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What Price Fairness? A Bargaining Study*

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Abstract

Our study concerns bargaining behavior in situations where one party is in a stronger position than the other. We investigate both the tradeoff the favored party makes between pursuing his strategic advantage and giving weight to other players' concern for fairness, and the tradeoff the disadvantaged player makes between pursuing a fair outcome from a disadvantaged position and the cost of that pursuit. In particular, we hypothesize that the degree to which strategically strong players attempt to exploit their strategic advantage depends on their potential costs for doing so. Similarly, the degree to which weak players persist in seeking "fairness" is also a function of how much it (potentially) costs them to do so.

Students negotiated in pairs over the division of $HK50 using a finite horizon, fixed-cost (per rejection) alternating offer rule. Each pair consisted of a high-cost and a low-cost bargainer. In accordance with the hypothesis, the willingness of the high-cost bargainers to demand fairness and to persist in their demands was a function of how much it cost them to do so, and the degree to which the low-cost bargainers attempted to exploit their strategic advantage depended on their own cost of rejection. We conclude that "fairness" has a price such that the higher its price, the lower the "demand" for it. This suggests that demands for fairness are subject to cost-benefit evaluation, are in this sense deliberate, and are well thought out.

1. INTRODUCTION

There is growing evidence that the assumption of pure self interest is an inadequate explanation of behavior in many contexts. Often, people behave as if they care not only about their own well being but also about the well being of others. In a bargaining context, for example, Corfman and Lehmann (1993) have argued that negotiators' offers are often more generous than the amount actually necessary to induce the other party to accept. Dwyer and Walker (1981), in a marketing context, have suggested that "... there is an equity norm against the full exploitation of a fortuitous situation that provides a clear power advantage" (p. 112). Similarly Kahneman, Knetsch and Thaler (1986b) have concluded that consumers may incorporate distributional concerns into their utility functions, and models invoking the notions of equity or equality explain consumers' behavior better than models incorporating the assumption of pure self interest. Furthermore, it has been suggested that distributional concerns influence wages and retail pricing policies and are not limited just to the laboratory (e.g., Kahneman et al. 1986b; Kumar, Scheer and Steenkamp 1995; Oliver and Swan 1989; Frey and Pommerehne 1993). Understanding what role fairness considerations play in an economic exchange context should enable us to make better predictions and hence to prepare for the outcomes of such exchanges (Bolton 1991; Rabin 1993).

Fairness considerations have recently been brought to the forefront in the discussion of the failure of a narrow self-interest model (a model that is based only on one's own consumption) to explain the results of the ultimatum game (Güth, Schmittberger and Schwarze 1982)[1]. Even in a one-shot game, Proposers tend to offer amounts significantly higher than the smallest monetary unit allowed. Moreover, a substantial percentage of games end in disagreement (Responders turn down a substantial number of offers possessing positive value).[2] It is the behavior of the Responders that is most difficult to reconcile with a narrow self-interest model.

Ochs and Roth (1989) have argued that the failure to predict subjects' behavior in a related game can plausibly be explained if the unobserved and uncontrolled elements of the bargainers' utilities have to do with subjects' perceptions of "fairness," which involve comparing their share of the available wealth to that of the other bargainer. Bolton (1991) and subsequently Bolton and Zwick (1995) have further demonstrated that, in the context of one- (ultimatum) and two-period discounting games, strategic considerations can explain observed behavior once players' preferences regarding the relative division of the pie are properly taken into account. In particular, they have hypothesized and verified experimentally that the strategically weak bargainers reject an amount they perceive as very small relative to their co-bargainers' share to punish the strong bargainers for unfair treatment. In the language of learning theory, fair behavior by the strategically strong player is best characterized as an attempt to avoid an aversive stimulus (the punishment), and is referred to by Bolton (in press) as the strong equity effect.

The importance of both rewards and punishments in shaping human behavior has been studied extensively mainly in the experimental psychology field. The general finding is that the more intense the punishment is or the higher the reward, the stronger the effect it will have on behavior (see review by Walters and Grusec 1977). Further, it was demonstrated in the experimental economics literature that people are willing to sacrifice their material well being to

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[1] In this game, two players, a Proposer and a Responder, must agree on how to divide a fixed amount of money. The Proposer proposes a division to the Responder. If the Responder accepts the offer, the money is divided accordingly. If not, both players receive nothing. Normatively, it is clear that any positive quantity offered should be accepted by the Responder who prefers receiving something to nothing. The Proposer is thus expected to offer the smallest positive quantity or nothing at all. Experiments clearly refute such behavior.

punish those who treat them unfairly (e.g., in the ultimatum game), and to reward others who are kind to them (e.g., in the trust and gift exchange games of Fehr, Gächter and Kirchsteiger 1997; Fehr, Kirchsteiger and Riedl 1998; and Berg, Dickhaut and McCabe 1995). In general, it is hypothesized that one's willingness to sacrifice one's material well-being to punish or reward others is higher when the material cost of the sacrifice is smaller. This hypothesis was tested and accepted by Ostrom, Walker and Gardner (1992) in a public good context[3], by Andreoni and Miller (1996) and by Eckel and Grossman (1996), and is presented as a "stylized fact" by Rabin (1993). Nevertheless, its intuitive appeal may be misleading and its empirical verification is not as straightforward as might have been originally thought.

First, if fairness is a matter of principle or moral imperative, one may resist unfairness regardless of the price (as was found, for example, by Eckel and Grossman 1996, among their male subjects). The perception of being treated unfairly can cause anger, and anger can overcome money and interfere with the efficient fulfillment of the profit motive (Pilluta and Murnighan 1996)[4]. Clearly, if the stakes are extremely high, almost everyone may opt for profit over fairness (Marwell and Ames 1979); hence, this sensitivity can be controlled with high payoffs, but little is learned. The difficult problem, of course, is to isolate and measure the effects of the variations (Ledyard 1995).

Second, the current evidence concerning the empirical support of the hypothesis is mixed. Rabin (1993), for example, cites the work of Leventhal and Anderson (1970) as providing a partial confirmation for the hypothesis. In their experiment, children of preschool age and a fictitious partner worked on identical tasks. Subjects were told that their performance was superior, equal, or inferior to that of their partner and were asked to divide a reward between the two of them. The choice was made unilaterally. This study can illustrate what children may consider a fair reward-to-contribution ratio, but it can not measure the elasticity of demand for altruism or fairness since no price manipulation was done. To address this issue directly, Andreoni and Miller (1996) used a modified dictator game[5] to measure explicitly elasticity of

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[2] This characterization of the data has proven robust to culture (Roth, Prasnikar, Okuno-Fujiwara, and Zamir 1991), framing (Hoffman, McCabe, Shachat and Smith 1994) and the size of the monetary incentives (Hoffman, McCabe and Smith 1996; Cameron 1995; Tompkinson and Bethwaite 1995; Fehr and Tougareva 1996).

[3] Ostrom et al. (1992) write: "the frequency of sanctions was inversely related to the cost of imposing the fine and dramatically increases with the stiffness of the fine." However, no further information is provided on this issue.

[4] For example, Kim and Mauborgne (1997) write that in the labor market "when individuals have been so angered by the violation of fair process that they have been driven to organized protest, their demands often stretch well beyond the reasonable to desire for what theorists call *retributive justice*: not only do they want fair process restored, they also seek to visit punishment and vengeance upon those who have violated." (p. 71).

[5] In the dictator game, one player, the dictator, decides how to distribute a fixed amount of money between himself and one other, the recipient.

demand for altruism. Subjects made choices over allocations of payoffs between themselves and other subjects, with different relative prices of own- and other-payoffs. In some conditions giving away money was relatively expensive, while in others it was relatively cheap. While there was a large individual difference, a representative individual's own-payoff was very inelastic with respect to the price of the other's payoff, and the other's payoff was highly elastic with respect to its own price. That is, similar to what has been reported by Bolton, Katok and Zwick (1998), dictators appear to be primarily concerned with securing what they consider to be their own fair share. The above evidence pertains only to the "reward" but not to the "punishment" component of the hypothesis that one's willingness to sacrifice one's material well-being to punish or reward others is higher when the material cost of the sacrifice is smaller.

