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ULTIMATUM AND DICTATORSHIP GAMES***

**BY**

***Andrew Schotter,  
Avi Weiss,  
and Inigo Zapater***

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**NEW YORK UNIVERSITY  
FACULTY OF ARTS AND SCIENCE  
DEPARTMENT OF ECONOMICS  
WASHINGTON SQUARE  
NEW YORK, N.Y. 10003**

**FAIRNESS AND SURVIVAL IN ULTIMATUM AND DICTATORSHIP GAMES\***

Andrew Schotter  
New York University

Avi Weiss  
Bar-Ilan University

Inigo Zapater  
Brown University

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## ABSTRACT

In recent years there has been a considerable amount of attention devoted by experimental economists to the study of dictatorship and ultimatum games. This interest is stimulated by two main concerns. First there is the game theoretical question of whether laboratory subjects will behave in a manner consistent with the backward induction logic called for by rational agents in such strategic situations. Second, to the extent that the answer to the first question is negative, investigators have asked whether notions of equity or fairness have intervened and guided the behavior of subjects in a manner that is contradictory to the prescriptions of game theory.

Fairness, however, is not a concept that is devoid of context. What may be considered unfair when two people meet face to face or in a bilateral manner may be considered fair in a market context where economic survival is at stake. For example, it may be considered unfair in isolation to charge a high price for prescription drugs to people in need but one's opinion of such an act might change if the economic survival of the company might be threatened if they failed to do so. Putting the survival issue aside, the act seems brutal, including it allows one to make a justification.

The morality of economic agents embedded in a market context may therefore be quite different from their morality in isolation. While we are not claiming that people change their nature when they function in markets it may be that the competition inherent in markets and the need to survive offers justifications for actions that, in isolation, would be unjustifiable. In the experiments that follow we test this hypothesis. While we give considerable support to it, there are still a number of unresolved issues.

## **Section 1: Introduction**

In recent years there has been a considerable amount of attention devoted by experimental economists to the study of dictatorship and ultimatum games (see Thaler (1988) for a review of the literature up to 1988). This interest is stimulated by two main concerns. First there is the game theoretical question of whether laboratory subjects will behave in a manner consistent with the backward induction logic called for by rational agents in such strategic situations. Second, to the extent that the answer to the first question is negative, investigators have asked whether notions of equity or fairness have intervened and guided the behavior of subjects in a manner that is contradictory to the prescriptions of game theory. In short, while the game theoretical solution may be rational, it may not be considered fair, since in the context of these experiments the backward induction solution often had one agent receiving all of the gains from trade during the experiment leaving his or her partner with nothing.

The poor performance of game theory in the early experiments of Guth et al. (1982) on this topic has led Binmore and Shaked (1985) to ask whether subjects are playing like "gamesmen" or "fairsmen" when performing the task asked of them. In other words, were their actions guided primarily by the precepts of game theory or by some inner notion of morality which often prescribed strikingly different forms of behavior. But fairness is not a concept that is devoid of context. What may be considered unfair when two people meet face to face or in a bilateral manner may be considered fair in a market context where economic survival is at stake. For example, it may be considered unfair in isolation to charge a high price for prescription drugs to people in need but one's opinion of such an act might change if the economic survival of the company might be threatened if they failed to do so. Putting the survival issue aside, the act seems brutal, including it allows one to make a justification.

The morality of economic agents embedded in a market context may therefore be quite different from their morality in isolation. While we are not claiming that people change their nature when they function in markets it may be that the competition inherent in markets and the need to survive offers justifications for actions that, in isolation, would be unjustifiable. In the experiments that follow we test this hypothesis. While we give considerable support to it, there are still a number of unresolved issues.

In the remainder of this paper we will proceed as follows: In Section 2 we will review the literature on dictatorship and ultimatum games. In this review it will become clear that all of the experiments performed so far have been non-market or bilateral experiments in which two people in isolation play either a dictatorship or an ultimatum game with no survival aspects attached. In Section 3 we review the experiments we have performed and present our experimental design. In Section 4 we present our results and finally in Section 5 we offer some conclusions and speculations about the course of future research on this topic.

## **Section 2: A Review of the Relevant Literature**

A dictatorship game is nothing more than a one-person income distribution problem in which one agent has the power and ability to unilaterally determine the split of a fixed pie between two people. Hence a dictatorship game in which two people must split \$10.00 would involve one person, designated as the chooser, announcing the split for both people. The other agent, called the receiver, is totally passive and must accept whatever he or she is given. An ultimatum game is a game in which the chooser has the ability to eliminate all but two actions available to the receiver leaving him or her with a bilateral choice. For example, in an ultimatum game where the object is to split \$10.00, the chooser would first make an offer to the receiver in which he would demand \$10.00 -

$\alpha$  for himself and offer the receiver  $\alpha$ ,  $0 \leq \alpha \leq \$10.00$ . The receiver must then choose between two alternatives, acceptance, in which case he or she would receive  $\alpha$ , and the chooser  $\$10 - \alpha$ , and rejection, in which case both the chooser and the receiver would receive 0. In an ultimatum game, then, while the receiver has some strategic latitude, his or her options are limited to a "take-it-or-leave-it" choice between two alternatives.

The first ultimatum game experiments in the modern experimental literature were those conducted by Elizabeth Hoffman and Matthew Spitzer (1982)<sup>1</sup> on the Coase Theorem and those of Werner Guth, Rolf Schmittberger and Bernd Schwarze (1982) whose purpose was explicitly to test for rationality in such games. The Guth et al. experiment was run using 42 German undergraduates who were divided into two groups of 21 choosers and 21 receivers and asked to divide  $c$  German marks between them using the rules of the ultimatum game described above.  $c$  was made to vary between 4 and 10. Guth et al.'s results indicated that while backward induction clearly indicates that the offers made by the choosers should approach 0 and be acceptable to the receivers, in fact offers tended, on average, to be in the vicinity of  $.32c$  to  $.37c$  with a modal response closer to the equal split division of  $.50c$ . In addition to offers being more generous than predicted, the acceptance behavior of receivers was also at odds with the theory in that positive but small offers tended to be rejected despite the theory's prediction of acceptance. Guth et al. interpreted these data as suggesting that experimental choosers might form their choice of the correct offer by employing some notions of equity which are at odds with the rationality of backward induction while receivers reject offers that offend their basic fairness instincts.

