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THE SALIENCE OF JUSTICE NORMS IN A NONSUPERADDITIVE GAME

BY

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Contents

Abstract

In many studies of coalition formation, the value of the grand coalition (the coalition of all players) is much greater than the values of all smaller coalitions. The present study attempted to extend the generality of several theories by assessing their accuracy in a game where the grand coalition is set to zero. The effects of inputs on the accuracy of different theories were examined, as well as the effects of two variables designed to increase the competitive motivation of the bargainers. The results indicate that increased competitive motivation had negligible effects, but several properties of the inputs had significant effects on the accuracy of different theories. The results suggest some important limitations on the generality of several theories; in particular, that equity theory is severely restricted in generality.

A coalition may be defined as two or more parties who agree to cooperate (pool their resources) in order to obtain some mutually desired outcome (Komorita and Kravitz, 1983). Outcomes may be anything that human beings desire (wealth, status, power, etc.) and the resources that are pooled may be anything necessary to obtain the desired outcome (skills, abilities, money, etc.). Examples of coalitions include: a group of workers banding together to form a trade union to obtain better working conditions, a major political party that uses the joint resources of individual members to influence government policies, or the merger of companies who pool their resources to increase profit. At the organizational level, the influence of coalitions was described by Cyert and March (1963) who argued that the operative goals of an organization arise from the characteristics of the persons in the dominant coalition. Because coalition formation is a pervasive aspect of social interaction, it is important to understand coalition processes and the behaviors that accompany them.

A review of theory and research in coalition formation indicates that a variety of theories have been proposed (cf. reviews by Kahan and Rapoport, 1984; Komorita and Kravitz, 1983; Murnighan, 1978). Many of these theories are based on two important concepts:

power and equity. The most relevant conceptualization of power in coalition situations is one proposed by Thibaut and Kelley (1959). They hypothesize that a person's bargaining power is based on his/her "comparison level for alternatives (CLalt), defined as the lowest level of outcomes a member will accept in light of alternative opportunities" (p.21). If outcomes in a relationship are greater than a person's Clalts , he/she is likely to stay in that relationship. If, however, the outcome of one of the parties is less than his/her Clalt , then he/she is more likely to leave the relationship. One implication in a coalition situation is that the member with lower expectations in alternative coalitions is likely to concede more than a member who has greater expectations. There is considerable evidence supporting this conception of bargaining power (Thibaut and Faucheux, 1965; Thibaut and Gruder, 1969; Komorita and Kravitz, 1979; Komorita, Lapworth, and Tumonis, 1981). Furthermore, there is substantial evidence to suggest that power based on Clalts of the bargainers has considerable influence on reward distributions in a coalition situation (cf. reviews by Murningham, 1978; Kahan and Rapoport, 1984).

The concept of equity (justice) can be more appropriately described as norms regarding a fair or reasonable distribution of rewards in a relationship.

There is considerable evidence to support the significant effects of justice norms on reward distribution in a coalition situation (Gamson, 1961; Komorita and Chertkoff, 1973; Rapoport and Kahan, 1983). For example, in Levanthal and Michaels' (1969) reward allocation paradigm, two subjects are asked to perform a joint task and are given feedback on their performance on the task. Based on their joint performance they are awarded a group reward (prize) and one of them is given the authority to allocate (divide) the prize. Subjects who are given the authority to divide the prize consistently allocate a sizable share of money to their co-worker (Levanthal and Lane, 1970; Levanthal and Michaels, 1969). The fact that the allocator could have taken all of the money with no fear of retaliation from their co-worker testifies to the strength of the justice motive.

Despite numerous studies supporting the importance of power and justice in coalition situations, few attempts have been made to integrate the two concepts. It has been suggested that any theory that ignores either power or justice is not likely to be accurate in a variety of situations (Komorita, 1984). As a test of this hypothesis, Komorita and Leung (1985) extended the typical coalition paradigm by requiring subjects to "invest" varying numbers of points in a three-person

game.

To illustrate this paradigm, consider the three-person game shown in Figure 1, where A, B, and C denote the three players, and v( ) denotes the value of the coalition in parentheses.

Insert Figure 1 about here

This game is an example of a class of games called a quota game (Shapley, 1953) in which there is a vector of weights associated with the players such that for any pair of players i and j, $v(ij) = w_i + w_j$. These weights are called the quota values of the players, and the value of each coalition is equal to the sum of the quota values of the players in that coalition. Quota values represent an index of power (bargaining advantage) of the players in the game. For the game in Figure 1, the quota values of players A, B, and C are 60, 40, and 20, respectively.[a]

In a typical experiment using this paradigm, the three players are asked to assume that they are three investors who must form a business partnership to maximize profit. If no partnership is formed, their profit is zero; if a partnership is formed, the profit is 150, 100, 80, or 60, as specified in the quota game.

To introduce justice norms in this coalition situation, the three subjects are told that each must pay a certain number of points at the beginning of the game. These points represent the overhead costs (investments) of the business partners. For example, prior to bargaining, players A, B, and C, are required to make investments (inputs) of 35, 25, and 15 units, respectively. The interesting question is how such "investments" will affect the negotiation of profit.

In the game presented here, the value of the ABC coalition is much larger than the values of the other coalitions. This type of game is said to be superadditive , defined as a game in which the value of any coalition is at least as large as the sum of the quota values of the nonoverlapping subsets of players in the coalition. Since the value of the ABC coalition is much larger than the values of the other coalitions, it is reasonable to assume that the ABC coalition is very likely to form. There is considerable evidence suggesting that the probability of the ABC coalition increases directly with its value, relative to the values of the two person coalitions (Komorita, Hamilton, & Kravitz, 1984; Medlin, 1976).

Also, it can be seen that the values of the alternative coalitions of the three players differ: 100 and 80 for player A, 100 and 60 for player B, and 80 and

60 for player C. According to the alternatives of the players (CLalt), player A should get the largest share and player C the smallest. There is considerable evidence supporting this hypothesis (Komorita, 1984; Murningham, 1978).

Three types of models yield predictions in this paradigm: 1) models based exclusively on justice norms, 2) models based exclusively on power (ignoring the inputs of the bargainers), and 3) models based on both norms of justice and the power of the bargainers. The models examined in this project included three models based on justice and one based on both justice and power. Previous studies have shown that models that ignore the investments of the bargainers are inadequate; hence, models based solely on power were not examined.

Models Based on Justice Norms

The three models based exclusively on justice norms were: (1) Equity Theory (Adams, 1963), (2) The Equal Surplus Norm (Komorita and Leung, 1985), and (3) The Bargaining Theory (Komorita and Chertkoff, 1973).

Equity theory predicts that shares in a coalition should be directly proportional to the inputs made by each of the members.

The equal surplus norm is based on the principle that each bargainer should receive his/her input, and

the excess profit should be divided equally among the bargainers. The equal surplus norm can be defined by Equation 1:

$$E_{iS} = I_i + (1/n)(V - \sum I_i),$$

where E_{iS} denotes the expected reward of player i in coalition S; I denotes player i's input; and the summation is over n, the number of players in coalition S.

