

S³H Working Paper Series

Number 01: 2021

Hawks and Doves: Seizing Pecuniary Benefits in a Conflict Situation

Maha Fayyaz

Zahid Siddique

May 2021

School of Social Sciences and Humanities (S³H)
National University of Sciences and Technology (NUST)
Sector H-12, Islamabad, Pakistan

S3H Working Paper Series

Faculty Editorial Committee

Dr. Muhammad Zubair Mumtaz (Head)

Dr. Samina Naveed

Dr. Gulnaz Zahid

Dr. Ume Laila

Dr. Umar Nadeem

Ms. Fariha Tahir

S³H Working Paper Series

Number 01: 2021

Hawks and Doves: Seizing Pecuniary Benefits in a Conflict Situation

Maha Fayyaz

Graduate, School of Social Sciences and Humanities, NUST

E-mail: maha.fayyaz@yahoo.com

Zahid Siddique

Associate Professor, School of Social Sciences and Humanities, NUST

E-mail: zahid.siddique@s3h.nust.edu.pk

May 2021

**School of Social Sciences and Humanities (S³H)
National University of Sciences and Technology (NUST)
Sector H-12, Islamabad, Pakistan**

Contents

Abstract	v
1. Introduction	1
2. Literature Review.....	2
2.1. Hawk-Dove Game: Dominance Versus Submissiveness	2
2.2. Equity and Ethical Considerations.....	3
2.3. Bargaining	5
2.4. Gender Studies	6
3. Methodology	7
3.1. Theoretical Model.....	7
4. Empirical Model	9
4.1. Research Questions	9
4.2. Experiment Design.....	10
4.2.1. Datasets.....	10
4.2.2. Game Play.....	11
4.3. Strategic Considerations of the Players	13
5. Result.....	13
5.1. Estimations and Analysis	13
5.1.1. Equity, Dominance and Entitlement.....	15
5.1.2. Appropriation of Share and Dominance.....	18
5.1.3. Gender Analysis	19
6. Discussion	21
7. Conclusion	24
References.....	25
Appendix.....	29

List of Tables

Table 3.1: Pure Strategy Nash Equilibria.....9
Table 5.1: Description of Variables.....14
Table 5.2: Correlation for Concern for Equity.....15
Table 5.3: Correlation for Concern for Dominance.....16
Table 5.4: Correlation for Role of Dominance.....18
Table 5.5: Correlation Table for Male Groups.....20
Table 5.6: Correlation Table for Female Groups.....20
Table 5.7: Correlation Table for Mix Gender Groups.....20

List of Figures

Figure 4.1: Final Claims.....11
Figure 5.1: Relationship between Percentage of Answers Correct and Entitlement Index Percentage.....15
Figure 5.2: Relationship between Percentage of Answers Incorrect and Entitlement Index Percentage.....16
Figure 5.3: Relationship between Hawk Index Percentage and Entitlement Index Percentage (line graph).....17
Figure 5.4: Relationship between Hawk Index Percentage and Entitlement Index Percentage (scatter plot).....17
Figure 5.5: Relationship between Hawk Index Percentage and Share Won Percentage.....18
Figure 5.6: Hawk Index of Contestants Per Share.....19
Figure 5.7: Time Taken by Exclusive Gender Groups.....23
Figure A1: Flow Chart of the Game.....29
Figure A2: Bargaining Duration of 28 Teams.....29

Abstract

The study examines entitlement and allocation of resources in the framework of Hawk-Dove game, involving face-to-face communication in a low stake four-person bargaining experiment, where the stake is divided into four unequal shares. Results show that entitlement to shares is not driven by concern for equity rather by the perception of dominance of players. Hawkish behavior leads individuals to secure higher payoffs in bargaining if players reach a Nash equilibrium. There is no evidence that positive or negative contribution to the divisible pool affects contestants' payoff. Male groups performed more efficiently than female groups under time pressure in bargaining phase and were better at averting an impasse. The results are compared with those of a study on gameshow 'DIVIDED' by Dolder *et al.* (2015) which analyzes a similar bargaining experiment in high stake situation. The comparison reveals that drivers of the bargaining outcomes alter with differing levels of stake size.

Keywords: Noncooperative Game, Bargaining, field experiment, bounded rationality, behavioral, gender.

JEL Classification: C72, C78, C93, D89, D91, J16

1. Introduction

The Hawk-Dove game demonstrates outcomes of dominant and submissive/docile behaviors. The hawks are dominating and always fight for the resource, whereas, the doves are peaceful and avoid fighting when competing for a resource. The results of the game cannot be determined with absolute certainty due to multiple pure strategy Nash equilibria and uncertainty as to which Nash equilibrium will manifest as the final outcome of the game. In this paper, the hawk-dove game is used to analyze dominant and submissive/docile behavior through experimentation involving face-to-face communication among players. The game employed in the experiment is inspired by the British television gameshow 'DIVIDED'. Failing to get access to the recordings of the gameshow, the research was conducted by designing and performing an experiment taking inspiration from DIVIDED.

The research attempts to analyze the effects of dominance and submissiveness on distribution of limited economic resources utilizing the framework of Hawk-Dove game. The objectives include determining whether equity or hawk/dove behavior defines the entitlement to economic benefits in low-stake gameplay. It also aims to observe the relationship of hawk/dove behavior on accumulation of the highest possible economic benefit and analyze the drivers of bargaining outcomes, as manifested by accumulation of reward. Lastly, the study attempts to determine the effect of gender on the performance and perception of contestants in an economic gameplay.

Bargaining in low-stake situations is a core component of everyday economic activities. This research provides important understanding of the relationship between expressive behavior and, perception of entitlement to and distribution of economic resources. It highlights the drivers of the outcomes of bargaining and how bounded rationality affects these drivers, and consequently, the outcomes of bargaining. The applications of this research are widespread in economics, especially in microeconomics and situations of collective decision making.

The paper is arranged in six sections. Section 2 provides the literature review. Section 3 elaborates the theoretical model while section 4 explains the research questions, experimental design (dataset and gameplay) and strategic considerations of the players. Section 5 carries the results with relevant discussion. Section 6 provides the conclusion of the research and the derived policy implications. An appendix is provided at the end containing flow chart of the game and bargaining duration of the teams.

2. Literature Review

Hawk-dove game is a non-cooperation game in game theory that represents a model of dominance and submissiveness (Price 1969 and Smith & Price, 1973). Game theoretic applications in experiments are becoming more popular as conventional economics is being researched, re-explored and challenged by behavioral economic theories.

The importance of experimentation in economics is that it provides the researcher with necessary control needed to test behavioral theories (Gomes *et al.*, 2001). With room for improvement, replicability in experimentation is generally possible especially of experiments published in top economic journals (Camerer *et al.*, 2016). Healy and Noussair (2004) replicated a bidding gameshow “The Price is Right” in laboratory settings. Necessary treatments and modifications were carried out for simplifying the game in order to identify the factors which were causing subgame perfection, the idea central to their study, to be predicted poorly. Empirical patterns and properties of the data observed in the gameshow were replicated to make the necessary modifications in the game’s structure to find out whether the failure of subgame perfection arises. The study compared the results from their experiments with the results from actual gameshow analyzed by Berk *et al.* (1996). It explicated the extent to which the results of gameshows can be replicated in laboratory settings and the similarities in the results from such attempts.

Hauk (2003) performed an experimental study altering the options of the payoff matrix in prisoner’s dilemma game. The experiment involved simultaneously played two-person finite prisoner’s dilemma super-game. The experimental design introduced additional/innovative payoff in the payoff matrix that followed from an innovative third strategy, namely the “outside option”. This strategy resulted into a known payoff. Utilizing this strategy, the players could surpass the payoffs from defection and cooperation and end up with the outcome of the innovative payoff. The players used this option mainly used to exclude the non-cooperators.