One possible explanation for Guth et al.'s data is that since receivers could expect to get nothing

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<sup>1</sup> Actually, Hoffman, et al. (1982) credit Fouraker and Siegel (1963) with running the first ultimatum games, but we will start our review with Hoffman and Spitzer (1982) since we consider that paper to be the first in which the concerns addressed here are investigated.

at the sub-game perfect equilibrium, rejection was a cheap alternative. Hence choosers had to offer more than zero in order to increase the opportunity cost of a rejection. Under this explanation the behavior of choosers had little to do with feeling of equity and fairness but was simply a strategic ploy of selfish individuals. One way to counter this claim is to run a dictatorship game as did Forsythe, Horowitz, Savin and Sefton (1988), (FHSS), since in these games there can be no fear of rejection so such strategic matters could not intervene. Their results seem to support the equity interpretation of the original ultimatum bargaining game results since in their dictatorship games, dictators (or choosers) offer significantly more than zero -- the unique sub-game perfect equilibrium offer.

A number of other avenues of explanation were pursued by investigators in order to try to straighten out the puzzling results of the early ultimatum experiments. One pursued by Binmore, Shaked, and Sutton (1985), Neelin, Sonnenschein and Spiegel (1988) and Harrison and McCabe (1990) was to try to uncover whether the irrational behavior of choosers and receivers could be explained by the fact that they had not learned the game sufficiently well to see the backward induction solution. Consequently, Harrison and McCabe (1990) proposed a design in which players were given repeated experience with all of the subgames separately of a larger multi-stage bargaining game in order to familiarize them with the strategic aspects of the problem they faced. Binmore, Shaked and Sutton (1985) had subjects switch strategic roles in the middle of the experiment to given them experience in all of the roles, while Neelin, Sonenschein and Speigel (1988) had subjects play a nested set of multi-stage bargaining games in an effort to disentangle their behavior. While Harrsion and McCabe (1990) and Binmore et al. (1985) claim support for rationality once subjects have had a chance to learn, Neelin et al. (1988) left the issue in considerably more doubt.

Another interesting avenue of pursuit on this problem has been taken by Hoffman and Spitzer

(1982) and more recently by Hoffman, McCabe, Shachat, and Smith (1991) where the framing of the problem is investigated. In this work two issues are investigated. One deals with the question of property rights where it is suggested that choosers in ultimatum games offer so much to their receivers because they feel they have arbitrarily been assigned to the role of chooser (this determination is made randomly) and therefore do not have the right to get more than half of the pie to be divided. They attempt to instill a sense of property rights on the parts of choosers by having them play a pre-game before the ultimatum game in which one subject could earn the right to be a chooser and this value laden language was used to further instill a sense of entitlement. Once this has been earned, Hoffman and Spitzer (1982) expect choosers to feel empowered to take more for themselves and receivers to give it to them. The second issue addressed by Hoffman, McCabe, Shachat, and Smith (1991) is whether the fact that the experimental administrator is watching their demands affects their behavior by way of shaming them into making more generous offers than they otherwise would. To investigate this they ran a double-blind experiment where no subject or experimental administrator was capable of knowing how much a chooser decided to demand for him or herself. They also mixed this double blind treatment with a single blind treatment as well as a set of treatments depicting different property rights systems. Ultimatum experiments under these circumstances were also run. Their results were contrasted with those of Forsythe, Horowitz Savin and Sefton (1988) where ultimatum and dictatorship games were run using a random determination of roles (minimal property rights) single blind design with value-free language.

They conclude that when the right to be a chooser is earned and such value-laden language is used in the instructions, choosers make significantly higher demands for themselves. In addition, the double blind treatment was significant in increasing the demands of subjects in dictatorship games. In their conclusions, Hoffman, McCabe, Shachat, and Smith (1991) come down on the side of

rationality as against equity as an explanation for the behavior of subjects in ultimatum and dictatorship games. In summation, then, it is probably safe to say that no consensus has been reached in the gamesmen versus fairsmen controversy. While each side has had its victories, each has suffered defeats.

### **Section 3: The Experiment and Experimental Design**

One feature to note in all of the experiments described in Section 2 is that choosers and receivers made their choices in bilateral pairs and were not subject to any survival pressures during the course of the experiment. In other words, their performance early in the experiment was not used to qualify them for participation in later rounds of the experiment where they could earn more money. In markets, however, this is common. Firms who do not do well in the early stages of an industry are weeded out during the "shake-out" stage, while managers who do not impress their bosses are passed over for promotion. In markets it is commonly believed that only the strong survive.

It was our conjecture that the fact that previous experiments were not performed in a setting that highlighted these survival pressures might be responsible for the observed generosity of choosers and possibly even the willingness of receivers to reject non-zero offers. We felt these survival pressures would be decisive even in a setting in which property rights were minimally induced and in which the experiment was run in a single blind fashion. Our reasoning was simple. Self-regarding behavior will be tolerated as long as it can be justified. In ultimatum games, low offers which are seen as unjustified will be rejected. In non-survival games, it is hard to justify taking a large part of the pie especially when the role of chooser was randomly assigned. In survival games, however, a chooser can always justify his or her greedy choice by claiming that survival pressures made it

necessary and receivers may even be convinced by such arguments since if they were suddenly placed in the role of the chooser they too might behave in that manner. In short they can feel that they are not selfish but rather that the institution they are placed in has forced them to behave that way. Hence choosers in such survival games may have found it easier to justify smaller offers and feared rejection less since they assumed that receivers would more easily understand why they behaved in such a manner. Even in dictatorship games, choosers, by feeling justified in making small offers, may feel less social embarrassment in front of experimental administrators for being greedy.