The bargaining theory predicts that expectations will be based on splitting-the-difference between the equity and equality norms.

A Model Based on Both Justice and Power

The Equal Excess Model (Komorita, 1979) assumes that the expectations of the bargainers will change over rounds of bargaining. Initially, the model predicts that each person will attempt to form the coalition that maxmizes initial expectations, denoted E_{iS}, for indivdual i in coalition S, as follows:

E_{iS} = v(S)/s, where v(S) denotes the value of S and s denotes the number of persons in S. The basic assumption of this model is illustrated in Equation 2:

$$E^{r}_{iS} = \max E^{r-1}_{iT} + (1/s)\,[\, v(S) - \sum \max E^{r-1}_{iT} \,],$$

where E^{r}_{iS} denotes the expectation of member i in coalition S on round r; max E^{r-1}_{iT} denotes the maximum expectation of member i in alternative coalitions on the previous round; and the summation is over s, the number of members in coalition S. Successive iterations of Equation 2 yield predictions on subsequent rounds of bargaining.

To account for the investments of bargainers in the coalition-input paradigm, Komorita, Leung, and Barth (1986) proposed an extension of the equal excess model that transforms the original three-person game into a new game according to the following rule:

$$v(S)' = v(S) - \sum I_j,$$

where v(S) and v(S)' denote the values of coalition S in the original and transformed game, respectively; I denotes the input of bargainer j; and the summation is over the members of coalition S. Predictions are derived from the transformed game using the equal excess model, then the inputs (investments) of the bargainers are added to these predicted shares yielding predictions

relative to the original game.

Summary Results of Coalition-Input Paradigm

Several studies have used this paradigm. Both inputs and quota values appear to have significant effects on bargaining outcomes, but inputs are much more salient than quota values (Komorita and Leung, 1985). In general, the results support the predictions of the justice norms, and are inconsistent with theories that ignore the inputs of the bargainers. The results suggest that no one theory is likely to be valid in all types of games. Thus, it is important to determine the generality of each theory.

Studies by Komorita and Leung (1985) and Komorita, Ellis, and Melton (1987) evaluated the accuracy of the justice norms and obtained the following results: first, the justice norms are more accurate when there is a high correspondance between inputs and quota values. Second, equity theory is more accurate when the value (profit) of the partnership is small relative to the sum of the inputs, whereas equal surplus is more accurate when the profit is large. Third, the justice norms are less accurate when the variance of inputs is very large. Equity theory is extremely inaccurate and sensitive to high input variance.

These results have important implications for the

generality of these theories. In particular, they indicate that equity theory is severely restricted in generality, and suggest that its long-range prospects as a universal theory of coalition bargaining are not very promising. Furthermore, since justice norms completely ignore the quota values of the bargainers, they cannot account for the effects of power (alternatives) in coalition formation. Any theory that ignores either power or justice is unlikely to be accurate in a variety of situations (Komorita and Leung, 1985).

Other experiments using this paradigm have shown that bargainers sometimes accepted shares that were less than those they could have received in an alternative coalition (Komorita, Ellis, and Melton, 1987). It was suggested that norms of reward allocation may have been in conflict with another type of norm: a norm of maximizing collective welfare. The latter norm prescribes that some members are expected to sacrifice individual gain in the interest of group welfare. In triads in which players A and B accepted shares (by forming ABC) that were less than their joint outcome in AB, the norm of collective welfare may have dominated the equity norm. In other triads, the AB coalition may have formed because the norm of maximizing collective welfare may not have been as salient. It was suggested that coalition formation is not based entirely on

maximizing payoffs, and other motives, such as collective welfare, also play an important role (Komorita, Ellis, and Melton, 1987). This implies that factors like collective welfare should be taken into account if a theory of coalition formation is to be accurate in a variety of situations.

If the norm of collective welfare has a significant effect on the salience of justice norms, then it is plausible that rendering collective welfare irrelevant may reduce the salience of these norms. This implies that justice norms are less likely to be accurate in situations where collective welfare is unimportant. Figure 2 illustrates a variation of the coalition-input paradigm which eliminates the incentive to form ABC, hence minimizing collective welfare:

Insert Figure 2 about here

Notice that in this game the value of the grand coalition v(ABC) is set to zero. This game is called a <u>nonsuperadditive</u> game, a game in which the value of the ABC coalition is less than the values of the other coalitions. There is evidence to suggest that the salience of justice norms may vary with the relative size of the ABC coalition (Komorita and Kravitz, 1979), so it is possible that models based on justice would not

be very accurate in a nonsuperadditive game.

By setting ABC equal to zero, one of the players is necessarily excluded from a coalition. This may heighten the competitive motivation of the bargainers, since an excluded player cannot earn a profit. Hence, each player must "compete" by trying to convince one of the two remaining players to join him or her in a coalition. Competitive motivation may also be heightened by increasing the incentives to maximize profit. In past studies, subjects bargained for small, almost trivial incentives, e.g., school supplies. If the incentives were much higher, the motivation to maximize profit might dominate the justice norms. It is plausible that the justice norms are less salient and accurate when competitive motivation is enhanced.

Purposes of the Present Study

The present study was an attempt to extend the generality of various theories of coalition formation by assessing their accuracy in the nonsuperadditive coalition-input paradigm. The theories examined included: equity theory, equal surplus, bargaining theory, and the equal excess model.

For the purposes of this study, and in order to simplify the analyses, only the round 0, 1, and asymptotic (round infinity) estimates of the equal

excess model, hereafter denoted EE^0, EE^1, and EE^{oo}, were contrasted. It can be shown that the round 0 predictions of the equal excess model coincide with the predictions of the equal surplus model. At the asymptote, the predictions of the equal excess model converge to the quota values of the bargainers.

This study also examined the effects of competitive motivation on the salience of justice norms. It was hypothesized that justice norms would be less salient and accurate when competitive motivation is enhanced. Two experimental manipulations were used to heighten competitive motivation: 1) the incentives of the bargainers were increased and 2) the inputs (investments) of the bargainers were retained by the experimenter even if they were excluded from a coalition.

Lastly, this study tested the effects of inputs on the justice norms in a nonsuperadditive game. It was hypothesized that the variance of the inputs (defined as the difference between the inputs of the high and low input players), the sum of the inputs, and the ratio of the inputs of player C to player A, hereafter denoted Rmax, would have significant effects on the accuracy of the justice norms.

Previous research has shown that the sum and the

variance of inputs had significant effects on the accuracy of the justice norms in a superadditive game (Komorita and Leung, 1985; Komorita, Ellis, and Melton, 1987), so it is reasonable to assume that they would also have significant effects in a nonsuperadditive game.

The effects of Rmax have not been studied in past research. Rmax is an index of the contributions of the low input player as a proportion of the contributions of the high input player. Hence, it is a measure of disparity between the inputs of these players. Although the variance of the inputs is also a measure of the disparity between the high and low input players, it indicates an absolute as opposed to a proportional difference between inputs. It was hypothesized that variance and Rmax capture separate properties of the inputs and would affect the accuracy of various theories in different ways.