Eckel and Grossman (1996), in an article directly relevant to ours, have investigated gender differences in the willingness to pay in order to punish unfair behavior, or to reward fair behavior. Extending the design of Kahneman, Knetsch and Thaler (1986a), subjects could choose to split a larger pie with a "bad" partner, or a smaller pie with a "good" partner. They observed differences in elasticity by gender: over the range of prices they have considered ($1 and $2), the demand for fairness was elastic for women but highly inelastic for men. Note, however, that subjects in Eckel and Grossman's study were not the direct beneficiaries or victims of the fair or unfair behavior demonstrated by their current partner. It is possible that women's elastic demand for fairness would have disappeared had they themselves been the target of the fair/unfair behavior. Further, the study does not distinguish between one's willingness to pay to reward fair behavior on the one hand and to punish unfair conduct on the other hand. By choosing to share a smaller pie with a "good" partner, subjects do not only punish the "bad" partner but also reward the "good" partner for his/her behavior. It is possible that one's willingness to pay in order to punish unfair behavior is different from one's willingness to pay in order to reward fair behavior. Finally, other studies have not found the same gender effect (e.g., Bolton and Katok 1995).

The proposition that the demand for fairness is price sensitive has also been forwarded by Telser (1995). He conjectured that in the ultimatum game, if fairness is interpreted as a commodity so that the closer the split to equality, the larger the amount of fairness, then it is consistent with standard theory to find that the demand for fairness varies inversely with its price. The larger the total amount to be divided, the higher is the relative price of demanding fairness. Therefore, Telser conjectured that the larger the pie to be divided, the closer is the split to the extreme in favor of the Proposer. However, most[6] experimental studies that manipulated the size of the monetary incentives did not find such an effect (Hoffman, McCabe and Smith 1996; Cameron 1995; Fehr and Tougareva 1996; Andreoni and Miller 1996[7]).

Finally, previous ultimatum game studies have shown that the probability an offer will be rejected is in inverse proportion to the amount being offered. This does not show that the demand for fairness is price sensitive since there are two confounding explanations. First, the closer the split is to equality, the larger the amount of fairness is, and responders are more likely to reject small offers not only because rejecting small offers is cheaper, but also because more people perceive small offers to be unfair (Pillutla and Murnighan 1996). Second, if we assume that people are more likely to punish unfair behavior the more effective the punishment is, then Responders are more likely to reject small offers not only because rejecting small offers is cheaper, but also because the punishment inflicted on the Proposers is higher.

Given these somewhat contradicting findings, the present study contributes to the debate on the price for fairness, first, by looking only at the price paid to punish unfair behavior, second, by directly manipulating this price, and third, by investigating the strong players' sensitivity to the weak player's price. Previous studies have shown that strategically strong players are sensitive to the availability of a punishment strategy to the weaker players (e.g., ultimatum vs. impunity games in Bolton and Zwick 1995; x-veto vs. no-revenge games in Güth and Huck 1997; and with vs. without (non-profitable) outside options in a fixed cost sequential bargaining game in Weg and Zwick 1994). However, this was only shown in an all-or-none fashion. In the present study, we investigate whether the strategically strong players are also sensitive to the cost (to the weak players) for delivering the punishment, and not only to the presence or absence of such a strategy.

To accomplish our goal, we study bargaining behavior in a situation where one party is in a stronger position than the other. We investigate both the tradeoff the favored party makes between pursuing one's strategic advantage and giving weight to other players' concerns for fairness, and the tradeoff the disadvantaged player makes between pursuing a fair outcome from a disadvantaged position and the cost of that pursuit. In particular, we hypothesize that the degree to which strategically strong players attempt to exploit their strategic advantage depends

[6] Slonim and Roth (in press) find small effect for inexperienced players, and observed that rejections were less frequent the higher the stakes, and proposals in the high stakes conditions declined slowly as subjects gained experience. Munier and Zaharia (1997) found that the lowest acceptable offers by the responders were proportionally lower in the high-stake condition than in the low-stake condition, but the stakes had no effect on the offers made by the proposers.

on how much it costs them to do so. In addition, the degree to which weak players persist in seeking "fairness" is also a function of how much it costs them to do so. If our hypotheses are correct, then we can conclude that "fairness" has a price and that the higher its price, the lower the "demand" for it.

The next section describes the experimental game implemented in the laboratory and explains why it is especially suitable to test our hypotheses.

1.1. Alternating offer bargaining games with fixed cost of delay

We consider a class of alternating offer bargaining games in which two bargainers, A and B, alternate in making offers concerning how to divide an amount p (money). Time is divided into discrete periods. At any period t for which bargaining continues, one player proposes to the other some partition (x, p-x) of the money. If the other player accepts this proposal, the game ends with the proposing player receiving x and the accepting player receiving p-x. If the proposal is rejected, the game proceeds to period t+1 and the two players reverse roles. The game commences with player A's proposal and terminates only when an agreement is reached.

An outcome of the bargaining is a partition of p in period t that both players accept. The two bargainers are characterized by their possibly different time preferences on the set of possible outcomes. For bargaining games that start at time t = 1, these preferences are described in our study by fixed costs of delay. That is, player i's preference is derived from the function x_i - (t-1) c_i, i.e., player i bears a fixed cost c_i per period.

Intuitively, the player with the lower cost of delay has a strategic advantage over the other player. Rubinstein (1982) showed how these time preferences determine the subgame prefect equilibrium (SPE) for this class of games. When time preferences are represented by fixed costs of delay, the SPE allocation is attained in the first period and is described as follows: If $c_A < c_B$, player A receives the entire amount p. If $c_A > c_B$, player A receives c_B. If $c_A = c_B$, any partition of the pie yielding at least c_A to player A is supported by SPE.

Note that both the ultimatum game and the alternating offer bargaining game with fixed costs of delay share the characteristic that according to SPE rationality the strong player --- the Proposer in the ultimatum game, and the player with the smaller cost in the fixed cost game (if he/she moves first) --- is expected to be apportioned virtually the whole sum in the first period of bargaining. Contrary to what might have been expected from the experimental findings in ultimatum games, where SPE is clearly refuted, Rapoport, Weg and Felsenthal (RWF 1990), and Weg and Zwick (WZ 1991) find that in the infinite horizon fixed cost games, a significant

[7] Based on the estimated utility function they conjectured that preferences for fairness would be roughly homothetic.

proportion of the demands and even offers to the strong players are the whole sum, in accordance with SPE.

We argue that the different outcomes are due to the cost-benefit analysis of punishment. In the ultimatum game, the price (to the Responder) for punishing the Proposer for unfair treatment is typically much lower than the damage inflicted upon the Proposer. If, for example, a Responder rejects a low offer x (i.e., x is much smaller than 50% of the pie), the price she pays (x) to punish the Proposer is much lower than the cost to the Proposer (p-x). On the other hand, in the fixed cost games of RWF[1990] and WZ[1991], the price (for the high cost player) for punishing the low cost player for unfair treatment was so high and the punishment was so mild that the demand for it (by the high cost players) was very low and thus near-SPE behavior was observed[8]. Further, in the ultimatum game, the cost is opportunity loss whereas in the fixed cost game it is out-of-pocket costs. Since people are more sensitive to out-of-pocket costs, to punish the strong player for unfair treatment is perceived to be more expensive in the fixed cost game, even if the same amount of money is involved.

Note that the fixed-cost environment is especially suitable to test whether demands for fairness are price sensitive because the cost of imposing punishment and the stiffness of the punishment can be manipulated while the predicted outcomes based on the SPE model are virtually unchanged. According to SPE, shares should be contingent on only the ordinal relationship between delay costs to both players rather than on actual quantitative levels. Consequently, variation in observed behavior as a function of different delay costs, keeping the ordinal relationship between costs fixed, cannot be explained by simple strategic reasoning.

Punishment, and the threat of punishment, can alter behavior very rapidly, sometimes in just one or two trials (Walters and Grusec 1977). Hence, we do not expect the punished behavior (extremely high demands) to be very common when the willingness to punish is high (i.e., when the cost for punishing is low). Consequently, our hypotheses are formulated in terms of (1) first period demands and final accepted offers as a function of costs to both players, and (2) resistance to exploitation (by the weak player) and persistence in demanding the strategically correct share (by the strong player). Initial demands reflect subjects' expectations as to what is likely to be accepted given the other player's aversion to being treated unfairly in conjunction with the responder's ability to inflict damage on the Proposer (and the cost to the Responder for doing so).