To operationalize these conjectures we ran four different sets of experiments, all run on undergraduates at New York University during the Spring of 1992. Two of the sets replicated earlier experiments in one-stage ultimatum and dictatorship games in which subjects played either an ultimatum or dictatorship game once and only once against a randomly chosen and anonymous opponent. The experiment was conducted by hand by having choosers write offers on pieces of paper which were then distributed to their anonymous receiver partners. These experiments used the FHSS (1988) instructions so that we attempted to control for property rights issues in a manner identical to the way employed by them. The two other sets of experiments were two-stage survival ultimatum and dictatorship games. In these experiments students were brought into a room and randomly divided into three groups. Group 1 was designated as choosers in stage 1 of the experiment, group 2, as receivers in stage 1 and group 3 as receivers in stage 2 of the experiment. In a typical experiment there were either 10 or 8 stage 1 choosers playing against a comparable number of stage-1 receivers, while group 3, consisting of stage-2 receivers, always contained half the number of stage 1 choosers.

In stage 1 of the experiment the choosers and receivers played a one-stage ultimatum or dictatorship game in a manner identical to the subjects in the first two experiments and using the

FHSS instructions. It was common knowledge that at the end of this stage choosers would be ranked by their payoffs and those in the top half with respect to earnings stayed in the room to play another identical round of the game with the receivers in group 3 (who had waited in isolation while stage 1 was being conducted). In other words, stage-1 receivers were finished with the experiment after stage 1 of the experiment while half of the stage-1 choosers, those whose payoffs were lowest, were also eliminated. Stage two was played between surviving stage 1 choosers and group-3 receivers. As a consequence, chooser subjects needed to have high demands accepted in stage 1 in order to proceed to stage 2 (if they were playing an ultimatum game) or simply make large demands if they were playing a dictatorship game.

Our experimental design is presented in Table 1:

**TABLE 1:**  
**EXPERIMENTAL DESIGN**

| Experiment   | Type of Experiment        | Number of Subjects |
|--------------|---------------------------|--------------------|
| Experiment 1 | 1-Stage Ultimatum Game    | 34                 |
| Experiment 2 | 1-Stage Dictatorship Game | 32                 |
| Experiment 3 | 2-Stage Ultimatum Game    | 45                 |
| Experiment 4 | 2-Stage Dictatorship Game | 40                 |

### **3.1: Expectations and Conjectures**

Our expectations about the results of our experiments can be summarized by the following three hypotheses.

#### **Stage-1 Demands**

##### **Hypothesis 1: Survival Pressures and Stage-1 Demands**

Choosers in two-stage ultimatum and dictatorship game experiments (Experiments 3 and 4) will

make higher demands for themselves in stage 1 than will choosers in one-stage ultimatum and dictatorship games (Experiments 1 and 2).

According to the theory of games, there should be no difference in the demands of choosers in one-stage games and stage one of two-stage games. If differences occur, it must therefore be due to the different institutional setting that subjects are placed in and the way these differing institutions affect their perceptions of fairness. Hypothesis 1 is predicated on the following argument: We expect choosers in two-stage games to make greater stage-1 demands than their counterparts in one-stage games for two reasons. First, if choosers in two-stage games wanted to proceed to the second stage, they would simply have to make higher demands for themselves in stage 1 or else face elimination. Whatever the attitude toward equity was of the chooser, placing him or her in a survival institution was expected to lead to more self-regarding behavior. *Ceteris paribus*, a two-stage survival game should evoke more apparently selfish behavior in stage 1 than a simple one-stage game. Second, and possibly more importantly, since survival pressures are common knowledge, receivers should consider greater stage-1 demands by choosers as being more justifiable and hence should be more willing to accept them. Knowing that greed is more easily rationalized in such a setting, self-seeking subjects should be tempted to make larger stage-1 demands.

While the argument above lumps dictatorship and ultimatum games together, there are actually differences between them which modify our predictions here. In dictatorship games the decision of the chooser depends only on his own perception of fairness. If he thinks it fair to offer more in the first stage because he will earn more in the second stage, he will do so. However, such a desire clearly has its costs since it may lead to a failure to survive. In the ultimatum game survival considerations may appear to be consistent with considerations of fairness since demands which are too high may be rejected and consequently minimize survival possibilities. Low demands, while

apparently fair, may also serve to enhance survival since they increase the probability of the receiver perceiving such demands as fair and hence accepting them. These considerations make the predictions of Hypothesis 1 less persuasive at least with respect to ultimatum games.

### **Stage-2 Demands**

Hypothesis 1 deals exclusively with stage-1 demands. However, what is expected of the demands of those subjects who succeed in moving to stage 2? Should they, upon reaching the second stage, simply revert to the type of behavior observed in 1-stage games or should we expect something different from them? The main difference between stage 2 of Experiments 3 and 4 (our two-stage ultimatum and dictatorship game experiments) and stage 1 is that there are no survival pressures in stage 2. As a result one might be led to conclude that demands in stage 2 should be smaller than were those in stage 1 since the lack of survival pressures would make high demands less justifiable. On the other hand, however, if only the greedy manage to survive stage 1 then there is a selection process at work here which would imply that the set of choosers remaining in stage 2 are precisely those that have proven themselves to be the most selfish subjects recruited. This would lead to demands which are equivalent to the ones observed in stage 1. To sort out these two conflicting predictions, we have formulated the following null hypothesis.

### **Hypothesis 2: Stage 2 Demands**

Demands of choosers in stage 2 of experiments 3 and 4 should be equal to the offers made in stage 1 of those game experiments.

### **Rejection Behavior**

Our final hypothesis concerns the rejection behavior of receivers in two-stage ultimatum experiments (Experiment 3). Here we conjectured that these receivers would be more accepting of high demands ( i.e. accept lower offers) than receivers in our 1-stage experiment (Experiment 1). Our reasoning was simple. Receivers are willing to accept any offer, no matter how low, if they see that offer as reasonable. The fact that choosers in two-stage experiments functioned under survival pressures made their relatively low offers more justifiable in the eyes of receivers. As a result we predicted that lower offers would be made and accepted. This intuition is formulated as Hypothesis 3.

### **Hypothesis 3: Rejection Behavior**

The mean offer rejected by receivers in Experiment 1 will be higher than the mean offer rejected by receivers in Stage 1 of Experiment 3.

## **Section 4: Results**

The presentation of our results will consist of describing the results of our three hypotheses.