Method

Subjects

The subjects were 96 male undergraduate students enrolled in an introductory psychology course. Their participation in the experiment partially fulfilled a requirement of the course.

Design

The three-person quota game shown in Figure 2 was used in all conditions with quota values of 60, 40, and 20 for players A, B, and C, respectively. Each triad played three games with the same values of the three coalitions.

The three games varied in the inputs of the bargainers and the properties of these three games are summarized in Table 1.

Insert Table 1 about here

It can be seen that Games 1 and 2 have identical Rmax values, Games 1 and 3 have identical variances of inputs, and Games 2 and 3 have identical sums of inputs. Systematic variation of each of these factors makes it possible to assess the accuracy of each theory as a function of the variances, sums, and Rmax values of the inputs.

Though a variety of investment combinations are possible, Game 1 investments of 9, 5, and 1 were chosen for players A, B, and C, respectively. The investments for Games 2 and 3 were linear transformations of the inputs in Game 1, i.e., the inputs of Game 2 were three times those of Game 1, and the inputs of Game 3 differed by an additive constant (+10). These distributions of inputs were used because they allowed each game to vary

from the other two games in one factor, while remaining identical to one of the games in another factor. As a result, each factor was controlled for, and the effects of the different properties of the inputs can be independently assessed. For example, if the results show that Game 1 differs from Games 2 and 3, we can attribute the effect to the sum of inputs (see Table 1). However, if the results for Game 3 differed from Games 1 and 2, we can attribute the effect to Rmax (see Table 1).

Experimental Conditions

Two variables were manipulated: the investments and the incentives of the bargainers. In the manipulation of the investments of the bargainers, half of the triads were told that if they were excluded from a coalition their investments would be returned to them; the other half were told that if they were excluded from a coalition their investment would be lost.

In the manipulation of incentives, half of the triads were told that they would be bargaining for small incentives, e.g., school supplies worth up to $3; the other half were told that they would have the opportunity to win a $20 cash prize.

Each triad played three games in a randomized order. Eight triads were assigned to each of four

experimental conditions.

In summary, the design was a 2X2X3 (Investment by Incentive by Games) with repeated measures on Games. Two dependent variables were analyzed: the frequrncies of the three coalitions and the square root of the mean of squared deviations (RMSE) between predicted and observed payoff shares.

Procedure

Subjects were scheduled in groups of three and were seated face-to-face around a large table. They were each given a stack of poker chips worth 100 points. Subjects were simultaneously presented with written and tape-recorded instructions which informed them that: (a) they were investors considering a business partnership; (b) they would be asked to negotiate the division of a prize (profits from that partnership); (c) there would be a number of bargaining transactions in which they would be asked to negotiate the division of a prize; and (d) they would be awarded prizes based upon how much profit they accumulated.

For all triads the instructions were identical except for the awarding of the prize. Half of the triads received the instructions:

> "At the end of the experiment your profit will be summed over all transactions to determine your total profit, and your and your total profit will be converted

> to prizes (the school supplies in the other room). Each of you can earn up to $3 worth of prizes depending on your total profit. The more points you accumulate, the greater the value of your prizes."

The other half received the following instructions:

> "There will be many groups performing the same task. Your profit will be summed over all transactions to determine your total profit. At the end of the semester, the person in each position (A, B, or C) who accumulates the most total profit will be awarded a $20 cash prize. In other words, you are not competing against each other, but against each person who has been or will be in your postition throughout the course of the semester. Thus, it is to your advantage to maximize profit over all trials."

Prior to each transaction, subjects were presented with an information sheet indicating the investments they were required to make on that round. The experimenter then collected the investments from each of the players before the actual negotiations began. Subjects were allowed to bargain freely with no time limits.

As an experimental manipulation, the procedures concerning the investments differed across subjects. Half of the subjects were told:

> "If you are excluded from a coalition, then you will receive no profits, but your investment will be returned to you. This means that you will lose your investment only if you form a coalition (partnership)."

The other half were told:

> "If you are excluded from a coalition, then you will receive no profits and your investment will be lost. This means that you should consider your investments as "overhead costs" and you lose them whether or not you form a coalition (partnership)."

Upon receiving the information sheets, subjects were asked to consider which of the three coalitions they would like to form and how they wanted to divide the profits of the coalition. Subjects were asked to indicate their preferred coalition and proposed division of profits on a "tentative offer form". The experimenter collected the tentative offer forms and projected the proposals on the wall using an overhead projector. Subjects were asked to consider the various offers and to indicate which offers, if any, they wished to accept on an "offer response form".

After receiving the offer response forms, the experimenter projected the responses on the wall. A coalition tentatively formed if both members of the coalition accepted the same proposal. Subjects were then given a free period to discuss their proposals out loud. Subjects were allowed to discuss their proposals whether or not a tentative coalition was formed. The discussion period continued until one of the subjects turned in an offer response form indicating which offer

he would like to accept. If two people accepted the same offer then a coalition was formed and each person was given his "profit" represented by poker chips. If a person was excluded from a coalition, he received no profit and his investment was either returned to him or retained by the experimenter. If no coalition was formed, the procedure of presenting proposals and completing offer response forms was repeated. Subjects were allowed to modify their proposals in the ensuing round, however they were not required to make another investment on each subsequent round of bargaining.

Results

Two dependent variables were analyzed: the frequencies of the three coalitions (AB, AC, BC) forming in each condition and in each game, and the square root of the mean of squared deviations between predicted and observed shares (RMSE) for each theory. The RMSE values indicate the accuracy of each theory: the smaller the RMSE, the closer the predicted payoff shares were to the observed payoff shares. For the frequency data, a Cochran Q test and several chi-square tests were conducted to determine whether there were significant differences in the frequencies of the three coalitions. A 2X2X3 (Investments X Incentives X Games) ANOVA was performed on the RMSEs for each theory to test the

effects of the experimental manipulations. To test for significant differences between theories, Friedman's ANOVA of ranks and Wilcoxon's signed ranks test were performed for each game separately. Many tests were performed in this study; consequently, to minimize Type I error, alpha level was set at .01.

Frequency Data

Table 2 shows the frequencies and mean shares of the three coalitions in each game and in each experimental condition. The last column in Table 2 shows the mean shares and the frequencies of each coalition across the four experimental conditions. Pairs of values in parentheses denote mean shares of the "stronger" and "weaker" members of each pair, respectively (e.g., in AB, A is stronger and B is weaker). It can be seen that the AB coalition was most frequent in all games, although only marginally more frequent in Game 2.

Insert Table 2 about here

All theories examined in this study predict that the AB coalition should form in each game. As Table 2 shows, this did not always occur, and the frequency of the AB coalition differed across games. To test whether

these differences were significant, a Cochran Q test was performed. The Cochran Q test provides a method for testing whether three or more matched sets of frequencies or proportions differ significantly among themselves. In this experiment, matching was based on the fact that each group played all three games. The Cochran test is particularly suitable when data are nominal or represent dichotomized ordinal information. Hence, the frequency data were separated into two categories: AB or not AB (AC or BC). The Cochran Q test was found to be significant: $Q = 11.14$ ($p < .01$), indicating that the frequency of the AB coalition differed significantly across games.