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[8] The cost parameters in RWF were 0.1 and 2.5 in experiment 1, and 0.2 and 3.0 in experiment 2, for the low and high cost players, respectively. The costs were 0.05 and 1.25 in WZ. In these studies, the high costs were 25 and 15 times higher than the low costs.

Final accepted offers reflect players' realization that further delay will not yield a better outcome. Finally, the frequency of disadvantageous counter-offers, those that if accepted would give both players less than what had been proposed in the rejected offer, represents subjects' willingness to resist and to punish exploitation.

1.2. Hypotheses

In the following, we derive the qualitative implications of the general hypothesis that the demand for fairness is price sensitive.

Because the higher the cost of delay to the low-cost players, the higher the punishment costs that the high-cost players can impose on them, we hypothesize that:

When the low-cost players make the first period proposal, an increase in their cost of delay,

H1a: decreases their first period demands,

H1b: decreases their share in the final agreement.

When the high-cost players make the first period proposal, an increase in the cost of delay for the low-cost players,

H2a: decreases the first period offers they make to the low-cost players,

H2b: decreases the low-cost players' share in the final agreement.

H3: An increase in the cost of delay for the low-cost players increases the high-cost players' willingness to punish high demands by the low-cost players.[9]

Because the high-cost players punish themselves when they punish the low-cost players, the higher their punishment costs, the less willing they will be to punish (and the low-cost players know this). We thus hypothesize that:

When the low-cost players make the first period proposal, an increase in the cost of delay for the high-cost players,

H4a: increases the low-cost players' first period demands,

H4b: increases their share in the final agreement.

When the high-cost players make the first period proposal, an increase in their cost of delay,

H5a: increases the first period offers they make to the low-cost players,

H5b: increases the low-cost players' share in the final agreement.

H6: An increase in the cost of delay for the high-cost players reduces their willingness to punish high demands by the low-cost players.

[9] Because the punishment can be more effective.

2. **METHOD**

2.1. Subjects

Three hundred and two male (31.4%) and female (68.6%), mostly undergraduate business students (95.3%) from the Hong Kong University of Science and Technology, participated in a session that lasted about 90 minutes. Subjects were recruited through advertisements placed on bulletin boards on campus and class announcements. The announcements promised monetary reward contingent on performance in a bargaining study.

2.2. Finite Horizon Games

Each of the bargaining games consisted of dividing a surplus of HK$50[10] with a fixed cost per rejection and a finite time horizon.

The SPE predictions described above apply to the infinite horizon case. Technically, of course, there is no way to realize an infinite game[11] in the laboratory[12]. However, a carefully chosen finite horizon version of the game can accomplish practically the same predictions as the infinite horizon version.

For the finite horizon case (with n periods), the unique SPE allocation *x* to player A is attained in the first period and is described as follows[13]:

$$\text{If } c_A < c_B, \qquad x = \begin{cases} p & \text{if n is odd} \\ \min[p, (\frac{n}{2}(c_B - c_A) + c_A)] & \text{otherwise} \end{cases}$$

$$\text{If } c_B < c_A, \qquad x = \begin{cases} c_B & \text{if n is even} \\ \max[c_B, (p - \frac{n-1}{2}(c_A - c_B))] & \text{otherwise} \end{cases}$$

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[10] The exchange rate between Hong Kong and US dollars is approximately 7.8 to 1.

[11] Unless a different interpretation of discounting is adopted (see for example Zwick, Rapoport, & Howard, 1992)

[12] In RWF[90] and WZ[91], subjects were told that the game would be terminated if it lasted "for too many trials," but in reality, in RWF, bargaining was terminated by the experimenter if the game exceeded a random limit that was distributed uniformly between 9 and 13 periods. In WZ, the experimenter terminated bargaining if the game reached the 14th period. Since the rates of such termination were not negligible (3.7% and 6.8% in the RWF experiments 1 and 2, respectively; and 10.15% in WZ), it is impossible to rule out the prospect that subjects' behavior was influenced by this information. As pointed out by Ståhl (1994), for example, the fact that some of the subjects who experienced exogenous termination played, nevertheless, according to the idea of allocating virtually nothing to the high cost player should have been counted as contradicting SPE rationality rather than supporting it. In WZ, for 13 periods, a pie of $15.00 and fixed period costs of $1.25 and $0.05, the SPE predicts (when the high cost player moves first) close to an equal split.

[13] For the discrete case see Ståhl (1994).

If $c_B = c_A$, $\quad x = \begin{cases} c_B & \text{if n is even} \\ p & \text{otherwise.} \end{cases}$

For each cost combination, we have selected n such that (1) based on SPE, the low-cost player should demand and get the whole pie if he moves first, and be offered at least 90% of the pie if he moves second (independent of the actual cost differences), and (2) the maximum number of periods be as close as possible to the length T for which the SPE solution is the same as in the infinite case for all n > T.

2.3. Experimental Design

We used a 3 (low cost) X 3 (high cost) X 2 (order) X *n* (iteration) partial factorial design. The first three factors were between subjects, and the last within subjects. The low cost of rejection per period was $0.5, $2.0, or $5.0, whereas the high cost was $10.0, $13.0, or $14.5. Order refers to who made the first proposal -- the low-cost or high-cost player. Iteration refers to the number of games each subject played. We elected to fix the session duration at 90 minutes and to allow the subjects to play as many games as they could in this time interval. Consequently, the number of games per session (*n*) varied from 5 to 12. Subjects played the same role (a high-cost or a low-cost player) in all games in a session, facing anonymous opponents. Table 1 presents more details on each experimental condition and session.

Insert Table 1 about here

The partial factorial design allows testing the effect of varying the low cost value while keeping the high cost constant (the $10.0 column in Table 1) and testing the effect of varying the high cost value while keeping the low cost constant (the $5.0 row in Table 1).

2.4. ***Procedure***

Upon arrival at the laboratory, subjects were asked to read the instructions. These were then read out loud by the monitor. The instructions said (in part) that[14]:

You are going to participate in several bargaining games. For each game the computer will randomly assign you to another person with whom you will bargain over how to divide $50. You will never bargain with the same player in two consecutive games. Since you are interacting via the computer, you will not know your co-bargainers' identities, nor will they know yours. We will ***NOT*** *reveal these identities even after you complete the last game.*

[14] These instructions are for fixed period costs of $10 and $0.5, and maximum length of 12 periods. The obvious changes were made for other parameters.

<u>How do you bargain over the division</u>?

A bargaining game consists of several periods. In each period one of you will be a Proposer and the other will be a Responder. The Proposer must propose how to divide the $50 between the two of you, and the Responder must either accept or reject this proposal. If the Responder accepts the proposal then the game ends with an agreement. If the Responder rejects the proposal then the game continues to the next period. In that period you and your co-bargainer reverse roles, that is, the previous period's Responder becomes this period's Proposer, and vice versa.

A game can last, at most, <u>12</u> periods. If no proposal is accepted in 12 periods then the game ends in disagreement.

<u>There are costs involved in rejecting proposals</u>!

Each time one of you <u>rejects</u> a proposal <u>both of you</u> must pay a personal rejection fee. One of you will pay $10.0 for any rejection (no matter who made it) and the other will pay $0.5 for any rejection (no matter who made it). These fees accumulate until you reach an agreement, or the game ends in disagreement after 12 periods.

YOUR REJECTION FEE WILL BE THE SAME IN EVERY GAME YOU PARTICIPATE IN, THAT IS, YOUR FEE WILL EITHER BE $10.0 PER REJECTION OR $0.5 PER REJECTION. The computer will randomly determine which of you has a $10.0 fee and which has a $0.5 fee before the start of the first bargaining game.

<u>What is your potential profit or loss in each game</u>?

If you reach an agreement in a game then your profit or loss from that game equals to your agreed share of the $50 <u>MINUS</u> your accumulated rejection fees during the game (if any).

If you do not reach an agreement in 12 periods, that is, one of you rejects the 12th proposal, then your losses for the bargaining session are in the amount of your accumulated rejection fees.