### **Hypothesis 1: Survival Pressures and Stage-1 Demands**

Hypothesis 1 predicts that demands in stage 1 of our two-stage ultimatum and dictatorship survival experiments (Experiments 3 and 4) will be higher than demands in our one-stage ultimatum and dictatorship games (Experiments 1 and 2). Before we actually perform a statistical test on the data here consider Table 1 and Figures 1 and 2 where we present the actual demands made by our choosers in stage 1 of Experiments 3 and 4 as well as the demands made by choosers in the one stage of Experiments 1 and 2.

From Table 1 and Figure 1 it should be clear that demand behavior changed substantially as we move from the one-stage to the two-stage game experiments. This is seen in both figures 1 and 2 as a shift in the distribution of demands to the right as we move from one-stage to two-stage experiments. From Table 1 we see that while the mean demand in the one-stage dictatorship experiments was 6.48 the mean in stage 1 of the two-stage dictatorship game was 8.2, after outliers were removed. For ultimatum games the increase in the mean was from 5.51 to 6.66. While one-stage game experiments presented uni-modal data distributions, two-stage games typically had many modes. However, all of these modes were at least as high as the one mode existing in one-stage experiments -- accounting for the observed shift in histograms of Figures 1 and 2.

Using a Wilcoxon non-parametric rank-sum test we tested whether the observed demands for one-stage and stage-1 demands for two-stage ultimatum and dictatorships games came, respectively, from populations with the same mean. For both dictatorship and ultimatum games we could not accept the equality of means between one-stage games and stage-1 of two-stage games at the 1% and 9% significance levels, respectively. In addition, using a Kolmogorov-Smirnoff test we tested whether the distribution of demands were the same across these experiments. While for dictatorship games the hypothesis that these distributions were equal can be rejected at the 10% level of significance, it could not be rejected at this level for ultimatum games.

### **Hypothesis 2: Stage-2 Demands**

As indicated in Section 3, we did not have precise predictions as to what we expected of our choosers in stage 2 of our two stage games. There are some complicated issues in how to analyze the data, however. For example, in ultimatum games it is not necessarily true that subjects who made large demands passed on to the second stage since their demands could have been rejected. Hence,

**Table 1: Stage-1 Demands and Demands in One-Stage Game Experiments  
Dictatorship Games**

| <u>Subject</u> | <u>One Stage Games</u> |                  | <u>Subject</u> | <u>Two-Stage Games</u> |                  |
|----------------|------------------------|------------------|----------------|------------------------|------------------|
|                | <u>Session 1</u>       | <u>Session 2</u> |                | <u>Session 1</u>       | <u>Session 2</u> |
|                | <u>Demand</u>          | <u>Demand</u>    |                | <u>Demand</u>          | <u>Demand</u>    |
| 1              | 10                     | 10               | 1              | 10                     | 10               |
| 2              | 9                      | 7                | 2              | 8                      | 10               |
| 3              | 7                      | 7                | 3              | 8                      | 10               |
| 4              | 7                      | 6                | 4              | 7                      | 10               |
| 5              | 5                      | 5                | 5              | 7                      | 8                |
| 6              | 5                      | 5                | 6              | 7                      | 7                |
| 7              | 5                      |                  | 7              | 7                      | 5*               |
| 8              | 5                      |                  | 8              | 5                      | 3*               |
| 9              | 5                      |                  | 9              |                        |                  |
| 10             | <u>1*</u>              | —                | 10             | —                      | —                |
| Mean           | 5.9<br>(6.4)           | 6.6              |                | 7.6                    | 7.8<br>(9.1)     |

**Combined Session 1 and 2 Data**

|        |        |        |
|--------|--------|--------|
| Mean   | (6.48) | (8.2)  |
| Median | 5.5    | 7.5    |
| Mode   | 5.0    | {10,7} |

Notes:

\* Indicates that in post-experiment interviews these subjects indicated that they either did not understand the task or simply behaved in a nonsensical manner for no obvious reason. We identified them therefore as outliers.

Numbers in parenthesis indicate statistics calculated with outliers removed.

**Ultimatum Games**

| <u>Subject</u> | <u>One Stage Games</u> |                  | <u>Subject</u> | <u>Two-Stage Games</u> |                  |
|----------------|------------------------|------------------|----------------|------------------------|------------------|
|                | <u>Session 1</u>       | <u>Session 2</u> |                | <u>Session 1</u>       | <u>Session 2</u> |
|                | <u>Demand</u>          | <u>Demand</u>    |                | <u>Demand</u>          | <u>Demand</u>    |
| 1              | 8                      | 7                | 1              | 9                      | 9                |
| 2              | 7                      | 5                | 2              | 9                      | 8                |
| 3              | 7                      | 5                | 3              | 8                      | 8                |
| 4              | 6                      | 5                | 4              | 7.05                   | 7                |
| 5              | 6                      | 5                | 5              | 7                      | 5                |
| 6              | 5                      | 5                | 6              | 6.5                    | 5                |
| 7              | 5                      | 4                | 7              | 5                      | 4.5              |
| 8              | 5                      |                  | 8              | 4*                     | 4                |
| 9              | 5                      |                  | 9              |                        | 4                |
| 10             | <u>4</u>               | —                | 10             | —                      | <u>1</u> *       |
| Mean           | 5.8                    | 5.1              |                | 6.9<br>(7.36)          | 5.53<br>(6.1)    |

**Combined Session 1 and 2 Data**

|        |      |         |
|--------|------|---------|
| Mean   | 5.51 | (6.66)  |
| Median | 5    | 7       |
| Mode   | 5    | {9,8,5} |

Notes:

\* Indicates that in post-experiment interviews these subjects indicated that they either did not understand the task or simply behaved in a nonsensical manner for no obvious reason. We identified them therefore as outliers.

Numbers in parenthesis indicate statistics calculated with outliers removed.

ultimatum games may not select for the greedy but rather for the strategically savvy or even for the equity minded subjects i.e. those whose demands have high probabilities of being accepted and therefore have high expected values. This is not true for dictatorship games, obviously, since there is no possibility of rejection in stage 1. As a result, a simple comparison between the mean demands of subjects in stage 2 and those of all subjects in stage 1 is not a relevant comparison. The relevant question to ask is whether subjects who moved on to stage 2 actually increased or decreased their demands in stage 2. For dictatorship games one might conjecture that high demands in stage 1 might have been the result of survival pressures so that in stage 2, when those pressures no longer exist, we might expect to see their demands drop. If stage 1 served as a filter, however, allowing only the greedy to pass through, then in stage 2 we might not expect any decrease in demands by our surviving choosers.