To determine whether there were significant differences in the frequencies of each coalition <u>within</u> each game, three chi-square tests were conducted, under the null hypothesis that the three coalitions are equally likely. These tests were performed for each game separately, and the frequencies were pooled over experimental conditions. Only Game 3 was significant at the .01 level, $\chi^2(2) = 10.94$. Since Game 3 had the highest Rmax value among the three games, these results suggest that when Rmax was low, as in Games 1 and 2, there were no significant differences in the frequencies of the three coalitions. However, when Rmax was high, the AB coalition occurred most frequently and the BC

coalition occured least frequently. This implies that Rmax affects the likelihood of the AB coalition more than either the sum or the variance of the inputs.

To test whether the frequencies of the coalitions differed across experimental conditions, the coalitions were separated into two categories (AB and not AB) and pooled over one of the experimental conditions (Investments or Incentives). This procedure was used to satisfy the chi-square assumption that the expected frequency in each cell must be at least five. By dichotomizing the dependent variable and pooling over one of the conditions, expected frequencies were greater than five in all cases. Six chi-square tests (2 sets of 3 tests) were performed, one for each game. None of these tests was significant at the .01 level. These results indicate that the experimental manipulations had no significant effect on the likelihood of the AB coalition.

Payoff Data

To evaluate the payoff predictions of the theories, the square root of the mean of squared deviations between predicted and observed shares (RMSE) was calculated for each triad.

Table 3 shows the mean RMSEs for each theory across the three games and four experimental conditions. The

last column le 3 shows the mean RMSEs in each game
for each th he last row in Table 3 shows the mean
RMSEs for ea ory in the four experimental
conditions.

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ert Table 3 about here

The row means of Table 3 show that equity theory and EE^{oo} predicted poorly when the sum of inputs was small (Game 1) and when input variance was large (Game 2). They predicted best in the high Rmax game (Game 3). It can be seen from Table 1 that Games 1 and 2 had identical Rmax values. This suggests that Rmax was the critical factor affecting the accuracy of equity theory and EE^{oo}.

Equal surplus and EE^{1} predicted best in Games 2 and 3, and worst in Game 1. Table 1 shows that Game 1 had the smallest sum of inputs, indicating that the sum of inputs affected the accuracy of these theories.

The mean RMSEs of bargaining theory are seen to be similar across games. This indicates that the properties of the inputs had no effect on the accuracy of its predictions.

Two sets of analyses were conducted on the RMSE values: 1) tests on the effects of experimental conditions (Games, Investments, Incentives) on the accuracy of each theory, and 2) tests on the difference in accuracy between the theories.

Effects of Experimental Conditions

To assess the effects of experimental conditions, a 2X2X3 (Investments by Incentives by Games) ANOVA was performed on each theory separately with repeated measures on Games. These analyses yielded the following significant effects: 1) Games for equity theory, $F(2,56) = 16.33$, equal surplus, $F(2,56) = 7.86$, and EE^{1}, $F(2,56) = 7.00$ and 2) the interaction between Investment by Incentive by Game for EE^{1}, $F(2,56) = 4.62$. No other significant effect was found at the .01 level.

The effect of Games on equity theory, equal surplus and EE^{1} was not surprising, since inputs have been found to affect bargaining outcomes in previous studies. The reasons for the triple interaction for EE^{1} are not clear, and no explanation is offered.

There was no significant effect of any independent variable on EE^{oo}. This indicates that the accuracy of its predictions did not differ significantly across

experimental conditions.

Contrast Between Theories

There was no significant main effect of the experimental manipulations; hence, in order to contrast the theories in each game, the RMSEs were pooled over Investments and Incentives. Since the error variance of the ANOVA is partly a function of the covariance of the predicted values, it would be inappropriate to compare the RMSE values using ANOVA. Therefore, all the RMSEs in each game were converted to ranks and as a preliminary comparison of the theories, Friedman's ANOVA of ranks was performed on each game separately. The results of these tests are shown in Table 4. The mean ranks indicate the comparative accuracy of the theories in each game: the smaller the mean rank, the more accurate the theory.

Insert Table 4 about here

These tests were significant at the .01 level, and they indicate that equity theory was generally least accurate, especially in Game 2. Equal surplus and EE^{oo} were intermediate in accuracy, and EE^{1} and bargaining theory were generally most accurate.

The Friedman's ANOVA was also performed on the mean of the RMSEs, again pooling over Investments and Incentives. The results of this test are shown in Table 5.

Insert Table 5 about here

This test was significant at the .01 level, indicating that the mean accuracy of the theories significantly differ in each game. Thus, further analyses were conducted to compare the predictions made by each theory.

To compare the relative accuracy of the theories, Wilcoxon's signed ranks test was performed on the RMSE values, separately for each pair of theories in each game. The results of of these tests are indicated by the letters in Table 6.

Insert Table 6 about here

It can be seen that the predictions of equity theory significantly differed from those of bargaining theory and EE^{1} in all games, and that EE^{oo} and equal surplus did not significantly differ from each other in any of the games.

The predictions of bargaining theory and EE^1 significantly differed only in Game 3. This indicates that the when Rmax was high, EE^1 was more accurate than bargaining theory, as suggested by the RMSEs of Table 3.

Discussion

Previous studies focused on the salience and accuracy of justice norms in a superadditive game. The present study was an attempt to extend the generality of various theories of coalition formation by assessing their accuracy in a nonsuperadditive game. The results suggest further limitations on the generality of equity theory as well as the equal surplus norm, and they indicate that Rmax (the ratio of the investments of player C to player A) has significant effects on bargaining outcomes.

The following hypotheses were tested in this study: 1) justice norms will be less salient and accurate when competitive motivation is enhanced and 2) three games varying in three properties of the inputs will have significant effects on the accuracy of various theories.

Three independent variables were manipulated: Investments, Incentives, and Games. The manipulations designed to enhance competitive motivation (Investments and Incentives) yielded no significant effects, but the

independent variable Games significantly affected the accuracy of various theories. Therefore, the effect of Games will be discussed first.

The three games used in this experiment varied three properties of the inputs. These properties were: 1) the sum of the inputs, 2) the variance of the inputs, and 3) the ratio of the inputs of players A and C, denoted Rmax. Rmax differs from the variance of the inputs because it is a measure of the ratio of player C's to player A's input, while input variance is a measure of the difference between the inputs of player C and player A. In this study, the sum of inputs was smallest in Game 1, the variance of inputs was largest in Game 2, and Rmax was highest in Game 3. Systematic variation of these factors makes it possible to assess the accuracy of each theory as a function of the inputs.

When the sum of inputs was small, Table 3 shows that equity theory and the equal surplus norm predicted poorly. EE^{oo} and EE^{1} were intermediate in accuracy, while bargaining theory predicted best. However, bargaining theory was not significantly better than EE^{1}.