Subjects interacted in a computer laboratory containing fifty terminals arranged in such a way that it was impossible for them to know with whom they were interacting. Proposals, acceptances and rejections were transmitted through terminals. No other communications were allowed. Subjects made proposals by filling their demands in the following statements: “I propose to get $XX.XX out of the $50.00.” After pressing the ‘Enter’ key, the computer displayed the proposal back in terms of both before and after accounting for the rejection fees if the proposal would have been accepted. At this point, subjects could revise their proposals if they so desired. Only confirmed proposals were sent to the other bargainer. A proposal was presented to the other bargainer in terms of payoffs both before and after accounting for the rejection fees. Bargainers could accept or reject the proposal by pressing the corresponding button. A history window at the bottom of the screen kept the current game information visible at all times.

The subjects were informed that they would be paid their net payoff from one randomly selected game. In addition, each subject was paid HK$120 upfront for participation. If, however, the net payoff from the randomly selected game was negative, subjects had to pay the monitor this amount out of the initial endowment. This procedure was explained to the subjects at the beginning of each session, and they were required to sign a consent form to show they would accept the payoff structure. It was made clear that the upfront payment of $120 guaranteed that subjects could not lose money for participating in this study[15]. On the average, subjects earned $140 in a session[16].

3. RESULTS

3.1. First period

Figure 1 shows the low-cost player's share in the proposals made in the first period. The left panels show the demands made by the low-cost players when they made the first period proposal. The right panels show offers made to the low-cost players when the high-cost players made the first period proposal. Each panel is designated by the delay costs (A, B) for the player either making or receiving the proposal in the first period. For ease of exposition, the term "offer" will henceforth refer to the low-cost player's share, regardless of who made the proposal. Recall that when the low-cost player makes the proposal, the SPE share of that player is $50, and when the high-cost player makes the proposal, the SPE offer is at least $45. Each offer is presented by a circle if it was accepted and by a black dot if it was rejected[17]. A solid vertical

[15] The maximum loss in our design ($120) can occur for the high cost player ($10) when T = 12.

[16] The amount of the cash prize was very attractive to students considering that an hourly wage for an on-campus job was about $35 during the first few sessions. The hourly wage was later raised to $50.

[17] Because some demands and offers in a given game are exactly the same, a small randomness was introduced to produce the graphic effect. Points that are partially overlapping each other are in fact representing the same exact amount. This is why some of the points are located slightly above $50. In the analysis, of course, the exact values were used.

line connects the minimum and maximum offers for each Game. A solid line joins the mean offers[18]. Reference lines are drawn horizontally at $25 (half the pie) and $50.

Insert Figure 1 about here

First period offers were subjected to a repeated measure ANOVA with Cost, Order, and Game[19] as the independent variables. Due to the non-orthogonal nature of the design, the analysis was conducted separately for the high cost value fixed at $10 (the upper 3 rows in Figure 1 corresponding to the $10.0 column in Table 1) and for the low cost value fixed at $5 (the lower 3 rows in Figure 1 corresponding to the $5.0 row in Table 1). All of the statistical tests in this section refer to the above analysis.

The following results are confirmed by the statistical analysis reported below:

(1) First period offers are, in general, non-decreasing with experience. In three cells ([5.0, 13.0], [10.0, 0.5], [10.0, 2.0]), first period offers increase significantly with experience (The exact F statistics for the hypothesis of no Game (repetition) effect in these three conditions are: $F(13,4) = 4.68$, $p < 0.02$; $F(10,4) = 20.64$, $p < 0.001$; $F(10,4) = 7.03$, $p < 0.001$, respectively. In all other cells the Game effect is not significant.)

(2) Low-cost players demanded more in the first period compared to what was offered to them by the high-cost players (when they moved first) under the same cost condition (compare offers within a row in Figure 1). The effect is significant ($p < 0.001$) at all cost levels (F = 32.35, 63.66, 18.18, 17.77, and 14.89 for cost levels [0.5, 10.0], [2.0, 10.0], [5.0, 10.0], [5.0, 13.0], and [5.0, 14.5], respectively).

(3) When the high-cost players moved first, they frequently demanded less than 50% of the pie (see the right panel in Figure 1 where in almost all conditions and games most offers are located above the $25 reference line[20]). In contrast, when moving first, the low-cost players, almost always demanded more than 50% of the pie.

(4) When the low-cost player moved first:

[18] Remember that the right panel presents offers to the low-cost player, hence, “low” offers are rejected and “high” are accepted, whereas the left panel presents demands by the low-cost player, hence “high” demands are rejected and “low” are accepted.

[19] Because the number of games played in a session varied, and it is important that all experimental conditions will be compared at the same experience level, the analysis is limited to the first 5 games (the minimum played in a session).

[20] Recall that the figure presents offers to the low-cost players. Offers above the $25 reference line thus indicate demands (by the high cost player) for less than half the pie.

a- for a fixed high-cost value ($10), the higher the cost to the low-cost player the lower their first period demands ($F(2, 42) = 15.14$, $p < 0.001$ -- see the top three cells on the left panel of Figure 1), supporting H1a.

b- for a fixed low-cost value ($5.0), first period demands did not change significantly as a function of the cost to the high cost player ($F(2, 48) = 2.48$, $p > 0.09$ -- see the bottom three cells on the left panel of Figure 1), not supporting H4a.

(5) When the high-cost player moved first:

a- for a fixed high-cost value ($10), the higher the cost to the low-cost players the lower the offers that were made to them ($F(2, 37) = 2.97$, $p < 0.06$ -- see the top three cells on the right panel of Figure 1[21]), supporting H2a.

b- for a fixed low-cost value ($5.0), first period offers did not change significantly as a function of the cost to the high-cost player ($F(2, 38) = 0.06$, ns -- see the bottom three cells on the right panel of Figure 1), not supporting H5a.

These results suggest that behavior in the first period seems to be affected more by the punishment costs that the high-cost players can impose on the low-cost players than by the amount of sacrifice that is required from the high-cost player to punish low-cost players for unfair demands.

3.2. Agreements

Figure 2 presents the low-cost players' net payoff (after accounting for delay costs) in agreements by the experimental condition. Payoffs are a function of the agreed division of the pie and the period of agreement. The meaning of the symbols remains the same as in Figure 1 except that a circle indicates that the low-cost player made the accepted offer and a black dot indicates that the high-cost player made the accepted offer. Most games ended (in agreement) with the high-cost player accepting the low cost player's demand.

Insert Figure 2 about here

As with first period offers, payoffs were subjected to the same repeated measure ANOVA with Cost, Order and Game as the independent variables. All of the statistical tests in this section refer to the above analysis.

For the most part, payoffs mirror the findings from first-period offers (since 56.6% of games ended in the first period). The major difference is that the low-cost players' net payoffs in

[21] A Duncan's Multiple Range Test on the average offers to the low-cost players indicates that all three pair wise comparisons are significantly different from each over at the 0.05 significant level.

agreements are independent of who made the first demand (compare payoffs within a row in Figure 2). The effects are insignificant at all cost levels (F = 1.65, 0.29, 0.11, 1.31, and 1.95 for cost levels [0.5, 10.0], [2.0, 10.0], [5.0, 10.0], [5.0, 13.0], and [5.0, 14.5], respectively). The fact that high-cost players offered the low-cost players less when they made the first period offer (compared to what low-cost players demanded under the same cost structure) was negated by the fact that about half of these offers (54.7%) were rejected, followed by an agreement that resulted from a low-cost player's demand.

Similar to first-period offers, for a fixed high-cost value ($10), the lower the cost to the low-cost players (regardless if they moved first or second), the higher their net payoff in agreements ($F(2, 79) = 29.33$, $p < 0.001$ -- see the top three rows of Figure 2), supporting H1b and H2b. For a fixed low-cost value ($5.0), the net payoffs to the low-cost players in agreement is a function of the cost to the high-cost players ($F(2, 86) = 3.09$, $p < 0.05$ -- see the bottom three rows of Figure 2). A Duncan's multiple range test for the mean low-cost players' net payoffs in agreements (over the first 5 games) revealed that these payoffs are significantly higher when the high cost value is $13.0 compared to when it is $10 or $14.5, but the latter two conditions did not differ significantly from each other, only partially supporting H4b and H5b.[22]

Similar to first-period behavior, these results again suggest that net payoffs to the low-cost players are affected more by the punishment costs that the high-cost players can impose on the low-cost players than by the amount of sacrifice that is required from the high-cost player to punish low-cost players for unfair demands.