For ultimatum games, on the other hand, we might very well expect a rise in demands since subjects are engaged in a two-period tournament in which the first period prize composed of a monetary prize plus the right to proceed to stage 2 where they might win more money. Hence, subjects in stage 1 of such games might lower their bid in order to survive only to increase their second stage demands when the option value of a future stage no longer exists. This would lead us to think that demands in ultimatum games would actually increase in stage 2. The actual results are presented in Table 2 and Figures 3 and 4.

As the data in Table 2 and Figures 3 and 4 indicate, there is no obvious difference between the demands made by surviving subjects in stage 2 of our two-stage game experiments and the demands made by these same subjects in the first stage. While the mean stage-1 demand of surviving choosers in dictatorship experiments was 9.125 when these survivors got to the second stage they demanded, on average, 9.25 for themselves. Similarly, surviving choosers in two-stage ultimatum games

**Table 3: Stage-2 Demands**

| <u>Dictatorship Games</u><br><u>Stage-2 Demands</u> |                  |                  | <u>Ultimatum Games</u><br><u>Stage-2 Demands</u> |                  |                  |
|---|------------------|------------------|--|------------------|------------------|
|   | <u>Session 1</u> | <u>Session 2</u> |  | <u>Session 1</u> | <u>Session 2</u> |
| <u>Subject</u>                                      | <u>Demand</u>    | <u>Demand</u>    | <u>Subject</u>                                   | <u>Demand</u>    | <u>Demand</u>    |
| 1   | 10[10]           | 10[10]           | 1  | --               | --               |
| 2   | 9[8]             | 10[10]           | 2  | --               | 8[8]             |
| 3   | 9[8]             | 10[10]           | 3  | 8[8]             | --               |
| 4   | 6[7]             | 10[10]           | 4  | 6.2[7.05]        | 4[7]             |
| 5   | --               | --               | 5  | --               | 5[5]             |
| 6   | --               | --               | 6  | 6.75[6.5]        | 5[5]             |
| 7   | --               | --               | 7  | 7[5]             | 5[5]             |
| 8   | --               | --               | 8  | --               | --               |
| 9   | --               | --               | 9  | --               | --               |
| 10  | --               | --               | 10   | --               | --               |
| Mean  | 8.5[8.25]        | 10[10]           |  | 6.92[6.6]        | 5.4[6]           |

**Combined Session 1 and 2 Data**

|        | <u>Stage-2 Demands</u> | <u>One-Stage Game Demands</u> | <u>Stage-2 Demands</u> | <u>One-Stage Game Demands</u> |
|--------|------------------------|-------------------------------|------------------------|-------------------------------|
| Mean   | 9.25[9.125]            | 6.48                          | 6.0[6.26]              | 5.51                          |
| Median | 10[10]                 | 5                             | 6.20[6.5]              | 7                             |
| Mode   | 10[10]                 | 5                             | {5}[5]                 | {9,8,5}                       |

Notes:

Numbers in brackets are the demands made by these same subjects in stage one of the experiment.

demanded 6.0 on average in stage two and 6.26 in stage 1. Note however, that surviving choosers in dictatorship games made substantially greater demands than their counterparts in one-stage games. (This difference was significant at the 1% level using a Wilcoxon test). For ultimatum games, there was also an increase in the second stage demands of surviving choosers over the demands made by their counterparts in one stage games (from 5.51 to 6.0). However, the means are significantly different only at the 20% level using a Wilcoxon test.

### **Hypothesis 3: Rejection Behavior**

It was our Hypothesis that if receivers felt that demands were justified by survival pressures, they would be rejected less often. If this conjecture were true, then we should expect to see one-stage experimental receiver subjects rejecting lower offers than receivers in stage 1 of two-stage games. Table 3 presents the data on third hypothesis.

The data presented in Table 3 are ambiguous as is the proper manner to go about analyzing them. To begin, it is hard to compare the rejection behavior of receivers in the one-stage experiments with that of stage-1 behavior in two-stage games because the set of demands made are different. Presumably we would like to control the demands placed on receivers and ask whether, conditional on identical demands, one-stage receivers reject higher or lower demands. Unfortunately, our data does not present themselves in that way. Looking at the set of demands and acceptances jointly, however, we see that while all demands of 8 were rejected in one-stage games, two out of the three demands of 8 were accepted in stage 1 of our two-stage experiments. Further, while a demand of 6 was rejected in our one-stage experiments, such demands were accepted as were demands of 7.05 and 7 in stage-1 of our two-stage games.

While these data are meager, it does paint a picture consistent with our expectations that higher



demands were considered more justifiable in two-stage than in one-stage games.