2.1. Hawk-Dove Game: Dominance Versus Submissiveness

Tiedens *et al.* (2007), after a series of studies, revealed that perception of dominance complementarity; that is, perception of dominance of the other person as different from ones’ own, are motivated by feelings of positive task relationships. Individuals desire to form hierarchies in order to smooth out the mechanism of achieving group tasks.

Kunst *et al.* (2017) aimed at finding relationship between group dominance and social inequalities. The findings reveal inequality at macro level to be associated with support for group dominance at individual level. If at individual level group dominance was a prevalent idea, then it was reflected in inequitable actions of the population. Likewise, Psychological dominance of groups effected behaviors and attitudes at individual level. The study suggests that when faced with a situation of inequality, members of dominant groups utilize their dominance to increases their chances for maximizing self-interest and individual payoffs. The tuning of these dominance motives was found to be at psychological level of individual agent.

Magee and Galinsky (2008) have argued that power and status are important basis for hierarchical differentiation due to the presence of some psychological and sociological elements. They explained power and status to be by nature self-reinforcing such that having power over a resource transformed the psychology to retain and acquire further power, whereas status, viewed in terms of respect, benefited individuals with a prior status advantage by generating positive expectations for behavior and opportunities for advancement.

2.2. Equity and Ethical Considerations

Winden (2007), intrigued by the strained relationship between ethics and mainstream economics, experimentally tested the role of fairness in relation to outcome-based inequality aversion approach and intention-based reciprocity approach. The research explained perception of fairness in the context of bounded rationality. Empirical results revealed human judgement to be liable to fallacies and be influenced by various effects, such as the framing effect, and not strictly following statistics while perceiving situations. Emotions defined compliance to norms like fairness more than cognition. It should be noted that cognitive ability of humans is subjected to psychological limits (Simon, 1955). Aspects of cognition are normally studied indirectly by drawing inferences from models that best describe the decision taken by participants in experimental economics (Gomes *et al.*, 2001).

Conlisk (1996) has researched the reasons for incorporating bounded rationality in economics. The research delineates its importance in light of ample empirical evidence in support of bounded rationality. The study concludes that inclusion of bounded rationality in economic models amplifies success in explaining economic behavior beyond the conventional models. It views human cognition as a scarce resource, like other resources in economics, and deliberation on an economic decision having an associated cost that needs to be considered. It also describes several psychological and economic behaviors and decisions undertaken by individuals during experiments that highlight the

importance of bounded rationality¹. The theory of Bounded Rationality explains that the rationality of humans is limited when faced with decision making due to cognitive and time limitations; therefore, people take decision that provide a satisfying solution rather than an optimal one. When individuals are in a situation that involves conflict and/or cooperation, then to evade an impasse, the rational economic agents must make a choice among various optimizing and satisficing decisions.

Neugebauer *et al.*, (2008) uses the hawk-dove game to measure fairness and reciprocity (positive and negative both) through an experiment and gives a generalized classification of the individuals' type as being hawk or dove. The experiment design distinguishes the players into four categories. Materialists(M), who play hawk if the opponent plays dove and vice versa. Hawk(H) who plays hawk irrespective of the opponents' strategy. In this case, response of hawk with hawk is interpreted as negative reciprocity. Dove(D) always plays dove. In this case, response as dove to dove is interpreted as positive reciprocity. Reciprocator(R) responds to hawk with hawk and vice versa. Ninety-four subjects played the game consisting of three stages with an average pay-off of 10,000 Italian lire (ITL). In the first stage (mix strategy environment) the subjects were asked to pick any number from zero to hundred (0-100) representing their probability of playing hawk. In the second stage (pure strategy environment) the subjects were asked to choose conditional strategy of hawk or dove in response to the opponent playing hawk and dove each. The choice made in this stage were termed as revealed preference. In the third stage, having no financial incentive, the subjects were asked to rank the four possible outcomes according to their preferences. These preferences were termed as stated preference. Based on the above-mentioned classification M-type were 53%, D-type 30%, H-type 6%, and R-type 5%. Results from stage 3 show subjects being M-type 87%, D-type 11%, H-type 2%, and none were R-type. The experiment concludes that the revealed preference for fairness or reciprocity may depend on the game. Majority of the subjects displayed materialistic preferences (M-type). The second largest group was of those who played Dove in every case and were classified by

¹ Conlisk (1996, p. 670) notes: "There is a mountain of experiments in which people: display intransitivity; misunderstand statistical independence; mistake random data for patterned data and vice versa; fail to appreciate law of large number effects; fail to recognize statistical dominance; make errors in updating probabilities on the basis of new information; understate the significance of given sample sizes; fail to understand covariation for even the simplest 2·2 contingency tables; make false inferences about causality; ignore relevant information; use irrelevant information (as in sunk cost fallacies); exaggerate the importance of vivid over pallid evidence; exaggerate the importance of fallible predictors; exaggerate the ex-ante probability of a random event which has already occurred; display overconfidence in judgment relative to evidence; exaggerate confirming over disconfirming evidence relative to initial beliefs; give answers that are highly sensitive to logically irrelevant changes in questions; do redundant and ambiguous tests to confirm a hypothesis at the expense of decisive tests to disconfirm; make frequent errors in deductive reasoning tasks such as syllogisms; place higher value on an opportunity if an experimenter rigs it to be the *_status quo_* opportunity; fail to discount the future consistently; fail to adjust repeated choices to accommodate intertemporal connections; and more."

the author as altruistic. From the third stage it was concluded that stated preferences were predominantly of M-type (self-interested type). The results of this experiment evidenced lower levels of reciprocity than previously reported results by other experiment, because in the hawk-dove game there were no pareto-gains for cooperation (dove). Therefore, the subjects did not have an incentive to cooperate to maximize the group pay-off. The degree of reciprocity observed in other studies did not carry-over fully to the hawk-dove game owing to its strategic environment indicating that predictive power of theories is contextually dependent.

2.3. Bargaining

Crawford (1982) in his article proposed a theory to explain impasses in bargaining that have detrimental consequences on welfare and explained why rational bargainers might take decision that would lead to impasse. It is based on Schelling's views of the bargaining process where each bargainer wants to be in a favorable bargaining position and tries to find the probability of an impasse endogenously in relationship to the bargaining environment. Crawford explains that bargaining impasses are generally pareto-inefficient, therefore, any situation involving a positive probability of impasse is also pareto-inefficient. The findings suggested that contrary to the conventional wisdom, making the commitment to a more difficult claim or altering the cost of disagreement such that there are wider choices that result into a better situation for both bargainers than disagreement, need not necessarily lower the probability of impasse. This is because it only considers the partial effect of lowering success probability and ignores the resulting changes in commitment positions with an effect that is usually opposite in direction to the effect of this partial change. The bargaining process has an obvious determinate solution (Harsanyi, 1956), at least in situations that are completely symmetric with respect to the two bargaining parties. If an individual is a tough bargainer, it may have negative effects on his/her payoffs (Hall *et al.*, 2019).

Dolder *et al.* (2015) analyzed the gameshow DIVIDED for bargaining behavior outside the laboratory, in a high-stake situation, involving face-to-face communication, and with a diverse subject pool. The findings reveal that concern for equity was the primary factor determining the behavior of individuals and the outcomes of bargaining in terms of winning greater shares. The individuals who had larger contributions to the jackpot claimed and fought for bigger shares, were less likely to make concessions, and ended up winning bigger shares of the jackpot. The positive contributions by the contestants effected the persons opening claim while the negative contributions derived the concession provided during the bargaining stage. There was no advantage found for being a first-

mover. First movers did not end up with larger shares. Among the demographic characteristics, the only significant statistic revealed that younger contestants were more successful in securing larger part of the initial jackpot. The threat of playing hardball was found to be ineffective as this made it difficult to reach an agreement, but these individuals performed well relative to those who did not announce hardball as this increased the relative standing of individuals within the group. The significant result suggest that the contestants were less likely to announce a hardball strategy when the stakes were relatively low. This showed they had a relatively laid-back attitude when the stakes were relatively low, and fairness did not matter with the same magnitude with a change in stake size.