3.3. Disadvantageous behavior:

Two types of behavior indicate that subjects are not motivated solely by their own monetary gains:

1. Rejecting last period offer[23], and
2. Rejecting an offer (x) and subsequently making a disadvantageous counter demand (y) (i.e., x > y - cost)

(1) Overall, 43 games (out of 1067) reached the maximum period and in 26 of these games the maximum period offer was rejected. Clearly, given that a game reached the maximum period, the chances of disagreement are very high.

[22] H4b and H5b predict that the low-cost player's share in agreements is highest when the high-cost player pays $14.5 for one period delay.

[23] In our game, cost is per rejection hence a player should prefer accepting zero (in the maximum period) to rejection and terminating the bargaining with disagreement.

(2) Table 2 presents the distributions of disadvantageous counter offers, and the number of subjects who made at least one disadvantageous counter-offer by the experimental condition and player identity (low- or high-cost). Overall, there were 1387 non-maximum period rejections (540 by A and 847 by B). In 121 cases, rejection was followed by a disadvantageous counter-offer (8.7%)[24].

(3) Out of the 121 disadvantageous counter-offers, 102 were made by the high-cost player (56 when it was B and 46 when it was A). When A was the low-cost player, he/she never made a disadvantageous counter-offer beyond the 3rd game. When B was the low-cost player, this behavior took longer to clear (7 disadvantageous counter offers were made beyond the 3rd game).

(4) Most subjects never made any disadvantageous counter-offers. Out of 151 high-cost players, 98 subjects never made such an offer (47 out of 79 when B was the high cost player and 51 out of 72 when A was the high cost player). This, in addition to the overall percentage reported in point 2 above, indicates that in the current study this behavior occurred less frequently than previously reported in similar games with discounting[25].

(5) The percentage of disadvantageous counter-offers declined almost systematically with experience (the percentages are 10.9, 8.9, 8.19, 9.0, 7.46, 6.7, 6.2, 5.9 for games 1 to 8, respectively; games 9 to 12 were too short to produce enough data points for this analysis). Note that in general the low-cost players' demands in period 1 did not decrease with experience (see the first column of Figure 1). Consequently, the decline in the number of disadvantageous counter-offers with experience indicates that the high-cost players learned to accept unequal division, rather than the low-cost players learning to demand less.

(6) Both the number of subjects who made at least one disadvantageous counter-offer and the proportions of such offers follow a clear pattern: they are monotonically increasing with the cost to the low-cost player (H3), and monotonically decreasing with the cost to the high-cost player (H6). In particular, when the low-cost player pays \$0.5, \$2.0, or \$5.0 per rejection and the high cost player pays \$10, the percentages of disadvantageous counter-offers (by the high cost player aggregated across roles) increase from 5.3% to 7.1% to 33.8%, respectively (the same

[24] In 2 out of the 121 cases, the rejection of an offer x was itself disadvantageous in the sense that the cost of delay by one period could not have been recovered in the next period (i.e., $x >$ pie - cost).

[25] The percentages of disadvantageous counter-offers were 81% in Ochs and Roth (1989), 75% in game A of Binmore, Shaked and Sutton (1985), 65% in the two experiments of Neelin, Sonnenschein and Spiegel (1988), 66.7% (df=2/3) and 100% (df=1/6) in Weg, Rapoport and Felsenthal (1990), 82.1% (df=2/3) and 100% (df=1/6) in Zwick, Rapoport and Howard (1992), and 13.4% and 77.5% in periods 2 and 3, respectively, in Weg, Zwick and Rapoport (1996).

pattern exists when A or B is the high-cost player as can be seen in Table 2), supporting H3. Similarly, when the high-cost player pays \$10, \$13, or \$14.5 per rejection and the low-cost player pays \$5 per rejection, the percentages of disadvantageous counter-offers (by the high-cost player aggregated across roles) decrease from 33.8% to 31.1% to 7.6%, respectively, supporting H6. The same pattern holds for the number of subjects who made at least one disadvantageous counter-offer[26].

(7) In the four conditions where the majority of disadvantageous counter-offers were made [(5, 10), (5, 13), the low-cost player moves first or second], the frequency does not decline with experience. In almost all of these cases, the high-cost player rejects less than 50% of the pie and offers him/herself 50% in the next period even though it is disadvantageous.

Insert Table 2 about here

3.4. First period behavior across games

Although the effect of the game on first period offers was found to be non-significant in most conditions (see Table 2), a closer inspection of game-to-game variability in first period offers revealed a consistent pattern. Following Ochs and Roth (1989), Zwick et al. (1992) and Weg et al. (1996), we examined first period demand (by A) in game t (D_t) in relation to the previous game's first-period demand (D_{t-1}) and player B's response made to the latter (accepted or rejected). This information by Cost condition, aggregated over all A Players, is presented in Table 3. Note that about 47% of all responses did not change as a result of player B's response to the previous game demand. This high proportion partly explains the insignificant Game effect. This proportion of unchanging behavior is not unexpected. Similar proportions are reported by Ochs and Roth (1989), Zwick et al. (1992), and Weg et al. (1996).

An adaptive (monotonic) response is defined to be a strict increase of the current game's first-period demand compared to the immediately preceding game's first-period demand when the latter is accepted and a strict decrease when it is rejected. Table 3 shows that the sign of D_t - D_{t-1}, when it is not zero (e.g., $D_t = D_{t-1}$), is a good predictor of the response to the immediately preceding game's first-period demand. There were 917 first period demands (excluding the first

[26] If disadvantageous counter offers were not a function of delay costs, we would expect the frequencies of these offers to be randomly distributed among the experimental conditions (the null hypothesis). For a fixed high cost value (\$10), there are three levels of low-costs (0.5, 2.0 and 5.0). Consequently, under the null hypothesis, each of the six possible frequency orders of disadvantageous counter offers are equally likely. Since we have two such independent conditions ($C_A<C_B$ and $C_A>C_B$), the probability of observing the orders reported in Table 2 (under the null hypothesis) is 1/36, given statistical support to the causal observation. The same is true for fixing the low-cost value.

game). After a demand was accepted, the next demand was higher in 42% and lower in 3% of the games. After rejection, the demand was higher in 11% and lower in 51% of the games. Thus, it can be seen that only about 6.5% of the responses, where $D_t \neq D_{t-1}$, are strictly non-adaptive, occurring mostly after a rejection. However, a closer inspection of Table 3 reveals that the level of adaptivity varies with cost composition.

The percentage of Player A demanding less (in the first period of the next game) after rejection (strict adaptive behavior) monotonically increases with his/her cost, and monotonically decreases with the cost to player B. In particular, when B's cost is fixed at $10, the percentages increase from 19% to 37% to 61% when A's cost increases from $0.5 to $2.0 to $5.0, respectively. Similarly, when B's cost is fixed at $5, the percentages increase from 28% to 58% to 66% when A's cost increases from $10.0 to $13.0 to $14.5, respectively. On the other hand, when A's cost is fixed at $5, the percentages decrease from 61% to 54% to 44% when B's cost increases from $10.0 to $13.0 to $14.5, respectively. Similarly, when A's cost is fixed at $10, the percentages decrease from 67% to 56% to 28% when B's cost increases from $0.5 to $2.0 to $5.0, respectively (see Table 3's "Rejected $D_t < D_{t-1}$" column.)

The above observation cannot be explained by simple, fortuitous behavior. That is, if Player A makes first-period demands at random, then the higher the first period demand in one game, the better the chance that the next demand will be lower regardless of B's reply. Note, however, that in all of the above comparisons, the higher the percentage of demanding less after rejection, the lower the rejected demands were to begin with (see Figure 1 solid line).

The same pattern (mirror image) can also be detected by looking at the percentages of demanding the same after rejection (see Table 3 in the "Rejected $D_t = D_{t-1}$" column).

There is no clear pattern (as a function of costs) in the level of strict adaptivity after acceptance. First, it was much more common for A Players to demand the same after acceptance (55%) compared to after rejection (38%). Second, adaptivity after acceptance is bounded above by the size of the pie. For example, 35.4% of first-period demands in condition (0.5, 10.0) were for the entire pie. Consequently, after acceptance (82.2% were accepted) a higher demand is impossible.