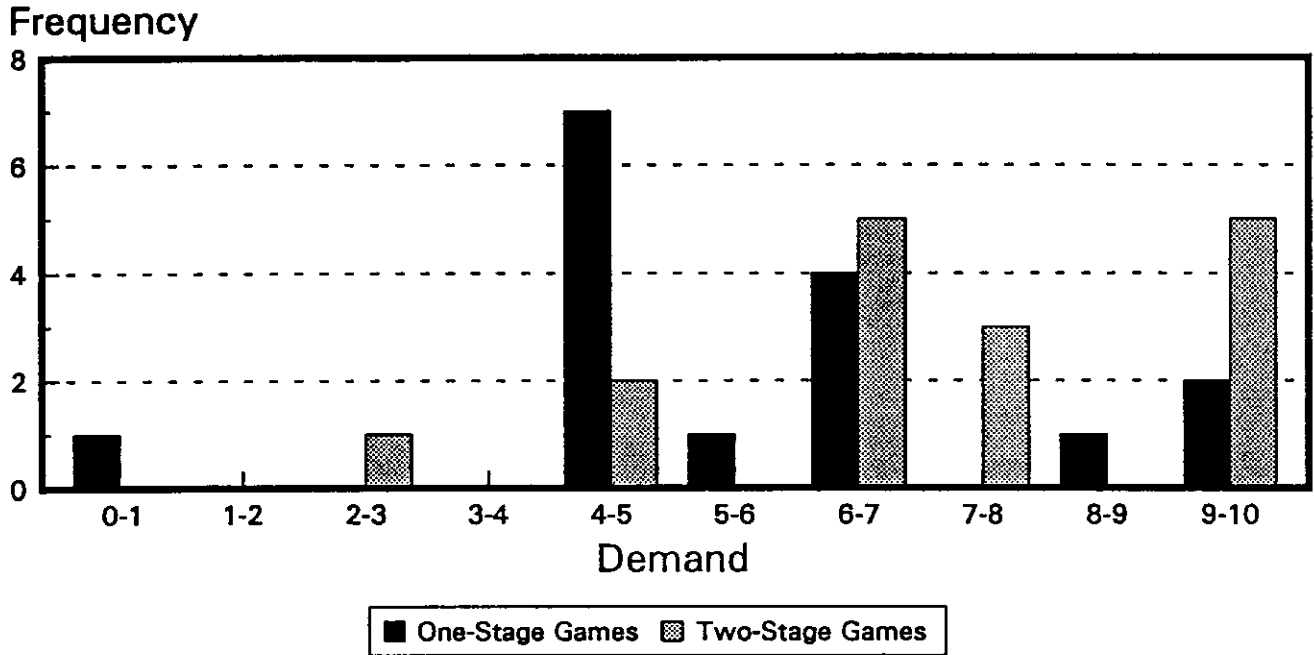
## **Section 5: Conclusions**

This paper has thrown another ingredient into the already complicated stew of results concerning ultimatum and dictatorship games. In it, we have taken the position that equity is not an absolute ideal but rather one that is defined conditional on the institutional structure agents are placed in. Consequently, it is our claim that one can not make the leap from the results of bilateral ultimatum and dictatorship games to the behavior of economic agents in markets because the meaning of equity or fairness is altered once agents face the types of survival dangers present in market-like institutions. By conducting a set of two-stage survival ultimatum and dictatorship games in which subjects must "survive" stage 1 in order to proceed to stage 2, we were able to substantiate the fact that the desire for fairness may many times be tempered by the day to day fight to survive in markets. While our results with respect to dictatorship games appear to be on solid ground, we present less strong evidence when it comes to ultimatum games. This is true because, as we have stated in the text, survival in stage 1 of ultimatum games may involve relatively small demands rather than relatively large ones. Future investigators will have to investigate these same hypotheses, possibly with varying degrees of survival pressure to see how robust they are and whether they can be strengthened by increasing the value of survival.

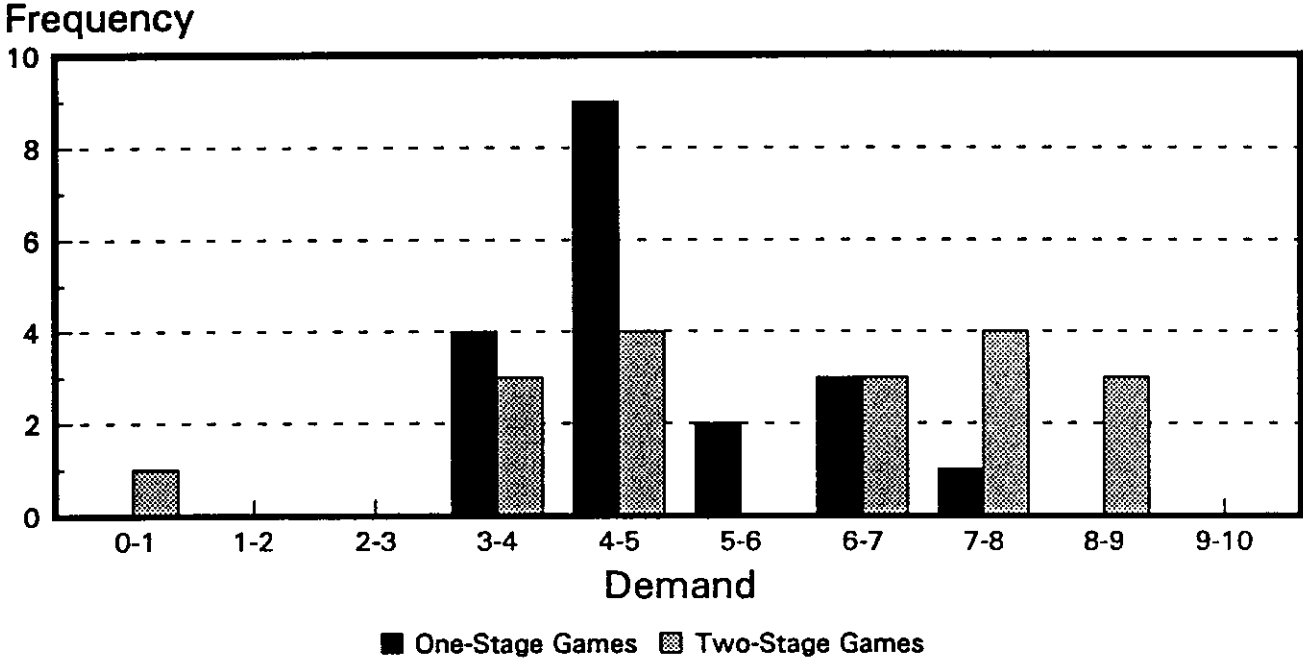
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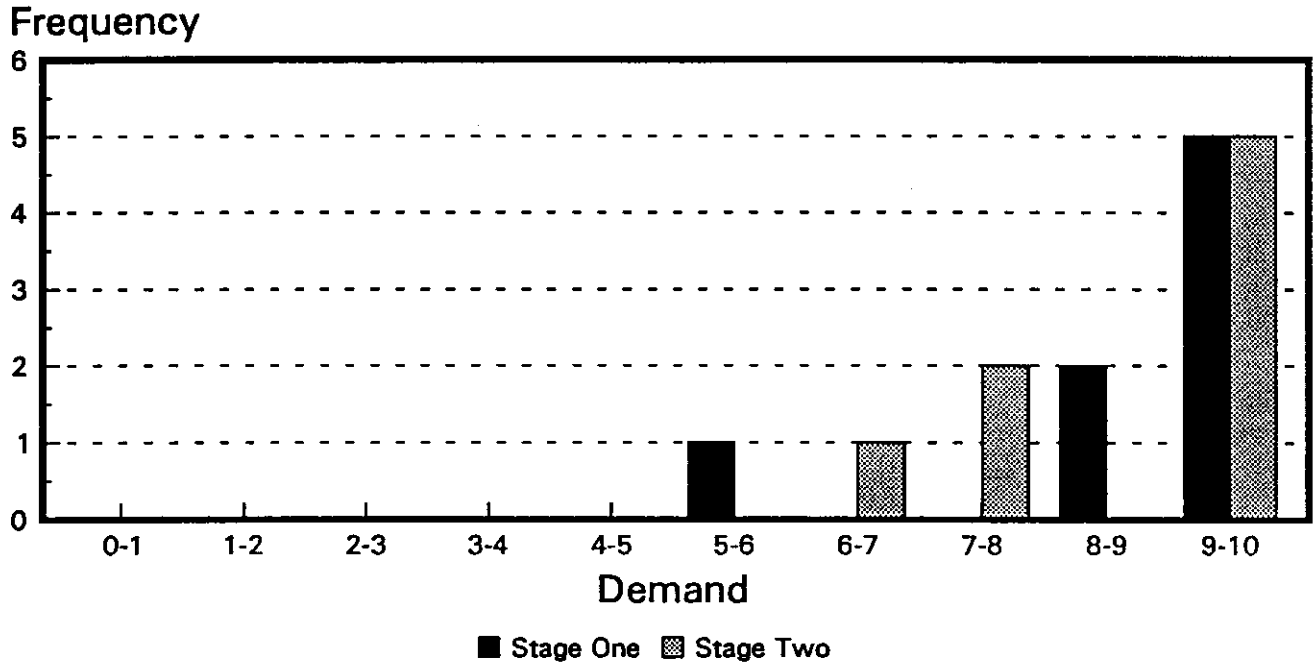
**Figure 1**  
**Dictatorship Games Demands:**  
**One-Stage and Stage One of Two-Stage Games**



