offer: _____

(Tick the appropriate option)

QUESTIONNAIRE

This questionnaire is anonymous. The following questions are optional but the information would be useful to me when analysing the results.

Please write down your ticket numbers for the 2 games played.

1) _____ 2) _____

Gender: (circle appropriate category) Female Male

Where were you born?

In what kind of cultural background did you grow up?

Where did you grow up?

Are you from the an urban or rural area?

What is your religion?

What faculty in the university are you from?

Your approximate monthly expenditure:
(circle appropriate category)

- 1) Less than Rp 50,000
- 2) Rp 50,000 to Rp 100,000
- 3) Rp 100,000 to Rp 150,000
- 4) Rp 150,000 to Rp 200,000
- 5) More than Rp 200,000

Thank you very much for your cooperation.