Only 13 first movers (out of 151) asked for less after their demand was accepted (only one of them did it twice, the rest one time). Forty subjects asked for more after rejection (accounting for the 48 violations). Only 2 subjects violated both conditions.

Insert Table 3 about here

4. DISCUSSION

Our study investigates the nature of the tradeoff between pursuing one's strategic advantage and giving weight to other players' concern for fairness, on the one hand, and the value of pursuing a fair outcome from a disadvantaged position and the cost of that pursuit, on the other. In particular, we hypothesized that one's willingness to pursue one's strategic advantage, disregarding the other players' concern for fairness, is higher the smaller the punishment, and one's willingness to sacrifice one's material well-being to punish others for unfair treatment is higher the smaller the material cost of sacrifice.

In what follows we briefly summarize the most important results and indicate their support to the above conjectures.

4.1. ***First and final (accepted) offers***. When the high-cost players moved first, they frequently demanded and got less than 50% of the pie. In contrast, the low-cost players, when moving first, almost always demanded and got (much) more than 50% of the pie. Still, when the low-cost players moved first, for a fixed high-cost value ($10), an increase in their cost of delay reduced their first period demands and reduced their net payoff in the final agreement, supporting H1a and H1b. Similarly, when the high-cost player moved first, for a fixed high cost value ($10), an increase in the cost of delay for the low-cost players reduced the first period offers they made to the low-cost players and reduced the low-cost players' net payoff in the final agreement, supporting H2a and H2b. These findings indicate that players recognize strategic power derived from cost advantage. Low-cost players exploit this advantage, but the degree of exploitation is moderated by their own cost of rejection. The fact that low-cost players are sensitive to their own costs of rejection in the first period suggests that they have an understanding that high-cost players will be "looking for fair treatment" and will incur some cost themselves in an attempt to secure "fairness".

Contrary to the support we found for the hypotheses dealing with a fixed high-cost value and varied low-cost values, the hypotheses dealing with a fixed low-cost value and varied high-cost values were not supported by the data (H4 and H5). The low cost players' share did not vary with the high-cost values in first-period offers, and varied in an unexpected way (highest for high cost of $13.0) in agreements. We do not know how to explain the last finding but can offer two explanations for the former. First, it is possible that the high-cost values of $10, $13, and $14.5 were not perceived (by both high and low cost players) to be sufficiently different to cause change in the willingness of the high cost players to punish low cost players for unfair treatment.

To test this explanation, a higher variation in the high-cost values is needed. Note that this explanation conforms to a concave utility function of money where the psychological perception of differences is higher in the lower domain. Consequently, varying the low-cost values by the same absolute amount (5-2 = 13-10 and 2-0.5=14.5-13) evoked more influence on behavior.

Second, Table 4 presents the differences and ratios between players' costs in our study. Note that we have fixed the differences between the costs to be \$9.5 and \$8 in the two sub-designs of our study (fixed low cost and varied high cost on the one hand and fixed high cost and varied low cost on the other hand). On the other hand, the cost ratios varied greatly in the fixed high-cost sub-design (20, 5 and 2), whereas the ratios are almost the same in the fixed low-cost sub-design (2.9, 2.6 and 2). It is possible that when players think about the relationship between the costs to punish and to be punished, they think in terms of the ratio of the costs and not in terms of their differences. This can explain why the main differences in our study were found in the fixed high-cost sub-design. Support for this interpretation can be found in numerous experimental confirmations of the Aristotelian ratio models of equity and inequality (e.g., Adams 1965; Anderson and Farkas 1975).[27] Further experimentation with different cost relationships is needed to clarify these points.

Insert Table 4 about here

The above findings might indicate that the high cost players are not price sensitive in their pursuit of fair treatment. Note, however, that the data from the disadvantageous counter offers indicates that they are indeed price sensitive in their pursuit of fairness. The higher the price, the less likely they are to make a disadvantageous counter offer.

4.2. ***Disadvantageous behavior***. We found that, first, the high-cost players made most of the disadvantageous counter-offers. Second, the percentage of disadvantageous counter-offers declined almost systematically with experience. Third, both the number of subjects who made at least one disadvantageous counter offer and the proportions of such offers follow a clear pattern: they increase monotonically with the cost to the low-cost player, and decrease monotonically with the cost to the high-cost player, supporting both H3 and H6. This indicates that high-cost players recognize the strategic advantage of low-cost players and attempt to resist its exploitation. Their willingness to demand fairness and to punish unfair treatment is an increasing function of their own costs of rejection and this willingness is eroded with experience.

[27] There are, however, studies that argue against the ratio models (see for example Mellers 1982).

4.3. ***Adaptive behavior***. Previous studies with similar games have reported an adaptive behavior across games by the first mover that can be described as a systematic search for the highest acceptable demand (e.g., Ochs and Roth 1989; Zwick et al. 1992; and Weg et al. 1996). The search is characterized by lower demands after rejection and higher demands after acceptance. The important finding in our study is that the level of adaptation is a function of the costs involved.

We found that the percentage of A players demanding less (in the first period of the next game) after rejection (strict adaptive behavior) increases monotonically with their cost, and decreases monotonically with the cost to player B. The same pattern (mirror image) can also be detected by looking at the percentages of demanding the same after rejection. This indicates that the willingness of the low-cost players to demand their "strategic fair share" and not to adapt to the high-cost players' reply is a decreasing function of their own costs of rejection. The willingness of the high-cost players to demand fairness and to persist in their demand for fairness (by not adapting to the low-cost players' reply), is itself a decreasing function of their own costs of rejection.

To summarize, low-cost players recognize their strategic advantage and attempt to exploit it. The degree to which they attempt to exploit this advantage depends upon their own costs of rejection. The higher their own costs, the less extreme their own demands. High-cost players recognize the strategic advantage of low-cost players and attempt to resist its exploitation. Their willingness to persist in rejecting extreme divisions of the money is eroded with experience and with persistent extreme demands by low-cost players. Further, the willingness of high-cost players to demand fairness and to persist in their demands for fairness is a decreasing function of their own costs of rejection. These findings indicate that "fairness" has a price, and the higher its price, the lower the "demand" for it. This suggests that demands for fairness are subject to cost-benefit evaluation, and are in this sense deliberate and well thought out.

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Table 1

Experimental Design

	High Cost					
	$10.0		$13.0		$14.5	
Low Cost	$c_A < c_B$	$c_A > c_B$	$c_A < c_B$	$c_A > c_B$	$c_A < c_B$	$c_A > c_B$
$0.5	T = 12 N = 16, 10 I = 9, 11 SPE = 50	T = 12 N = 16, 12 I = 6, 8 SPE = 49.5				
$2.0	T = 12 N = 12, 16 I = 6, 8 SPE = 50	T = 12 N = 18, 10 I = 6, 12 SPE = 48				
$5.0	T = 11 N = 18, 20 I = 5, 6 SPE = 50	T = 12 N = 12, 12 I = 6, 7 SPE = 45	T = 9 N = 18, 16 I = 5, 9 SPE = 50	T = 8 N = 12, 18 I = 5, 7 SPE = 45	T = 7 N = 16, 16 I = 9, 5 SPE = 50	T = 8 N = 12, 22 I = 8, 7 SPE = 45

T = Maximum number of periods
N = Number of subjects in a session (two sessions in each condition)
I = Number of games played in a session
SPE = Predicted share to the low cost player

Table 2

Frequency distributions (%) and number of subjects (N) who made disadvantageous counter offers

	$C_A<C_B$				$C_A>C_B$			
	A		B		A		B	
Costs	%	N	%	N	%	N	%	N
(0.5, 10.0)	0.0	0	6.7	3	3.7	2	0.0	0
(2.0, 10.0)	1.3	1	7.1	5	7.1	4	1.7	1
(5.0, 10.0)	4.5	3	28.4	11	42.6	7	5.0	2
(5.0, 13.0)	4.2	2	25.9	8	38.9	6	4.2	3
(5.0, 14.5)	0.0	2	9.1	5	5.7	2	4.0	1
	2.1	8	15.2	32	18.2	21	2.7	7