To account for the inaccuracy of equity theory when the sum of inputs was small, it is possible that high input players were less likely to propose reward

distributions based on the equity norm because they were fearful of being excluded from a coalition. In this game, it can be shown that equity theory predicts extremely large differences in shares between the high and low input players. Although bargainers might agree that the high input player should receive the most profit, they may be reluctant to allocate an extremely large share to anyone. As a result, high input players who proposed a division of profits based on equity may have been excluded from many of the coalitions in this game.

The inaccuracy of the equal surplus norm when the sum of inputs was small is surprising, since previous studies indicate that equal surplus is more accurate when the profit is large relative to the sum of the inputs. It is possible that weak bargainers were less likely to demand equality because they were afraid of being excluded from a coalition. Since the investments of the players relative to the profits are small, even a share of profits less than those prescribed by the equality norm may seem fair to most bargainers. Hence, a low input player who demands too much may be perceived by the other players in the game as being greedy and an undesirable partner. In particular, if a weak player demands too much, the stronger players may be less likely to reciprocate offers to him because his demand

appears unreasonable considering the size of his investment. This explanation suggests that if a weak player demands equality when the sum of inputs is small, he is likely to be excluded from a coalition.

The accuracy of bargaining theory suggests that when the sum of inputs was small, many bargainers were more likely to form a coalition with someone who proposed a compromise between equity and equality, as bargaining theory predicts.

When input variance was large (Game 2), equity theory predicted poorly. Equal surplus was fairly accurate, and not significantly different from bargaining theory. The predictions of bargaining theory and EE[1] were best, and did not differ significantly.

The predictions of equity theory were poorest when input variance was large. This finding is consistent with previous research (Komorita, Ellis, and Melton, 1987). The predictions of equity theory in this game were identical to its predictions in the game where the sum of inputs was small, so it prescribed extremely large differences in shares between the high and low input players in a coalition. Thus, the explanation offered for equity theory's inaccuracy when the sum of inputs was small is also a plausible explanation for why it was inaccurate when input variance was large.

Previous studies indicate that equal surplus is more accurate when the input variance is large (Komorita and Leung, 1985). Table 4 shows that equal surplus was fairly accurate when input variance was large, and its predictions did not differ significantly from those of bargaining theory. This suggests that some coalitions in this game may have based reward distribution on the equality norm.

However, the predictions of EE^{1} are seen to be significantly better than those of equal surplus. This indicates that, while equality may have been used in some coalitions, it was not the dominant norm.

The results of this study showed that Rmax had a significant effect on both the accuracy of different theories and the likelihood of the AB coalition. Equity theory and equal surplus were fairly accurate when Rmax was high (Game 3). The predictions of bargaining theory and EE^{1} were most accurate, and significantly differed from each other. The accuracy of EE^{∞} did not differ significantly from the other theories in the high Rmax game.

Equity theory made its best predictions in the high Rmax game. In this game, equity theory prescribed less

extreme shar between high and low input players than in either the game where the sum of inputs was small or the game where input variance was large. As a result, bargainers who proposed reward distributions based on equity may not have been excluded from a coalition as often in the high Rmax game as they may have been in the other two games.

Paradoxically, equal surplus was considerably more accurate in the game where Rmax was high than it was in the game where the sum of inputs was small, even though it made identical predictions in each game. To explain this result, it is plausible that when the sum of inputs is large, as in the high Rmax game, the relative ratios of the players' investments (measured by Rmax) become more salient. This suggests that a high input player may have been more willing to form a coalition with a low input player who demanded equality because, as a proportion of the total profit, the low input player's investment was similar to his own. If the inputs of each player were large relative to the profits, demands based on the equality norm may not have appeared as unreasonable to bargainers as when the inputs were small.

When Rmax was high, EE^{1} was significantly more accurate than bargaining theory. This indicates that compromising between equity and equality may not

have occurred as often in this game as in the other two games. Since EE^{1} considers both power and justice, this result also suggests that power (defined by alternatives) may become more salient when Rmax is high.

Partial support for this hypothesis is provided by the results of Table 6 which show that the predictions of EE^{oo} did not significantly from those of the other theories. Since EE^{oo} predicts the quota values of the bargainers, this indicates that many coalitions divided profits at or near the quota values in the high Rmax game.

Further support for the hypothesis that high Rmax increases the relevance of power is provided by the significantly greater frequency of the AB coalition when Rmax was high (see Table 2). None of the other properties of the inputs had an effect on the likelihood of AB. Since the variance of inputs was small in the high Rmax game, it is unlikely that bargainers would propose extreme differences in shares. When Rmax was high, it is probable that bargainers proposed very similar distributions of shares because of the high ratios between the different players' investments. As a

result, bargainers may have given less consideration to the investments each player made, and more consideration to the profits available in different coalitions. This explanation suggests that AB formed in the majority of cases because the motivation to maximize profit became the primary concern of bargainers. When Rmax is high, it is plausible that the two strongest players will form a coalition, unless one of them demands too much or the weakest player makes extreme concessions.

These conceptions of bargaining in a nonsuperadditive game were supported by the comparative accuracy of the various theories examined in this study. The predictions of equal surplus are the most egalitarian, while those of equity theory and EE^{oo} are least egalitarian. All of these theories were not very accurate across games, though the accuracy of equity theory within games varied as a function of the properties of the inputs. Bargaining theory and EE^{1} predict shares midway between equity and equality. Across games, these theories were most accurate, and they differed significantly from each other only when Rmax was high.

Regarding the Incentives and Investments manipulations, the results of this study did not yield any significant effects of these independent variables. It is possible that the manipulations were not powerful

enough to affect bargaining strategies. Apparently, it made no difference to subjects whether they could win up to $3 worth of school supplies or the possibility of a $20 cash prize. It may be that the effects of the incentive manipulations were negligible because bargainers in the high incentive condition did not know how likely it was that they would win the cash prize. In contrast, in the low incentive condition, bargainers knew they would receive school supplies.

General Conclusions

The findings of this study suggest limitations on the generality of equity theory and the equal surplus norm. Furthermore, they indicate that bargaining in a nonsuperadditive game may include considerations not present in a superadditive game. The greater possibility of exclusion may discourage strong bargainers from demanding equity and weak bargainers from demanding equality, particularly when their investment is small. However, when Rmax (the ratio of their inputs) is high, bargainers may be less likely to consider inputs, and more likely to consider the profit available to them in different coalitions.

Among the theories examined, bargaining theory and EE^1 were the most accurate. Bargaining theory assumes that the high input player will demand equity and the low input player equality. Accordingly, each player

decides to base demands on a compromise between the two norms, and bargaining theory predicts that bargainers will split-the-difference between equity and equality. This aspect of bargaining theory is particularly relevant in a nonsuperadditive game where it is important for bargainers to consider the possibility of being excluded from a coalition if they demand too much.