2.4. Gender Studies

Hannagan and Larimer (2010) studied the effect of gender composition on group decision outcomes. They performed experiment based on ultimatum game on groups with varying gender composition including exclusive male groups, exclusive female groups and mix gender groups. In their findings, difference in strategies that vary with respect to gender and dynamics of gender group interaction predicted group outcomes. They found evidence that gender composition of groups effects the preference of group outcomes of individuals. They also found evidence in support of the hypothesis that difference in group outcomes based on gender composition is due to the difference in strategies used by the two different genders.

Powell and Ansic (1997) analyzed the gender differences in risk behavior on financial decision making through experimentation. Research suggested that the female gender experiences negative outcomes more as compare to the male gender when they show dominance and it damages their likability if the dominance is displayed explicitly, however the effect of dominance on perception of competence did not differ for males and females (Williams and Tiedens, 2016).

Paola and Gioia (2016) in their field experiment examined the effects of time on the performance of male and female university students. Their findings reveal that time pressure had no statistically significant impact on male students however it had a very strong and statistically significant negative impact on the performance of female students. It led to deteriorating both the quantity and quality of output of the females.

The hawk-dove behavior can be demonstrated due to many reasons and is determined by many characteristics. Genotypes and phenotypes might be associated to hawk and dove tactics (Auger *et al.* 1998) but we limit our review of the literature to the above-mentioned areas.

Mehta *et al.*, (2017) suggested that new studies should combine financial motives and social concerns in the hawk-dove game. Hawk-dove game is a relatively lesser explored area of game theory. Few experiments have been performed that have analyzed the behavior of dominance and submissiveness in the framework of hawk-dove game in economics. The core concept of the experiment employed in this research was inspired from the gameshow DIVIDED, analyzed in a research paper by Dolder *et al.*, (2015). No research has replicated the gameshow DIVIDED and analyzed the results for a low-stake situation.

3. Methodology

3.1. Theoretical Model

The research employs hawk-dove game in an experiment to test the dominant and submissive behaviors in a low stake situation.

Hawk-dove game is a non-cooperation game in game theory. The classic hawk-dove game represents a model of conflict in which two players compete/fight for a shared resource. Hawks intend to dominate and therefore fight for the resource whenever confronted with competition, whereas doves are submissive and never fight for the resource. Both players have an option of either to play as 'hawk' (hawk strategy), i.e., display an aggressive behavior, or play as a 'dove' (dove strategy), i.e., display a submissive behavior. If both players play the dove strategy while competing for the resource, then there will be no fight and the resource would be divided equally between them (called dove-dove outcome). If one of the players plays hawk strategy and the other plays dove strategy, then fight is avoided; the hawk gets a bigger share than the dove (called hawk-dove, dove-hawk outcomes).

This represents a competition in which each player wants to prevail over the other (Snyder, 1971) because "each player prefers the equilibrium in which he/she plays hawk" (Berninghaus *et al.*, 2012). If both players play the hawk strategy, then the result is a fight between the two players and the pay-off that each player gets is the resource minus the cost of fight, divided equally between both players (called hawk-hawk outcome). The first three outcomes represent situations of cooperation while the last outcome represents non-cooperation. In the hawk-dove game dominance and submissiveness are the defining characteristics. The classic hawk-dove game has two asymmetric pure strategy Nash equilibria as hawk-dove and dove-hawk and a mixed strategy equilibrium in which the player mixes between hawk and dove strategies with equal probabilities. Neither player has an incentive to deviate from their strategy when the equilibrium strategies are being played. Whether a

model evolves into Nash equilibrium or not depends upon the conditions and environment in which the game is played (Conlisk, 1996). The hawk-dove game manifests status competition and models the emergence of hierarchies (Mehta *et al.*, 2017; Smith 1982; Matsumura and Kobayashi, 1998; Vugt and Tybur, 2015). The Nash equilibria in hawk-dove game represent different possible hierarchies (Mehta *et al.*, 2017).

Our experiment involves four players and is not, therefore, proceeded in the paradigm of the classic hawk-dove game. We develop an indicator for measuring the dominance of players, denoted as hawk index. Higher the value of this index, the more hawkish (dominating) the player; conversely, lower the value of index, the more dovish (submissive) the player.

The experiment is divided into two stages. In first stage the contestants answer questions by unanimously agreeing to one of the answer options, after discussion, in order to accumulate the divisible reward (called jackpot). A correct answer by the team leads to increasing the amount of jackpot while a wrong answer has no effect on the jackpot. The second stage is a bargaining experiment in which the amount accumulated in the jackpot is divided in four unequal shares of 50%, 30%, 15% and 5%, and the contestants enter the hawk-dove gameplay. Contestants divide these shares among themselves within a time period of 60 seconds, in which they have to discuss and unanimously agree on the allocation of shares. They require to lock in a distribution from among the 24 possible Nash equilibria as the final decision of the team. After the first ten seconds the jackpot starts to drain out at a rate of two percent with each passing second so that when the sixty seconds end the team is left with nothing in their jackpot.

In our game, there are 24 pure strategy Nash equilibria. They are the combinations of shares that do not lead to a deadlock. These Nash equilibria are shown in Table 3.1 below. Which of these 24 Nash equilibria prevails, it can be determined if an agreement is reached.

Table 3.1. Pure Strategy Nash Equilibria

Nash Equilibrium No.	Share player A	Share player B	Share player C	Share player D
1	50	30	15	5
2	50	30	5	15
3	50	15	30	5
4	50	15	5	30
5	50	5	15	30
6	50	5	30	15
7	30	50	15	5
8	30	50	5	15
9	30	15	50	5
10	30	15	5	50
11	30	5	50	15
12	30	5	15	50
13	15	50	30	5
14	15	50	5	30
15	15	30	50	5
16	15	30	5	50
17	15	5	50	30
18	15	5	30	50
19	5	50	30	15
20	5	50	15	30
21	5	30	50	15
22	5	30	15	50
23	5	15	50	30
24	5	15	30	50

4. Empirical Model

4.1. Research Questions

Our empirical model is designed to test economic theories presented in the theoretical model by answering the following questions:

1. Is it equity or hawk/dove behavior that defines entitlement to economic benefits in a low stake situation?
2. Do hawks succeed in securing larger shares in a low stake situation?
3. Does time pressure affect the efficiency and performance of the bargaining abilities of males and females differently?