Table 3
A Players' First-Period Demands Across Games

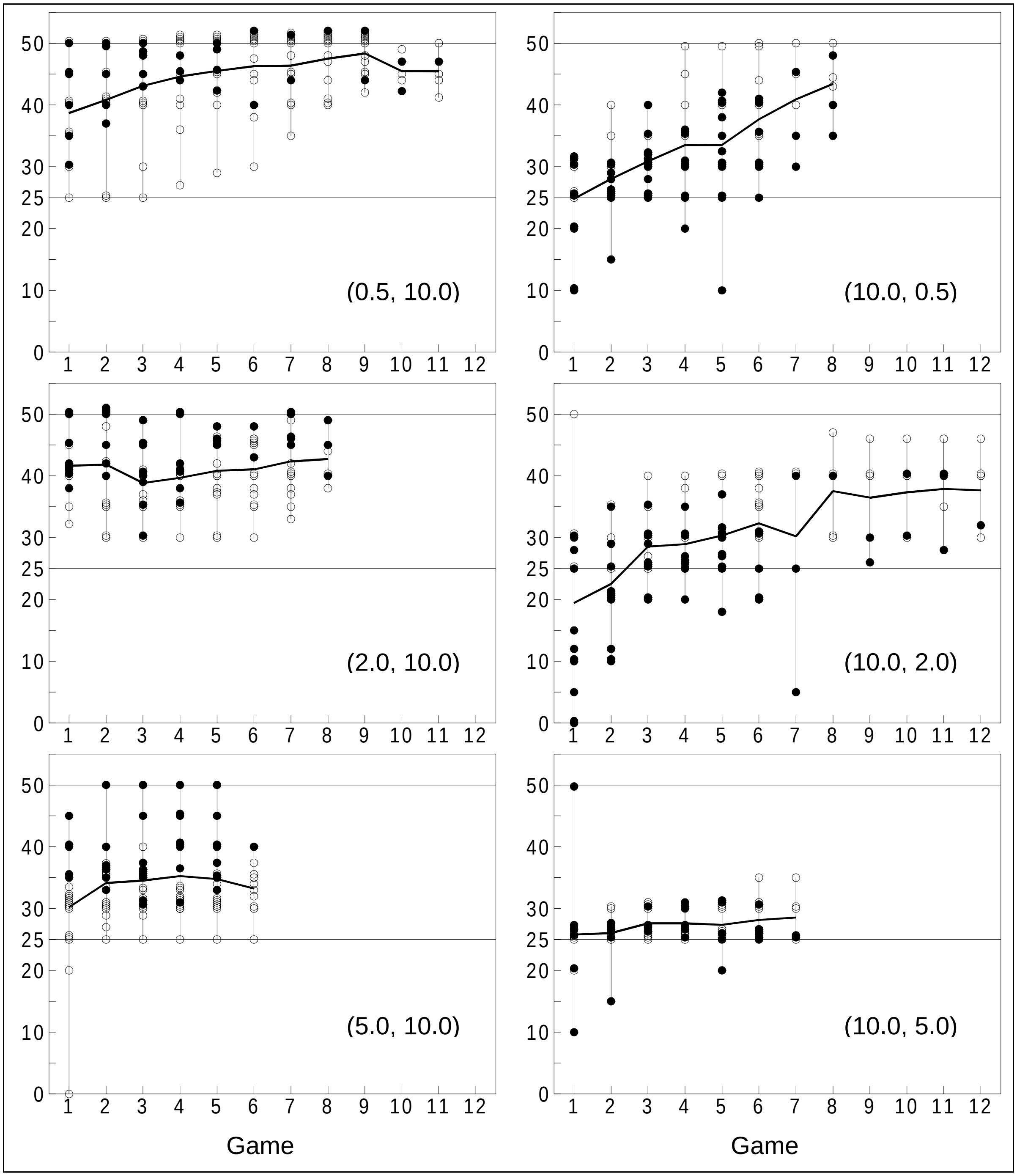
		D_{t-1}							
		Accepted				Rejected			
Cost A	Cost B	% $D_t>D_{t-1}$	% $D_t=D_{t-1}$	% $D_t<D_{t-1}$	N	% $D_t>D_{t-1}$	% $D_t=D_{t-1}$	% $D_t<D_{t-1}$	N
0.5	10.0	43	56	1	82	22	59	19	32
2.0	10.0	58	40	2	52	18	45	37	38
5.0	10.0	38	58	4	52	12	27	61	33
5.0	13.0	49	51	0	72	14	32	54	28
5.0	14.5	48	48	3	60	14	42	44	36
Overall (A low cost)		47	51	2	318	16	41	43	167
10.0	0.5	50	41	9	22	3	30	67	60
10.0	2.0	38	57	5	37	10	35	56	63
10.0	5.0	6	88	6	34	9	63	28	32
13.0	5.0	21	77	3	39	8	34	58	38
14.5	5.0	54	44	2	57	10	24	66	50
Overall (A High Cost)		35	61	4	189	8	35	57	243
Over All		42	55	3	507	11	38	51	410

TABLE 4
Differences and Ratios of Costs in the Experimental Design

Costs			
Low	High	Difference	Ratio
0.5	10	9.5	20
2	10	8	5
5	10	5	2
5	13	8	2.6
5	14.5	9.5	2.9

FIGURE 1

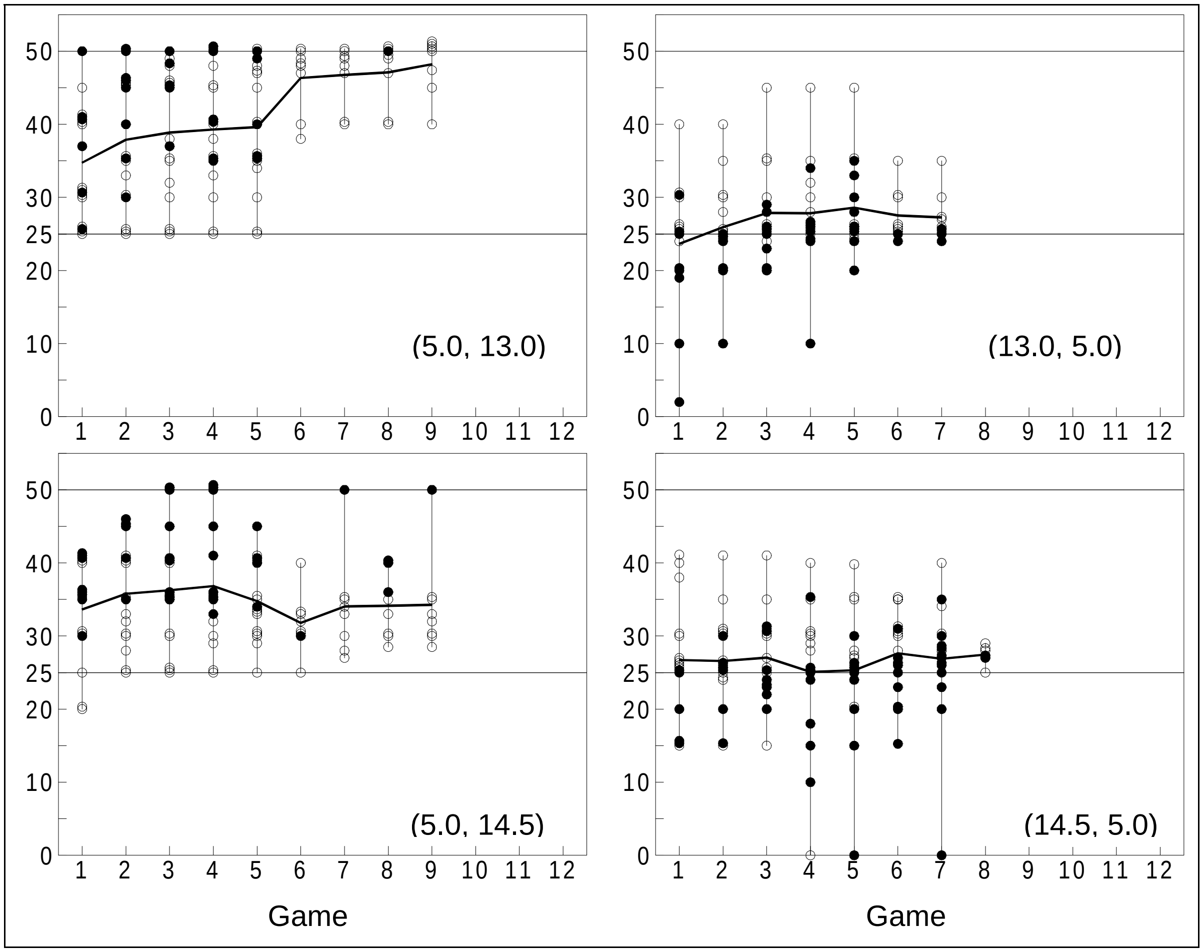
LOW-COST PLAYER'S PROPOSED SHARE IN PERIOD 1