EE[1] also makes predictions that are somewhere between equity and equality. In addition, it accounts for the power of bargainers, making it more likely to yield accurate predictions than the justice norms when the salience of power is increased, as in Game 3 with high Rmax.

From the results of this study, it appears that the possibility of exclusion makes bargainers more likely to compromise. In the real-world, where the investments of parties and the outcomes of coalition formation are considerably greater than those simulated in the laboratory, exclusion from a coalition partnership can be very costly. Therefore, it is unlikely that bargainers would risk being left out of a coalition by demanding an unreasonable share of the profit. However, when the risk of exclusion is reduced, i.e., when the profit is large, and if all the relevant parties are likely to be included in a partnership, then weaker bargainers may be more willing to risk demanding larger

shares of the profit because they believe that the stronger bargainers are likely to make concessions.

For now, the question of whether competitive motivation reduces the salience of justice norms remains unanswered. In this study, the manipulations designed to enhance competitive motivation did not have significant effects because they did not sufficiently arouse the competitive motivation of the subjects. It is plausible that the possibility of exclusion is the primary motivation of bargainers in this type of game, regardless of the incentives offered for maximizing profit. Further research might focus on whether competitive motivation reduces the desire of stronger players to compromise in a superadditive game. Under these conditions, the motivation to maximize profit might be more prominent, and the three-person coalition would occur less frequently than the two-person coalition involving the stronger players. It is also possible that bargainers would be more likely to base demands on equity under these conditions. As a result, equity theory might be more accurate than the other justice norms.

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Footnote

[a] Shapley's (1953) definition of a quota game also specified that the value of the grand coalition must be equal to the sum of the quota values of the players. However, Kalish (in Kuhn, 1953) extended Shapley's definition to the case of **m-quota games**, defined as a game in which v(S) = w for all coalitions S with m members. Hence, my example of a quota game is a special case of Kalisch's m-quota game.

Table 1

Inputs and the Properties of the Inputs for Each Game

Game	Inputs	Sum of Inputs	Variance of Inputs	Rmax
1	(9, 5, 1)	15	8	.11
2	(27, 15, 3)	45	24	.11
3	(19, 15, 11)	45	8	.57

Table 2

Summary Table of Frequencies (f) of the Three Coalitions (AB, AC, BC) and Mean Shares

	Investment Lost		Investment Retained		Totals
	Prize	Cash	Prize	Cash	
	f (shares)	f(shares)	f(shares)	f (shares)	f(shares)
Game 1					
AB	5 (58,42)	2 (55,45)	3 (56,44)	4 (61,39)	14 (58,42)
AC	1 (66,15)	5 (66,14)	1 (48,32)	2 (59,21)	9 (60,20)
BC	2 (43,17)	1 (50,10)	4 (42,18)	2 (40,20)	9 (44,16)
Game 2					
AB	5 (60,40)	1 (58,42)	4 (58,42)	2 (57,43)	12 (58,42)
AC	0 ---	4 (57,23)	3 (57,23)	3 (62,18)	10 (58,22)
BC	3 (42,18)	3 (48,12)	1 (40,20)	3 (38,22)	10 (42,18)
Game 3					
AB	4 (58,42)	6 (56,44)	5 (55,45)	4 (59,41)	19 (57,43)
AC	3 (51,29)	1 (55,25)	3 (59,21)	2 (65,15)	9 (57,23)
BC	1 (45,15)	1 (33,27)	0 ---	2 (38,22)	4 (39,21)

Table 3

Mean RMSEs of Each Theory Across Games and Conditions

Equity Theory					
	Investment Lost		Investment Retained		
Game	Prize	Cash	Prize	Cash	Mean
1	13.4	16.6	21.9	16.2	17.0
2	13.7	23.2	16.8	21.9	18.9
3	8.9	5.9	5.1	11.6	7.9
Mean	12.0	15.2	14.0	16.6	
Equal Surplus					
Game					
1	12.0	22.0	10.3	11.8	14.0
2	6.7	11.7	5.7	5.8	7.5
3	9.1	5.2	9.0	12.1	8.9
Mean	9.3	13.0	8.3	9.9	
Bargaining Theory					
Game					
1	5.8	13.3	4.2	4.9	7.0
2	4.6	9.2	5.5	6.7	6.5
3	7.8	3.5	6.1	10.3	6.9
Mean	6.0	8.7	5.3	7.3	

EE[1]

Game					
1	8.6	17.1	5.9	6.0	9.4
2	5.1	10.2	3.7	4.3	5.8
3	6.4	3.1	4.1	7.9	5.4
Mean	6.7	10.1	4.6	6.0	

EE[oo]

Game					
1	9.8	12.4	14.3	10.9	11.9
2	9.2	15.2	10.0	13.6	12.0
3	10.5	8.8	7.7	10.8	9.5
Mean	9.8	12.1	10.7	11.8	

Table 4

Mean Ranks of Theories in Each Game from Friedman's ANOVA of Ranks[1]

Game	Equity Theory	EE^{oo}	Equal Surplus	EE^{1}	Bargaining Theory
1	3.4	2.8	3.5	2.6	2.1
2	4.6	3.2	2.9	2.1	2.2
3	2.7	3.5	3.8	2.1	2.7

[1] In each game, data have been pooled over experimental conditions; hence, each mean is based on thirty-two observations.

Table 5

Mean Ranks of Theories Pooled Over Games from Friedman's ANOVA of Ranks[2]

Equity Theory	EE^{oo}	Equal Surplus	EE^{1}	Bargaining Theory
4.3	3.4	3.3	1.9	2.1

[2] Data were pooled over games and experimental conditions; hence, each mean is based on thirty-two observations. The Friedman's test was significant at the .01 level, $\chi^2(4) = 50.23$.

Table 6

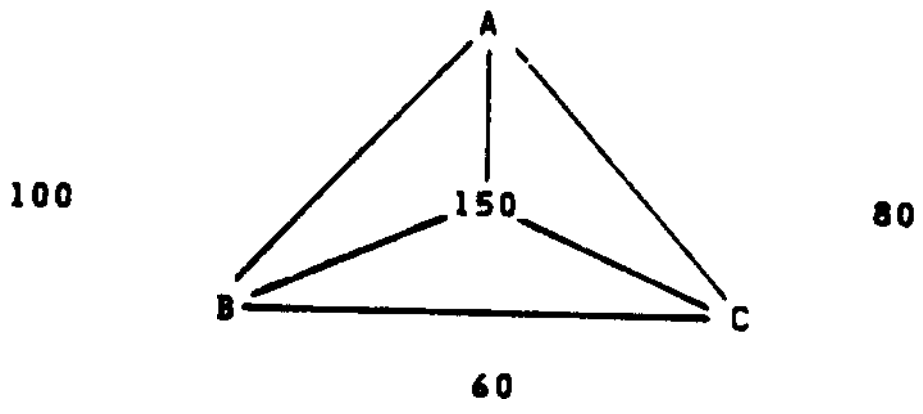
Results of Wilcoxon's Signed Ranks Test

Game	Equity Theory	EE[oo]	Equal Surplus	EE[1]	Bargaining Theory
1	a	bc	ab	cd	d
2	a	b	bc	d	cd
3	ab	abc	a	c	b
Mean[3]	14.6	11.1	10.1	6.9	6.8

[3] Mean values of RMSEs over games, pooled over experimental conditions. Entries with different letters differ significantly at .01.