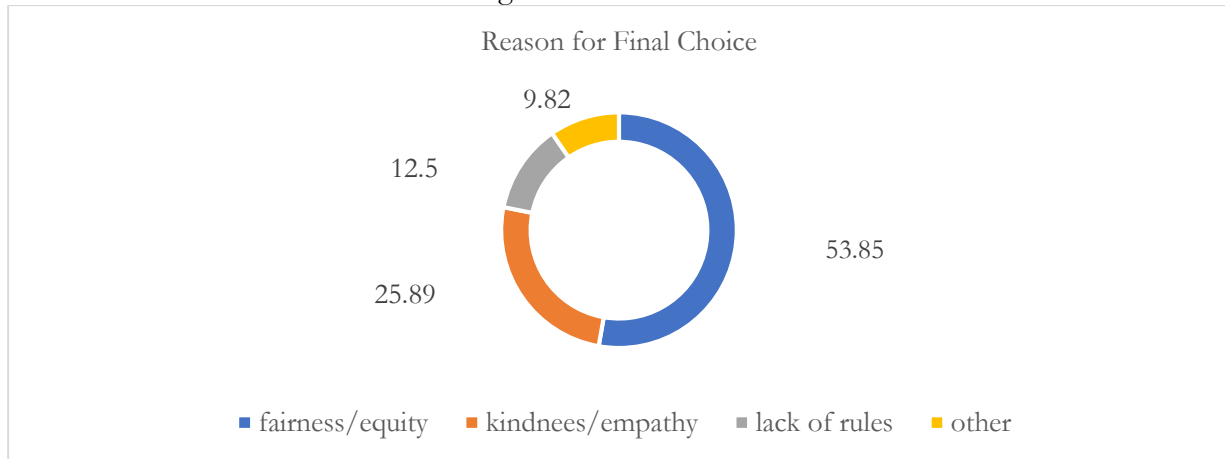
4.2. Experiment Design

4.2.1. Datasets

Primary research method employing qualitative and quantitative data is used to carry out the analysis. The game was carried out as a field experiment at National University of Sciences and Technology (NUST), Islamabad, Pakistan. A total of twenty-eight games were conducted. Each game consisted of four participants, making a total of one-hundred and twelve players. Six games involved only male participants, 12 games involved only female participants and 10 games had mix gender participants. There were 44 males and 68 females. The respondents were postgraduate and undergraduate students from different schools of NUST. Fifty-one students were from undergraduate programs and 61 were from post graduate programs. They were chosen via convenience sampling for the experiment.

The players were assigned names A, B, C and D, and handed a form, the front side of which they had to fill before the question-answer session started in the first stage. It contained questions requesting their demographic information. Providing mobile phone number was necessary for players as the payoff was given in the form of 'mobile phone credit'. The descriptive statistics reveal that the average age of the players is twenty-two years nine months and seven days. The maximum age is 35 years while the minimum age is 18 years. After the question-answer session ended, the contestants were told to fill the other part of the form on back-side of the same page or, in some cases, on a separate page. It requested to designate the fair entitlement of share (50%, 30%, 15% and 5%) to each player and rank each player, including them self, according to perception of dominance, from lowest to highest. After the bargaining phase ended in stage 2, the contestants were told to answer the last question on the questionnaire asking their reason for their choice of share in the bargaining phase. The question had four options in the answer and the contestants could choose more than one of the enlisted options. The options were: fairness/equity, kindness/empathy, lack of rule (for division) and other (also requesting to specify the reason). The reason identified by the players for making their final choice is as; fairness/equity 53.85%, kindness/empathy 25.89%, lack of rules 12.5% and other 9.82%.

Figure 4.1. Final Claims



The time taken to conduct the entire game was normally 20 minutes. The average time taken by a team in the bargaining phase was 27.57 seconds, minimum time taken was 3.99 seconds and the maximum time was drowning the entire 60 seconds.

4.2.2. Game Play

The experiment was conducted personally along with a trained helper. It was conducted with a motive to examine the role of fairness and dominance in economic decision making. The game was divided in two stages. The first stage is the stage of accumulation of jackpot (the sum of money won by the team that will be later divided among the players). The contestants are detailed about the winnable amount, i.e., the cumulative amount and per question amount. In this stage four players are made to sit together for the experiment. After the contestants fill the form described above, they are explained the pattern of the first phase of the game. In the first phase, the contestants are asked five questions of general knowledge each followed by four options, from which one is the correct answer to the question. For each question there is a time duration of sixty seconds to give the answer failing which the team gets no reward which they would otherwise have banked for answering the question correctly. After the question is asked the stopwatch starts, the players discuss the answer among themselves and unanimously lock-in one option as the collective answer of the team, with everyone's approval/consent (explicit, i.e., clearly stating the answer, or tacit, i.e., remaining quiet and going along with everyone's decision). After the team locks-in their answer, the stopwatch stops, the correct answer is revealed and contestants are told whether their answer is correct or incorrect, and the amount of money they have banked. Answering a question correctly, within sixty seconds, leads to

the team accumulating the amount of the reward in the teams' bank, while answering a question incorrectly or not answering the question within the stipulated time leads to the amount of reward not being banked. After the question-answer session ends, the team is informed about the amount they have banked. Questions one and two were of 400 Pakistani rupees (PKR) each, questions three and four were of PKR600 each and question five was of PKR1000. The maximum amount a team could win was PKR3000 and the minimum amount was PKR0. Subsequently, the maximum or minimum amounts a contestant could win were PKR1500 and PKR0, respectively. The individual responses of each player to every question are also noted in terms of questions answered correct or incorrect, whether the player argues in favor of the answer or tacitly goes along with the answer of the team. The average amount of the finally banked amount in rounded figures is PKR1693, the smallest is PKR600 while the largest is PKR3000; of this, on average the amount that a player could win is PKR361, the smallest is PKR0 while the largest is PKR1500. The average amount won by team is PKR1032, with minimum PKR0 and maximum PKR2600; of this, the average amount won (payoff) by players is PKR258, with PKR0 as minimum amount and PKR1300 as maximum amount. Stage one ends here.

A game played in strategic form to solve a distribution problem is a bargaining game (Guth and Schwarze, 1982). The second stage is the bargaining phase involving face-to-face communication and, continuous bargaining cost after the first ten seconds, as the jackpot starts to drain out with each passing second starting with the eleventh second. If the players reach an agreement, it would be a relative gain for every player over the conflict situation resulting from no agreement (Harsanyi, 1956). To induce a competitive behavior, decision making environment is created (Kemenica, 2012). The team is told that the amount banked would be divided in four unequal shares of fifty percent, thirty percent, fifteen percent and five percent, and each player would get one of the four shares. As framing of instructions of the game affects the cooperation rates of the players (Rege and Telle, 2004), therefore, in most cases they were told the amount of 50% and 5% of the jackpot and that these two values had a significant difference and they should consider this difference while making decisions. The contestants were requested to fill the other side of the form after which the team was explained that they had a time duration of sixty seconds to bargain and reach a collective decision regarding the allocation of shares. If the team locks-in their decision in the first ten seconds, they get hundred percent of the amount banked. After the first ten seconds the team loses two percent of the amount banked with each passing second such that after sixty seconds the team has no amount left in their

bank. The team members had to bargain and mutually decide which player gets which share and everyone had to agree on the decided distribution in order to lock it in as the final decision of the team and win a sum of reward from the amount banked. The contestants were requested to answer the final question on the form. This concludes the second phase of the game. Flowchart 1 in the appendix displays the game in visual form.

Our experimental design altered the number of outcomes of the payoff matrix of the classic hawk-dove game by altering the simultaneous use of dove strategy by players. Hence, we ruled out the dove-dove option. The payoff matrix is known to influence the degree of cooperation among players (Hauk, 2003). Due to the reward of the game involving low-stakes there was a high probability that, if not all, then at least most of the players would resort to the risk-averse dove-dove option, especially in the cases where the contestants were acquaintances. As the research was subjected to a limitation of funds therefore, we could neither increase the stake size nor perform too many experiments. To study the effect of dominance and submissiveness it was necessary to impose restriction on this option.

4.3. Strategic Considerations of the Players

The goal of each player, being a rational economic agent, is to maximize his/her payoff by:

1. Banking the maximum amount in the team's jackpot in stage 1
2. Secure the maximum possible share in the least possible time, with the consent of all players, in stage 2.

Therefore, to strategically evaluate the game we analyze the answers correct and answers incorrect from the first round, and entitlement and dominance in the experiment performed.