Continued

FIGURE 1

CONTINUED



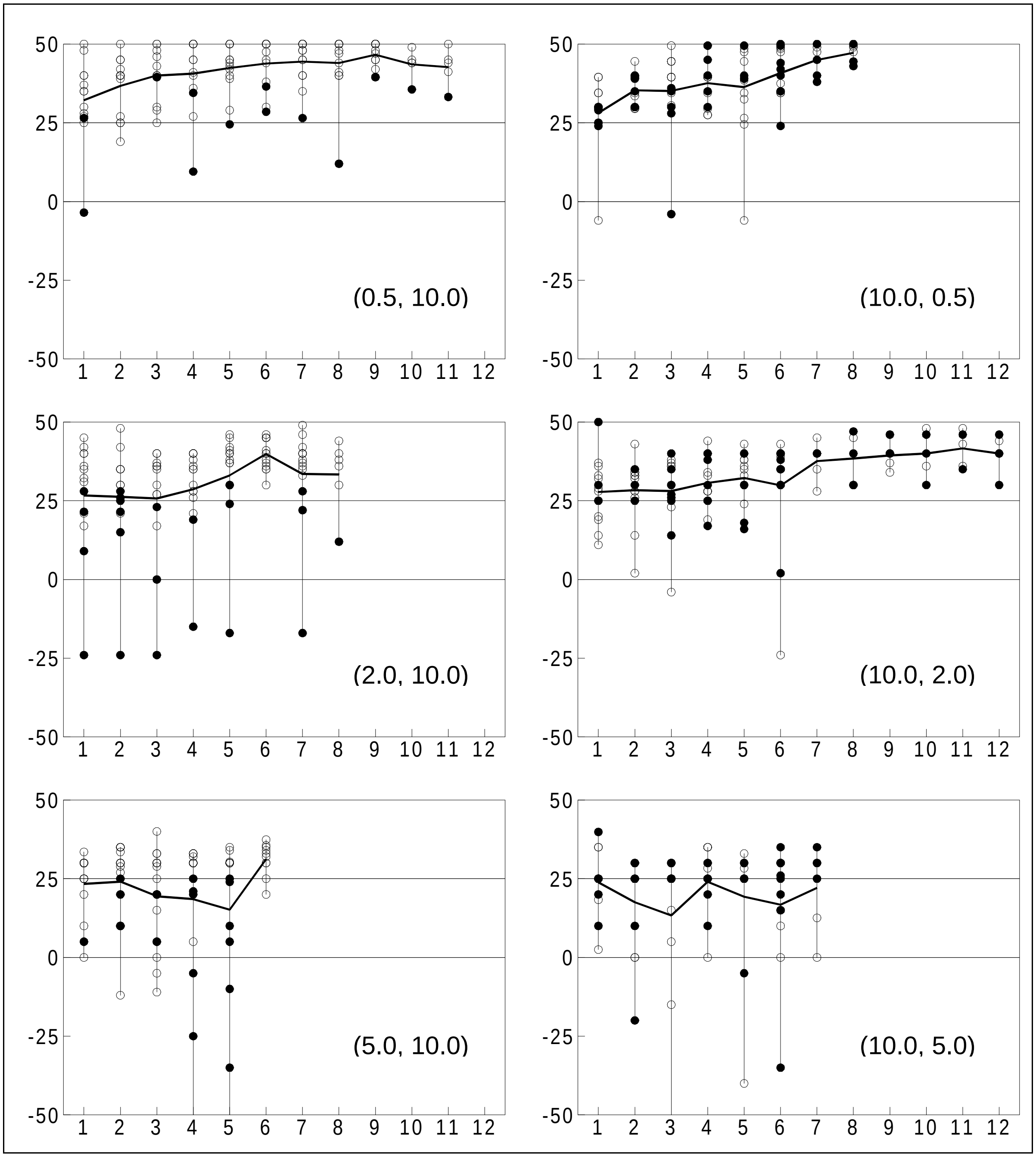
Legend

● Rejected

○ Accepted

FIGURE 2

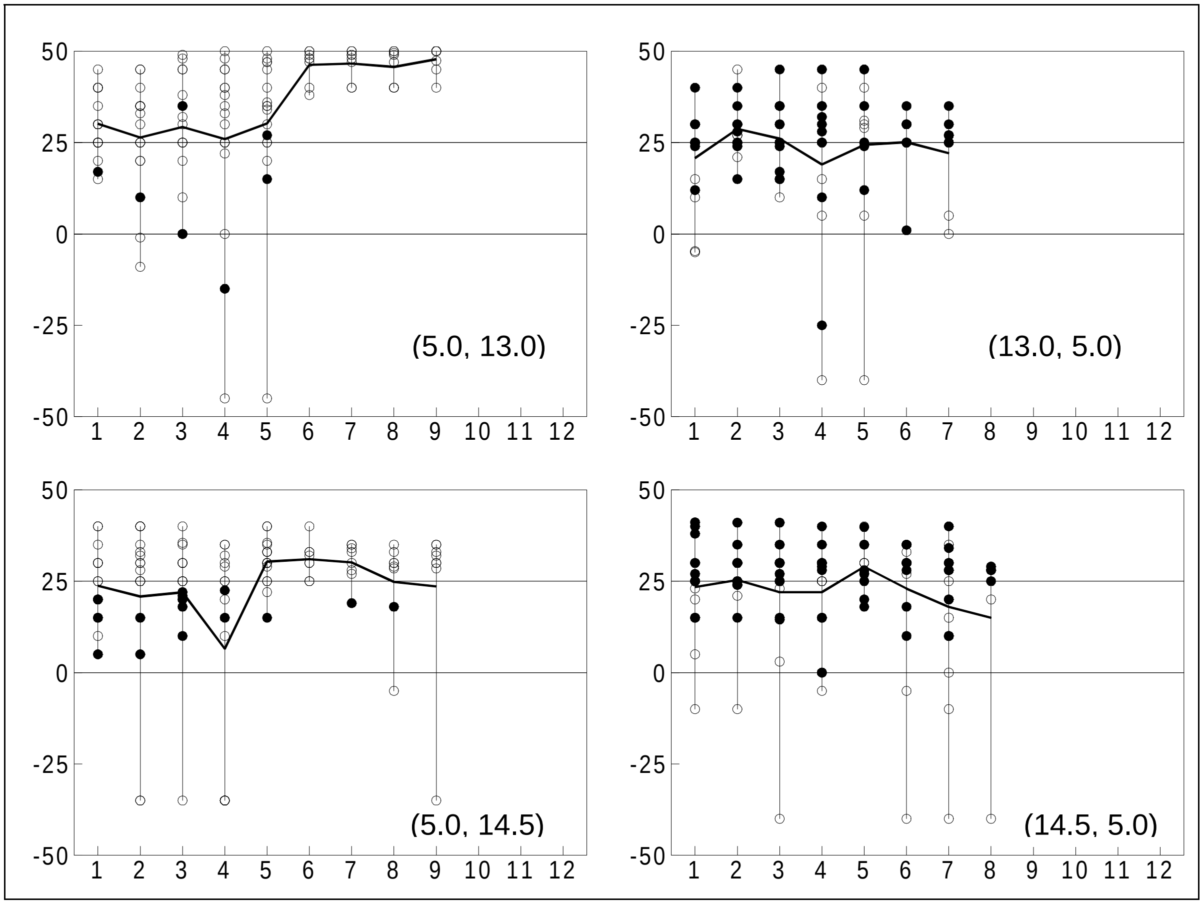
Low-cost player's net payoff in AGREEMENTS



Continued

FIGURE 2

CONTINUED



Legend

Mean Payoff

Accepted offer was made by:

- ● High cost player
- ○ Low cost player