Figure 1

Superadditive Game



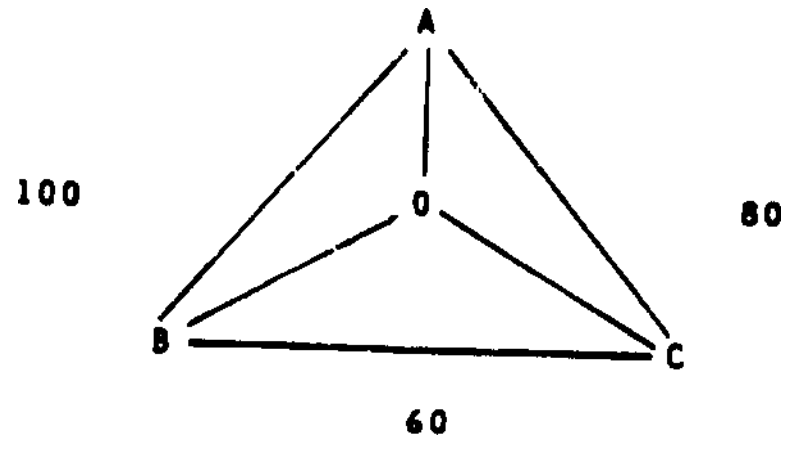
$$v(A) = v(B) = v(C) = 0;$$

$$v(AB) = 100,\ v(AC) = 80,\ v(BC) = 60;$$

$$v(ABC) = 150$$

Figure 2

Nonsuperadditive Game



$$v(A) = v(B) = v(C) = 0;$$

$$v(AB) = 100,\ v(AC) = 80,\ v(BC) = 60;$$

$$v(ABC) = 0$$

Appendix A

Predicted Payoff Shares and Coalitions for Each Theory

Game	Predicted Coalition	Predicted Shares for Each Coalition AB	AC	BC
Equity Theory				
1	AB	(64, 36)	(72, 8)	(50, 10)
2	AB	(64, 36)	(72, 8)	(50, 10)
3	AB	(56, 44)	(51, 29)	(35, 25)
Equal Surplus				
1	AB	(52, 48)	(44, 36)	(32, 28)
2	AB	(56, 44)	(52, 28)	(36, 24)
3	AB	(52, 48)	(44, 36)	(32, 28)
Bargaining Theory				
1	AB	(58, 42)	(58, 22)	(41, 19)
2	AB	(60, 40)	(62, 18)	(43, 17)
3	AB	(54, 46)	(47.5, 32.5)	(32.5, 27.5)

EE^{1}				
Game				
1	AB	(56, 44)	(52, 28)	(36, 24)
2	AB	(58, 42)	(56, 24)	(38, 22)
3	AB	(56, 44)	(52, 28)	(36, 24)
EE^{oo}				
Game				
1	AB	(60, 40)	(60, 20)	(40, 20)
2	AB	(60, 40)	(60, 20)	(40, 20)
3	AB	(60, 40)	(60, 20)	(40, 20)

Appendix B

Instructions for High Incentive Condition

In many situations, individuals must join forces and cooperate with one another in order to achieve a mutual goal. This process of uniting to reach a common goal is called coalition formation. This experiment is about coalition formation in he business world. As you know, businesses sometimes form a coalition to increase profits. In this experiment we would like you to assume that you are the president of a firm considering such a merger. You may join forces with one of the other firms and the joint profit available will depend on which firms are involved in the merger. Your task in the experiment is to maximize the profits you receive in a coalition.

You will be asked to negotiate with the other persons in your group. Each person represents a business. Each business is designated by a letter: G, M, or W. The business you represent is shown on the card in front of you.

Your task is to negotiate with the other businesses to determine which partnership you wish to form as well as what your share of the profits should be in that partnership. The profits to be divided vary for the different coalitions. For example:

COALITIONS			
GM	GW	MW	GMW
100	80	60	0

It can be seen that the profits to be divided among the partnership members vary depending on the partenrship. Those belonging to a particular partnership must negotiate to determine how the profits should be divided. If a partnerhsip forms that does not include you, you will not earn a profit.

Your goal is to maximize your share of the profits without regard to how well the other persons are doing. There will be many groups performing the same task. Your profits will be summed over all transactions to determine your total profit. At the end of the semester, the person is each position (G, M, or W) who accumulates the most total profit will each be awarded a $20 cash prize. In other words, you are not competing against each other, but against each person who has or will be in your position throughout the course of the semester. Thus, it is to your advantage to maximize your profit over all trials.

Appendix C

Instructions for Low Incentive Condition

In many situations, individuals must join forces and cooperate with one another in order to achieve a mutual goal. This process of uniting to reach a common goal is called coalition formation. This experiment is about coalition formation in he business world. As you know, businesses sometimes form a coalition to increase profits. In this experiment we would like you to assume that you are the president of a firm considering such a merger. You may join forces with one of the other firms and the joint profit available will depend on which firms are involved in the merger. Your task in the experiment is to maximize the profits you receive in a coalition.

You will be asked to negotiate with the other persons in your group. Each person represents a business. Each business is designated by a letter: G, M, or W. The business you represent is shown on the card in front of you.

Your task is to negotiate with the other businesses in order to determine which partnership you wish to form as well as what your share of the profits should be in that partnership. The profits to be divided vary for the differnent coalitons.

Appendix C

Instructions for Low Incentive Condition

In many situations, individuals must join forces and cooperate with one another in order to achieve a mutual goal. This process of uniting to reach a common goal is called coalition formation. This experiment is about coalition formation in he business world. As you know, businesses sometimes form a coalition to increase profits. In this experiment we would like you to assume that you are the president of a firm considering such a merger. You may join forces with one of the other firms and the joint profit available will depend on which firms are involved in the merger. Your task in the experiment is to maximize the profits you receive in a coalition.

You will be asked to negotiate with the other persons in your group. Each person represents a business. Each business is designated by a letter: G, M, or W. The business you represent is shown on the card in front of you.

Your task is to negotiate with the other businesses in order to determine which partnership you wish to form as well as what your share of the profits should be in that partnership. The profits to be divided vary for the differnent coalitons.

For example:

COALITIONS			
GM	GW	MW	GMW
100	80	60	0

It can be seen that the profits to be divided among the partnership members vary depending on the partenrship. Those belonging to a particular partnership must negotiate to determine how the profits should be divided. If a partnerhsip forms that does not include you, you will not earn a profit.

Your goal is to maximize your share of the profits without regard to how well the other persons are doing. At the end of the experiment, your profits will be summed over all transactions to determine your total profit, and your total profit will be converted to prizes (the school supplies in the other room). Each of you can earn up to $3 worth of prizes depending on your total profit. The more points you accumulate, the greater the value of your prizes.