5. Results

5.1. Estimations and Analysis

Each player was asked to assign one of the shares out of the four to each player in the team. The Entitlement Index (EI) is constructed for each player by summing up the shares assigned to each player by every player. Because the minimum and maximum shares are 5% and 50%, EI can range from 0.2 to 2. Higher the value of the index, more entitled to higher shares the player will be perceived by the team members; and vice versa. Although the value of the reward for questions were different, but during the experiment the contestants referred to the number of questions answered correctly or incorrectly and rarely, if ever, to their value while making discussions during the conduct of

experiment. This might be due to the reward being not a very large amount. Therefore, we use the number of answers correct or incorrect and not their value amounts in the analysis. Perception of dominance is a proxy variable used for measuring hawkishness of the contestants. Hawk index is made by adding the value of the rank assigned to each player by every player, while ranking each player according to perception of dominance. The ranks were most dominating (having a value of four), very dominating (having a value of three), average dominating (having a value of two) and least dominating (having a value of one). This index can range from four to sixteen. The higher the value of index, the more hawkish (dominating) a player is, and vice versa. In order to get a clear understanding and for facilitating comparison, the entitlement index and hawk index were converted into percentage values. Entitlement index has minimum 10% and maximum 100% values, therefore 55% is the median value. Hawk index has minimum 25% and maximum 100% values, therefore 62.5% is the median value. Efficiency rate indicates the efficiency of the team. It is calculated by dividing the amount won by a team by the amount banked by it. It can range from 0 to 1 with zero being the minimum value implying that the team won nothing of the amount banked, and 1 being the maximum value implying that the team won entire amount of what it had banked.

The variables used to perform econometric analysis on our data to find answers to our research questions are described in Table 5.1.

Table 5.1. Description of Variables

Variable Name	Variable Type	Range		Mean	Total
		Minimum/ 0(binary)	Maximum/ 1(binary)		
Gender	Binary(male=0)	44	68	-	112
Education	Binary (UG=0)	51	61	-	112
Age (years)	Ratio scale	18	35	22	-
Answers Correct	Interval scale	0	5	2.47	-
Answers Incorrect	Interval scale	0	5	1.84	-
Team Jackpot (PKR)	Ratio scale	600	3000	1692.85	47400
Player's Payoff (PKR)	Ratio scale	0	1300	257.97	28893.4
Bargaining Duration (sec.)	Ratio scale	3.99	60	27.57	-
Entitlement Index	Ratio scale	0.2	2	1	-
Hawk Index	Interval scale	16	4	10	-

5.1.1. Equity, Dominance and Entitlement

To find whether equity or hawk/dove behavior defines entitlement to economic benefits in a low stake situation, the correlation of entitlement index with answers correct, answers incorrect and hawk index is calculated. Spearman's Rank Order Correlation (table 5.2) is used to calculate the correlation between entitlement index and answers correct and incorrect. The spearman's rho for entitlement index and answers correct and answers incorrect are 0.1512 (insignificant) and 0.0419 (insignificant), respectively. The results for correlation display a weak, insignificant and positive spearman's rho, suggesting that the contestants did not have significant regard for equity while deciding the entitlement to shares of the jackpot.

Table 5.2. Correlation for Concern for Equity (p-values in parenthesis)

	Entitlement Index	Answers Correct	Answers Incorrect
Entitlement Index	1.0000 (0.0000)		
Answers Correct	0.1512 (0.1114)	1.0000 (0.0000)	
Answers Incorrect	0.0419 (0.6611)	-0.6902* (0.0000)	1.0000 (0.0000)

The graphical representation of these relationships can be observed in figures 5.1 and 5.2, respectively. It can be observed that there is no substantial relationship between the variables.

Figure 5.1. Relationship between Percentage of Answers Correct and Entitlement Index Percentage

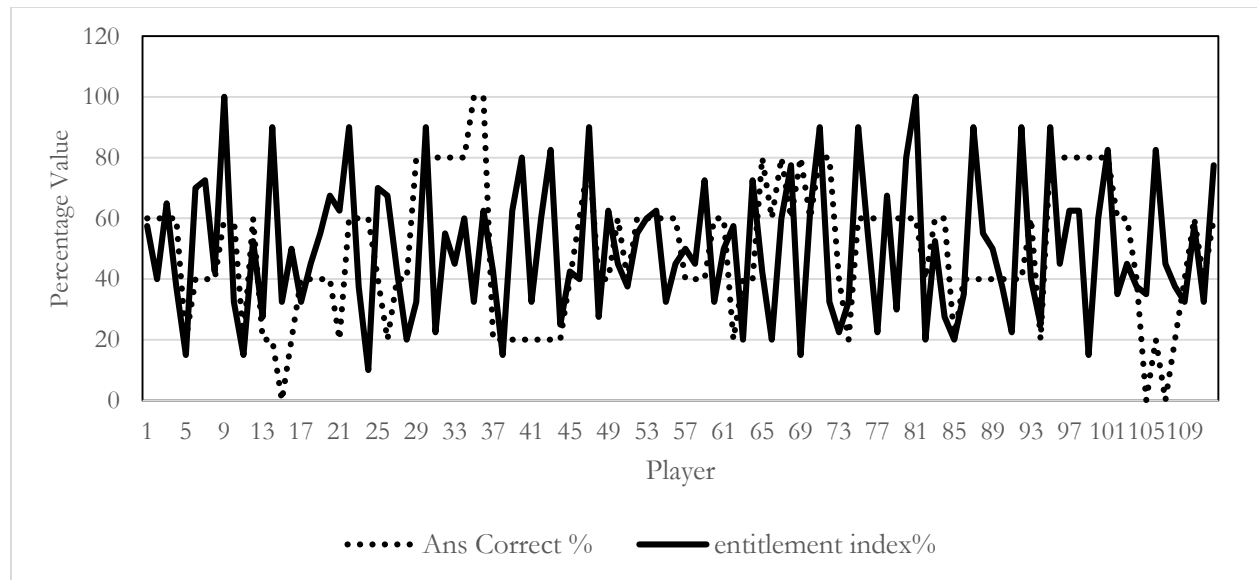
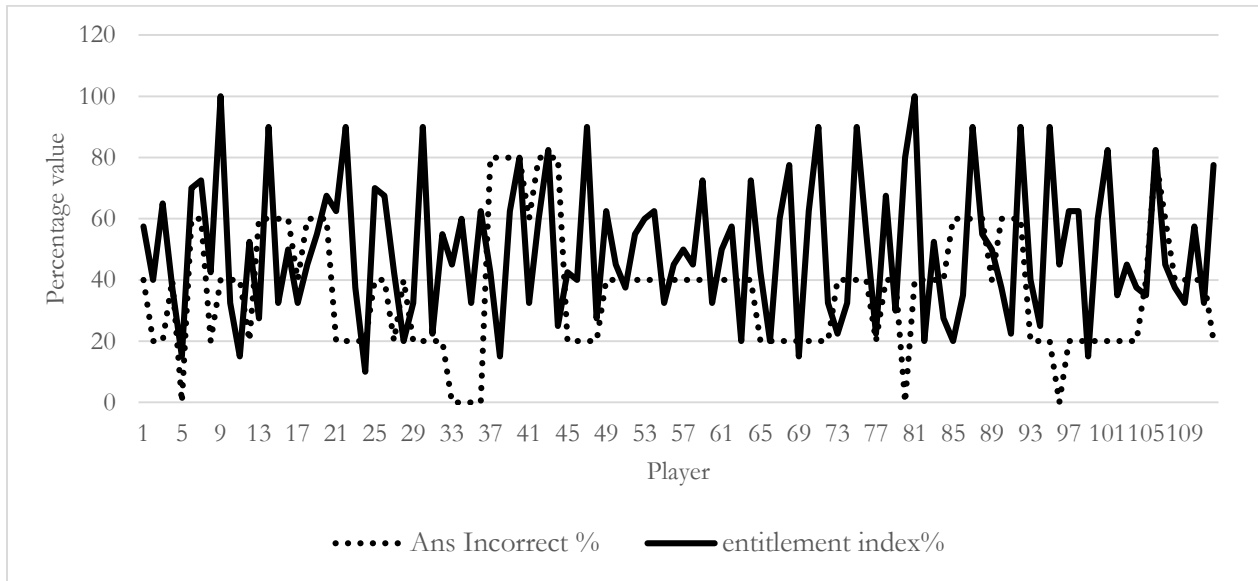


Figure 5.2. Relationship between Percentage of Answers Incorrect and Entitlement Index Percentage



To analyze the role of hawk/dove behavior in defining entitlement of share, Pearson Product Moment Correlation (Table 5.3) is used to calculate the correlation between entitlement index and hawk index. Pearson’s correlation coefficient for entitlement index and hawk index is 0.7018 and is also significant.