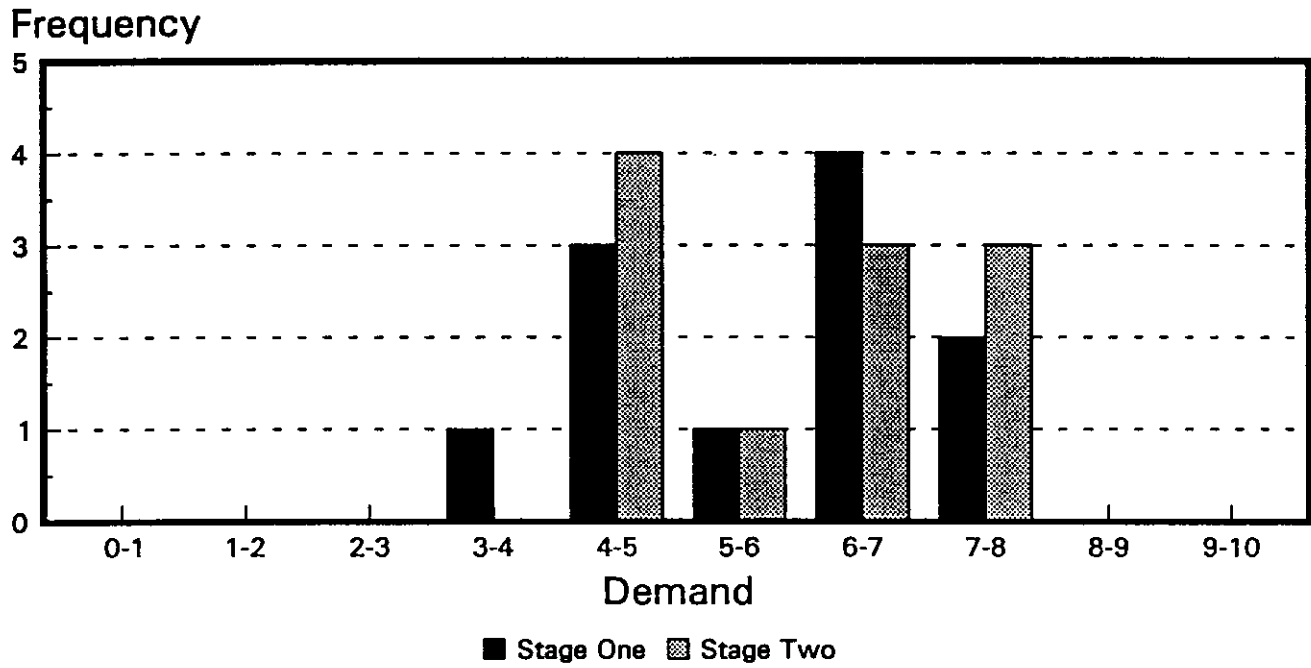
**Figure 2**  
**Ultimatum Games Demands:**  
**One-Stage and Stage One of Two-Stage Games**



**Figure 3**  
**Dictatorship Games:**  
**Stage One and Stage Two Demands**



**Figure 4**  
**Ultimatum Games:**  
**Stage One and Stage Two Demands**



## APPENDIX

### Instructions: One-stage Ultimatum Game

You have been asked to participate in an economics experiment. For your participation today we will pay you \$3 at the end of the experiment. You may earn an additional amount of money, which will also be paid to you at the end of the experiment.

In this experiment each of you has been randomly assigned a type (either A or B) and will be randomly paired with a person of the other type sitting on the other side of the room. All persons sitting on your side of the room are of the same type as you. You will not be told with whom you are paired, either during or after the experiment, and they will not be told with whom they are paired, either during or after the experiment.

The experiment is conducted as follows: A sum of \$10 has been provisionally allocated to each pair, and the person assigned type A can propose how much of this each person is to receive. To do this, the person of type A must fill out the form titled "Proposal Form." You will find a copy of this form attached to these instructions. The first line of this form tells you your identification number (if you are of type A) or the identification number of the person with whom you are paired (if you are of type B). The identification number of the person with whom you are paired (if you are of type A) or your identification number (if you are of type B) is on line 2. The amount to be divided is on line 3. The person of type A makes the proposal. The proposal consists of the amount, if any, that the person of type B is to receive (entered on line 4) and the amount the person of type A is to receive (entered on line 5). The amount the person of type A is to receive is simply the total amount to be divided, \$10, minus the amount the person of type B is to receive.