Appendix D

Procedure for High Incentive Condition

In front of should be a tentative offer form, an offer response form, and some poker chips. The poker chips will be used to make your investments. The blue chips are worth 10 points, reds are 5, and whites are 1. You will each start with 100 points worth of chips.

At the beginning of each trial I will hand you an information sheet that has the investments you are required to make for each particular round as well as the profits associated with each coalition.

HAND OUT INFORMATION SHEETS

As you can see, G must invest __, M must invest __, and W must invest __. Before each round of bargaining I will collect these investments from you. Notice also that the GM coalition is worth 100, the GW coalition is worth 80, and the MW coalition is worth 60. The GMW coalition is worth 0 points.

Now the tentative offer stage begins. During the tentative offer stage, each person must examine the possible coalitions and decide which coalition he would like to form and propose a division of profits for that coalition. These offers are not binding, that is, you are not required to accept your own offer. To make a tentative offer you should use the tentative offer form

in front of you.To use this form you must:

1. Write you identifying letter in the space marked from.
2. Decide on which coalition you would like to form and write its letter in th space marked coalition proposed.
3. In the space marked offer you should fill in the amount of points you would like each member of the coalition to recieve.
4. To make sure your offer sums to the proper total, add the numbers in your offer and enter the result in the space marked total.
5. When you are through, hand your tentative offer form to me.

HAVE THEM FILL OUT TENTATIVE OFFER FORMS

After I receive all the offer forms I will display them on the overhead.

READ OFFERS ON THE TRANSPARENCY

At this point, the free discussion period will begin. The object of the free discussion period is to negotiate over the division of points. In order to put this time to good use, you should attempt to exchange as much information about the offers as possible. For example, you might explain your reasons for making the offer you proposed, learn the reasons the others made

the offers they did, and try to convince others to accept your offer. You might also propose a coalition that is not proposed in the tentative offer forms.

During the free discussion period you should examine all offers and decide if you would like to accept any of them.

BEGIN DISCUSSION. AFTER IT HAS GONE ON FOR A WHILE, OR WHEN THEY ARE ABOUT TO REACH AGREEMENT, BEGIN EXPLAINING THE OFFER RESPONSE STAGE.

The free discussion period ends when one person turns in an offer response form. Look at the offer response form in front of you. If you decide not to accept any of the proposed offers, you should place an X on the line "I reject all offers." If a new coalition has been proposed during the discussion period that does not appear on the transparency, you should also reject all offers and then propose that coalition in the next round of bargaining. If you decide to accept an offer, you should place an X by the letter of the person making that offer. You may only accept one offer. however, if more than one person proposes identical coalitions, then you may accept either one or both of them.

EITHER LET THE DISCUSSION CONTINUE OR HAVE THEM FILL OUT OFFER RESPONSE FORMS. AFTER OFFER RESPONSE FORMS ARE FILLED OUT:

When I have received all of the response forms, I

will display the responses on the wall. DO THIS.

If all members of any proposed coalition have accepted the same division of profits, then that coalition will have formed. I will then give each person in that coalition their profits from the "bank" in the middle of the table. If you are excluded from a coalition, then you will receive no profits and your investment will be lost. This means that you should consider your investments as "overhead costs" and you lose it regardless of whether or not you enter into a partnership. If no coalition is agreed upon, then negotiations will go to a second round offers. In this case,you will each fill out another tentative offur form and go through the discussion period and offer response stage again. You do not have to invest on every negotiation.

Are there any questions?

IF THERE ARE NO QUESTIONS, BEGIN REAL TRIALS

Appendix E

Procedure for Low Incentive Condition

In front of you should be a tentative offer form, an offer response form, and some poker chips. The poker chips will be used to make your investments. The blue chips are worth 10 points, reds are 5, and whites are 1. You will each start with 100 points worth of chips.

At the beginning of each trial I will hand you an information sheet that has the investments you are required to make for each particular round as well as the profits associated with each coalition.

HAND OUT INFORMATION SHEETS

As you can see, G must invest __, M must invest __, and W must invest __. Before each round of bargaining I will collect these investments from you. Notice also that the GM coalition is worth 100, the GW coalition is worth 80, and the MW coalition is worth 60. The GMW coalition is worth 0 points.

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2. Decide on which coalition you would like to form and write its letter in th space marked coalition proposed.
3. In the space marked offer you should fill in the amount of points you would like each member of the coalition to receive.
4. To make sure your offer sums to the proper total, add the numbers in your offer and enter the result in the space marked total.
5. When you are through, hand your tentative offer form to me.

HAVE THEM FILL OUT TENTATIVE OFFER FORMS

After I receive all the offer forms I will display them on the overhead.

READ OFFERS ON THE TRANSPARENCY

At this point, the free discussion period will begin. The object of the free discussion period is to negotiate over the division of points. In order to put this time to good use, you should attempt to exchange as much information about the offers as possible. For example, you might explain your reasons for making the offer you proposed, learn the reasons the others made

the offers they did, and try to convince others to accept your offer. You might also propose a coalition that is not proposed in the tentative offer forms.

During the free discussion period you should examine all offers and decide if you would like to accept any of them.

BEGIN DISCUSSION. AFTER IT HAS GONE ON FOR A WHILE, OR WHEN THEY ARE ABOUT TO REACH AGREEMENT, BEGIN EXPLAINING THE OFFER RESPONSE STAGE.

The free discussion period ends when one person turns in an offer response form. Look at the offer response form in front of you. If you decide not to accept any of the proposed offers, you should place an X on the line "I reject all offers." If a new coalition has been proposed during the discussion period that does not appear on the transparency, you should also reject all offers and then propose that coalition in the next round of bargaining. If you decide to accept an offer, you should place an X by the letter of the person making that offer. You may only accept one offer. However, if more than one person proposes identical coalitions, then you may accept either one or both of them.

EITHER LET THE DISCUSSION CONTINUE OR HAVE THEM FILL OUT OFFER RESPONSE FORMS. AFTER OFFER RESPONSE FORMS ARE FILLED OUT:

When I have received all of the response forms, I

will display the responses on the wall. DO THIS.

If all members of any proposed coalition have accepted the same division of profits, then that coalition will have formed. I will then give each person in that coalition their profits from the "bank" in the middle of the table. If you are excluded from a coalition, then you will receive no profits, but your investment will be returned to you. This means that you will lose your investment only if you form a coalition (partnership). If no coalition is agreed upon, then negotiations will go to a second round offers. In this case, you will each fill out another tentative offer form and go through the discussion period and offer response stage again. You do not have to invest on every negotiation.

Are there any questions?

IF THERE ARE NO QUESTIONS, BEGIN REAL TRIALS

Appendix F

Sample Information Sheet

Coalition Values	GM = 100	GW = 80	MW = 60	GMW = 0
Investments	G _____	M _____	W _____	

Appendix G

Sample Tentative Offer Form

From _____

Coalition proposed _____

Offer G _____ M _____ W _____

Total of Offers _____