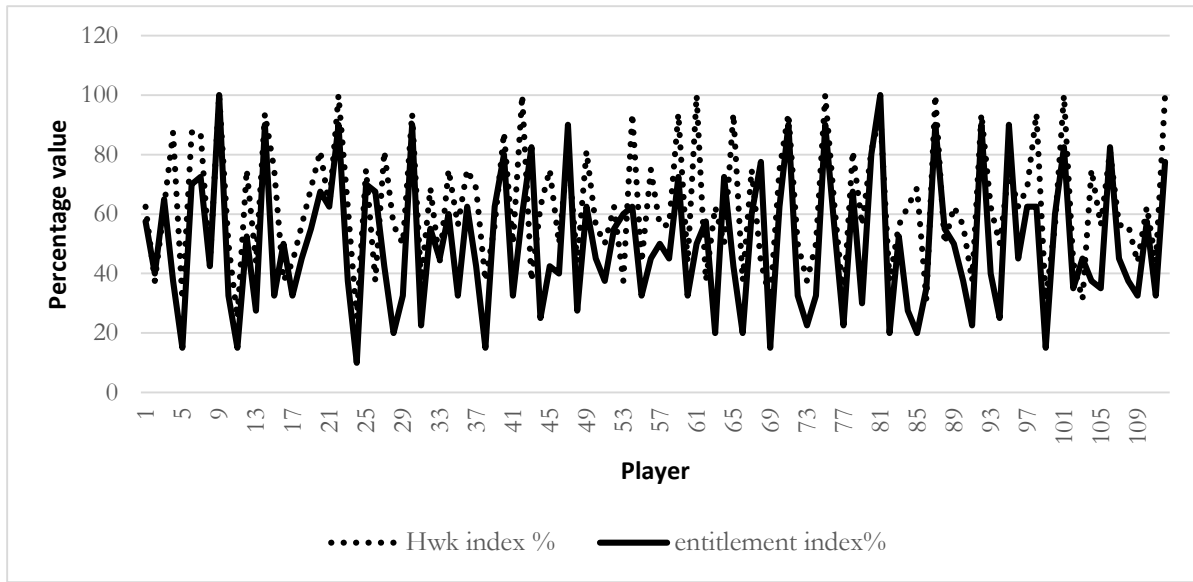
The results for correlation display a strong, significant and positive Pearson’s correlation coefficient, suggesting that the contestants had significant regard for dominance while deciding the entitlement of shares. The results are shown in Table 5.3 below.

Table 5.3. Correlation for Concern for Dominance (P-values in parenthesis)

	Entitlement Index	Hawk Index
Entitlement Index	1.0000 (0.0000)	
Hawk Index	0.7018* (0.0000)	1.0000 (0.0000)

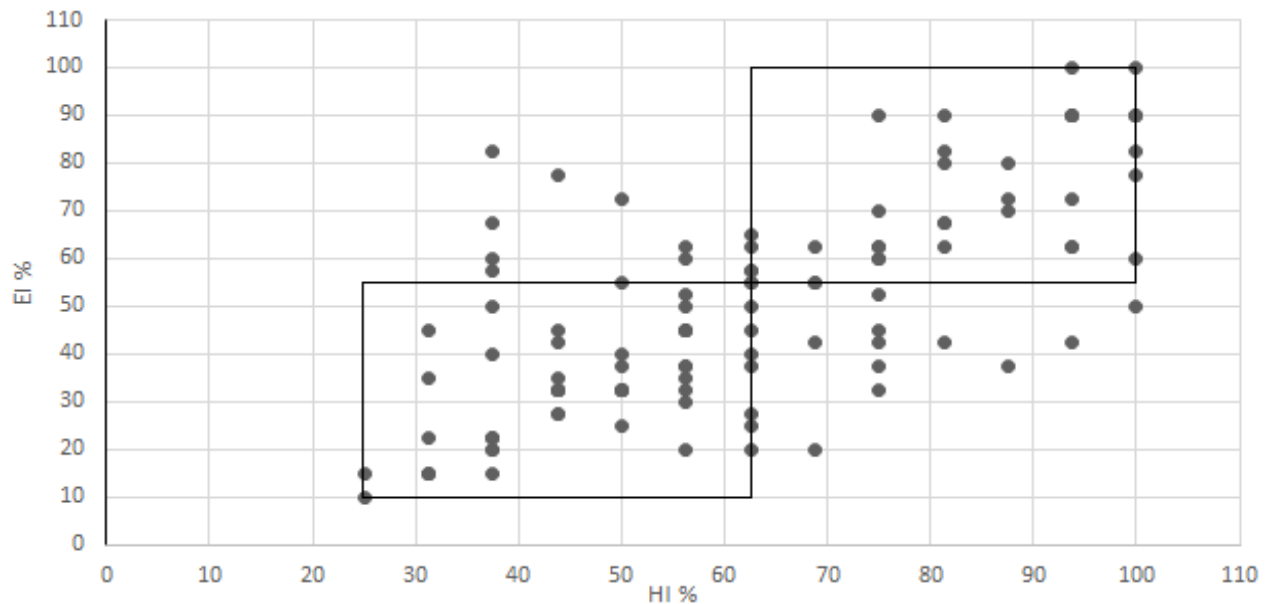
Figure 5.3 shows the relationship between hawk index percentage and entitlement index percentage for each player. It can be seen in this figure that hawk index percentage is harmonious to entitlement index percentage. In many cases, they also have the same values.

Figure 5.3. Relationship between Hawk Index Percentage and Entitlement Index Percentage



This relationship can be further observed in figure 5.4. (recall that 55% is the median value for entitlement index percentage and 62.5% is the median value for hawk index percentage). It can be observed from the figure that contestants with a low hawk index percentage (hwk index %) (25%-62%) have mostly a low entitlement index percentage (5%-54%), whereas contestants with a high hawk index percentage (63%-100%) have mostly a high entitlement index percentage (56%-100%).

Figure 5.4. Relationship between Hawk Index Percentage and Entitlement Index Percentage



5.1.2. Appropriation of Share and Dominance

In order to analyze if hawks succeed in securing larger shares in a low stake situation, correlation is calculated between hawk index and amount that could have been won (share amount) and the amount actually won (payoff of each player) using Pearson's product moment correlation. In Table 5.4., the correlation coefficients are significant, positive and have values of 0.2643 and 0.23, respectively. This indicates that there is a moderate correlation of dominance/hawkishness with the share amount and payoff of an individual. The more hawkish a contestant, the higher share the player secures.

Table 5.4. Correlation for Role of Dominance (P-values in parenthesis)

	Hawk Index	Share Amount	Payoff
Hawk Index	1.000 (0.0000)		
Share Amount	0.2643* (0.0049)	1.0000 (0.0000)	
Payoff	0.2333* (0.0133)	0.8779* (0.0000)	1.0000 (0.0000)

This relationship is shown in figure 5.5. It can be observed that the movement of the two variables shows a moderate correlation.