If you are of type A you will have five minutes to come to a decision about your proposal. At the end of five minutes a buzzer will sound. Do not be concerned if other people make their decisions before you, we will not collect the forms until the buzzer sounds. Your proposal form will then be sent to the person of type B with whom you are paired.

The person of type B will then be given a chance to accept or reject the proposal. If the person of type B accepts the proposal, then the amount of money will be divided as specified in the proposal. If the person of type B rejects the proposal, then both people in the pair receive zero. If the person of type B wishes to accept the proposal he or she should check "Accept" on line 6 of the proposal form. If the person of type B does not wish to accept the proposal he or she should check "Reject" on line 6 of the proposal form.

If you are of type B you will have five minutes to come to a decision about whether to accept or reject. At the end of five minutes, a buzzer will sound. Do not be concerned if other people complete their proposal forms before you, we will not collect them until the buzzer sounds. You should record the same amounts on the other copy of the proposal form. One copy is for your records and the other will be sent to the person of type A with whom you are paired.

After the proposal forms have been collected, each person will be paid. Each person will receive \$3 for participating. Each person of type A will also receive the amount shown on line 5 of his or her proposal form if the proposal was accepted. Each person of type B will also receive the amount shown on line 4 of the form if the proposal was accepted.

Are there any questions?

**Proposal Form**

1. I.D. Number of person of type A \_\_\_\_\_
2. I.D. Number of person of type B \_\_\_\_\_
3. Amount to be divided                      \$10

To be filled out by person of type A

4. Person of type B receives \_\_\_\_\_
5. Person of type A receives \_\_\_\_\_

To be filled out by person of type B

6. Accept \_\_\_\_\_                      Reject \_\_\_\_\_
- check one)

(please

## **Instructions: Two-stage Ultimatum Game**

You have been asked to participate in an economics experiment. For your participation today we will pay you \$3 at the end of the experiment. You may earn an additional amount of money, which will also be paid to you at the end of the experiment.

In this experiment each of you has been randomly assigned a type (either A, B or C). Type C people will participate at a later stage, and will be asked to leave the room after the instructions are read until the first round has been completed. Each remaining person will be randomly paired with a person of the other type sitting on the other side of the room. All persons sitting on your side of the room are of the same type as you. You will not be told with whom you are paired, either during or after the experiment, and they will not be told with whom they are paired, either during or after the experiment.

The experiment is conducted as follows: A sum of \$10 has been provisionally allocated to each pair, and the person assigned type A can propose how much of this each person is to receive. To do this, the person of type A must fill out the form titled "Proposal Form." You will find a copy of this form attached to these instructions. The first line of this form tells you your identification number (if you are of type A) or the identification number of the person with whom you are paired (if you are of type B). The identification number of the person with whom you are paired (if you are of type A) or your identification number (if you are of type B) is on line 2. The amount to be divided is on line 3. The person of type A makes the proposal. The proposal consists of the amount, if any, that the person of type B is to receive (entered on line 4) and the amount the person of type A is to receive (entered on line 5). The amount the person of type A is to receive is simply the total amount to be divided, \$10, minus the amount the person of type B is to receive.

If you are of type A you will have five minutes to come to a decision about your proposal. At the end of five minutes a buzzer will sound. Do not be concerned if other people make their decisions before you, we will not collect the forms until the buzzer sounds. Your proposal form will then be sent to the person of type B with whom you are paired.

The person of type B will then be given a chance to accept or reject the proposal. If the person of type B accepts the proposal, then the amount of money will be divided as specified in the proposal. If the person of type B rejects the proposal, then both people in the pair receive zero. If the person of type B wishes to accept the proposal he or she should check "Accept" on line 6 of the proposal form. If the person of type B does not wish to accept the proposal he or she should check "Reject" on line 6 of the proposal form.

If you are of type B you will have five minutes to come to a decision about whether to accept or reject. At the end of five minutes, a buzzer will sound. Do not be concerned if other people complete their proposal forms before you, we will not collect them until the buzzer sounds. You should record the same amounts on the other copy of the proposal form. One copy is for your records and the other will be sent to the person of type A with whom you are paired.

After the proposal forms have been collected, each person of type B will be paid \$3 for participating. Each person of type B will also receive the amount shown on line 4 of the form if the proposal was accepted. All type B people will then leave the room, as they will have concluded their role in the experiment. Type C people will then return to the room.

Some type A people will get to participate in the same experiment one last time against a type C person who has not participated in the previous experiment. Those not selected will be paid \$3 plus the amount shown on line 5 of their proposal form if their proposal was accepted. Their participation in the experiment will then be over and they will be asked to leave the room. In order to decide which type A subjects will get to participate one more time, all type A subjects will be ranked according to the amount of money they have accumulated in the experiment just completed.

Those A's who have accumulated the most money in the first round will be those that play again. To be precise, the top five (5) ranked subjects of type A will participate the second round. However, no A subject who has had his offer rejected will participate in the second round. If more than half of the A players have had their offers rejected, only those who's offers have been accepted will play in the second round. In the second experiment all rules will be identical to those in the first experiment, except that the amount to be divided by the subjects will be only \$1. To start the experiment, new proposal forms will be given to the type A players who are participating. The experiment will proceed in identical form to the first experiment, at the end of which all remaining subjects will be paid. Type A subjects will be paid \$3 plus the amount shown on line 5 of their proposal form from the first experiment plus the amount from line 5 of their proposal form from the second experiment if their proposal was accepted. Type C subjects will receive \$3 plus their line 4 earnings in that experiment if the proposal was accepted.

Are there any questions?

**Proposal Form**

- 1. I.D. Number of person of type A \_\_\_\_\_
- 2. I.D. Number of person of type B \_\_\_\_\_
- 3. Amount to be divided                      \$10

To be filled out by person of type A

- 4. Person of type B receives                      \_\_\_\_\_
- 5. Person of type A receives                      \_\_\_\_\_

To be filled out by person of type B

- 6. Accept \_\_\_\_\_                      Reject \_\_\_\_\_                      (please check one)