Figure 5.5. Relationship between Hawk Index Percentage and Share Won Percentage

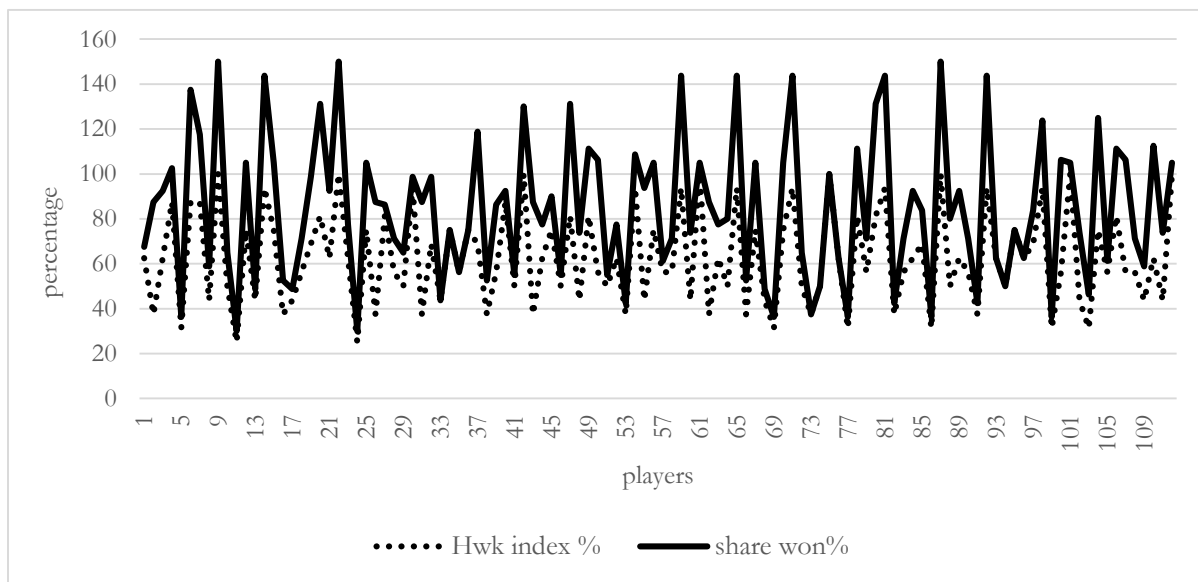
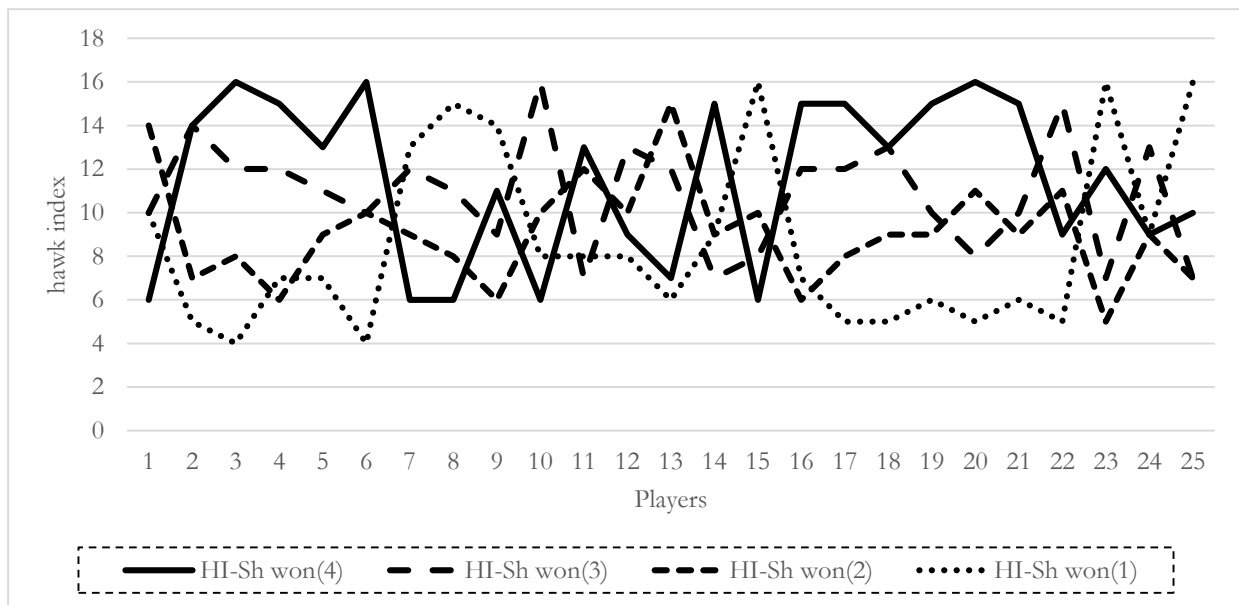


Figure 5.6 shows the hawk index of individuals for each share won. The dotted line (HI-Sh won (1)) indicating hawk index for the individuals who secured the lowest share of 5% is mostly the lowest, and below hawk index of 10 (median value of the hawk index). The small-dashed line (HI-Sh won (2)) indicating hawk index for the individuals who secured the second lowest share of 15% is also mostly below hawk index of 10, but mostly above the dotted line. The big-dashed line (HI-Sh won (3)) and the filled line (HI-Sh won (4)) indicate hawk index for the individuals who secured the second and first highest share of 30% and 50%, respectively, are mostly above the hawk index of 10, and mostly above the dotted and small-dashed lines. This shows that dominance of the contestants helped them in securing larger shares.

Figure 5.6. Hawk Index of Contestants Per Share



5.1.3. Gender Analysis

The role of gender on the behavior of players and outcomes is also relevant in such games. To find out whether gender influences the relationship between hawkishness of individuals, perception of entitlement and share won; correlation between hawk index, entitlement index and share won by players is calculated. The analysis is done for mix gender group and exclusive gender groups, i.e., male groups and female groups.

To analyze the role of dominance on the perception of entitlement and share won, and the effect of perception of entitlement on share won by the mix gender and exclusive gender groups Pearson's product moment correlation is used. For male groups (table 5.5) the Pearson's coefficient for hawk index and, entitlement index and share won are 0.6160 (significant) and 0.2805 (insignificant), respectively, whereas it is 0.7175 (significant) for entitlement index and share won. For female groups (table 5.6) the Pearson's coefficient for hawk index and, entitlement index and share won are 0.8285 (significant) and 0.2292 (insignificant), respectively, whereas it is 0.2587 (significant) for entitlement index and share won. For mix gender groups (table 5.7) the Pearson's coefficient for hawk index and, entitlement index and share won are 0.6904 (significant) and 0.3398 (significant), respectively, whereas it is 0.4809 (significant) for entitlement index and share won.

Table 5.5. Correlation Table for Male Groups (P-values in parenthesis)

Male Groups	Hawk Index	Entitlement Index
Entitlement Index	0.6160* (0.0014)	1.0000 (0.0000)
Share Won	0.2805 (0.1843)	0.7175* (0.0001)

Table 5.6. Correlation Table for Female Groups (P-values in parenthesis)

Female Groups	Hawk Index	Entitlement Index
Entitlement Index	0.8285* (0.0000)	1.0000 (0.0000)
Share Won	0.2292 (0.1346)	0.2587* (0.0900)

Table 5.7. Correlation Table for Mix Gender Groups (P-values in parenthesis)

Mix Gender Groups	Hawk Index	Entitlement Index
Entitlement Index	0.6904* (0.0000)	1.0000 (0.0000)
Share Won	0.3398* (0.0319)	0.4809* (0.0017)

To scrutinize the effect of time pressure on the efficiency and performance in bargaining of males and females the efficiency of exclusive gender groups was analyzed. The maximum efficiency of male groups was 1, minimum efficiency was 0.7378 and average efficiency was 0.9563. The maximum efficiency of female groups was 0.96, minimum efficiency was 0 and average efficiency was

0.478717. The stark difference between the efficiency rates of the two categories of groups clearly indicates that male groups were more successful in avoiding losses resulting from drainage of jackpot in the bargaining stage as compare to female groups; resultantly, they were more successful in securing larger amounts of the jackpot won.

6. Discussion

The results from our experiment provide several insights. No evidence is found that equity matters while deciding the entitlement of shares in low stake situations with fixed pool. Positive contribution to the jackpot did not have a substantial effect on increasing a player's chances towards winning a larger share. Likewise, negative contribution did not decrease a players' chances towards winning a larger share. The perception of entitlement to a share amount was predominantly driven by perception of dominance of the players. Hawks were perceived more entitled to receiving bigger shares as compared to doves who were thought entitled to receiving smaller shares. Securing of a higher share by individuals with a higher hawk index was, in most cases, preceded and complimented by a high entitlement index. This might have followed from adaptive expectations. The dominance of hawks in stage 1 led to their dominance and success in stage 2. From the analysis above, it can be concluded that the major source of entitlement to share is not equity but hawkishness of the contestants.

Sixty-three people (53.85%) identified fairness as the reason for making the final choice of share. An equal division of the jackpot might have seemed as the reference point of fairness (Eichenberger and Oberholzer-Gee,1998 and Bohnet and Frey, 1999) where some or all contestants had performed equally in answering the questions in the game, but as the division of the share was predefined, therefore, fairness also needed to be redefined and perceived in our experiment. Anomalies in incentives are primarily driven by social preferences (Kamenica, 2012; Fehr and Falk, 2002 and, Fehr and List, 2004). This can be a reason why dominance was more relevant than equity during the second stage (bargaining phase) of the game. These findings are important concerning the significance of emotions in defining perceptions having practical implications for distribution of limited resources in the presence of social hierarchies. The subjects in our experiment were bounded by time constraint. Deliberating on distribution of shares was prone to an economic cost. This impacted the cognitive process of the players. The stake size was low, therefore, due to bounded rationality the deduction on the basis of statistics of answers correct (/incorrect) became weak, consequently, equity took a back seat while “overconfidence in judgement relative to evidence”

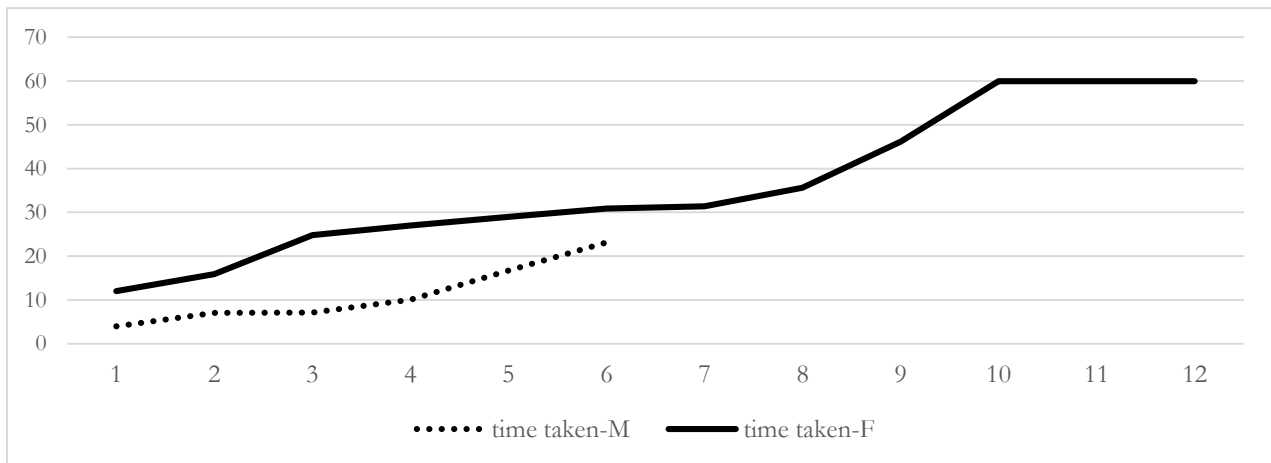
displayed a pronounced effect. Resultantly, more dominating individuals were perceived as more entitled to higher shares. There is psychological evidence that expectations about other people's behavior push individuals into social hierarchies (Tiedens *et al.*, 2007). Therefore, the entitlement of shares is highly correlated to perception of dominance and is also a determinant of share amount won.

The answers given by the team were unanimously agreed upon, yet there was emergence of hierarchy. This happened because individuals who had higher hawk indexes managed to magnify their contributions due to their higher dominance in the group. This magnified contribution made them perceptively more entitled to higher shares and subsequently helped them in securing bigger share. Also, as the stakes were low, the contestants were differently motivated to fight for the shares than from situations in which stake size are high. When the resource is scarce its allocation can trigger both selfish and generous tendencies displayed by individuals (Roux *et al.*, 2015). The individuals with a higher hawk index acting selfishly secured higher amounts for themselves while the doves submitted to accepting the smaller shares. Also, face-to-face communication tends to increase rate of cooperation as evidenced by studies performed by Bohnet and Frey (1999). In any case this was a win-win situation for all players in light of theory of relativity in economics where each individual measures their economic gain from a point of relativity. In case of our experiment the point of relativity for the contestants was the start of the game when they had zero amount earned. Therefore, in 25 out of 28 games the contestants preferred more over less and formed a hierarchy where the hawks submitted to the doves and the outcome of the game was one of the 24 Nash equilibria. Heuristics, such as might is right, have been viewed as a source of bias yet critical to problem solving (Groner *et al.*, 1983; Gugerty, 2006 and Payne *et al.*, 1993). In our experiment too might was a determinant of share won, it was also observed during conducting the experiment that the hawks while stressing their decisions helped solve the problem of division. Our results are also complimented by evolutionary economics in which more successful economic agents increase their share at the expense of less successful ones. The hawks after establishing their psychological dominance in stage 1 go on to maximize their benefits at the cost of loss to doves in stage 2.

The exclusive gender analysis and mix gender analysis reveals that, while playing the game with contestants from their own gender, the dominance of the players is highly correlated and shapes the perception of entitlement to economic resources, but it does not have any significant effect on the share won by the players. Whereas, in mix gender groups the dominance of the players significantly shapes the perception of entitlement to economic resources and also the share won by the players.

Hence, dominance was not found to be gender neutral in determining the payoffs of the players. These findings are in line with former studies that group outcomes differ with varying gender composition of groups due to differing process strategies used by men and women (Hannagan and Larimer 2010). It was observed that time was a consideration for the contestants as the contestants would ask about the time duration of the game before giving their consent to participate. As female gender experiences negative outcomes more as compare to the male gender when they show dominance (Powell and Ansic, 1997), female teams generally took more time than male teams. Figure 5.7 shows the time taken by these teams, arranged in ascending order with respect to time. It can be clearly observed that female teams were less efficient than male teams as they lost more time that cost them more money to be drained from the jackpot. The three teams that ran out of time and drained the jackpot were also female teams. From the figure it is also evident that the bargaining duration of the exclusive gender groups also increased as the size of the jackpot increased.

Figure 5.7. Time Taken by Exclusive Gender Groups



We compare the results from this analysis to the results from the research by Dolder *et al.*, (2015) on the gameshow DIVIDED. “In Divided, the only and apparent source of entitlements are contestants’ individual contributions to the communal jackpot” Dolder *et al.*, (2015). The results from our experiment show that in low stake situations the apparent source of entitlement of the contestant is hawkishness/dominance. This dichotomy in results can be due to the fact that Divided was not analyzed for dominance. It is possible that dominance was the underlying factor that determined the payoff of the individuals and not equity, but this was not included in the regression analysis by Dolder *et al.*, (2015) hence the dichotomy in the answers. Conlisk (1996) explains that a sensible rationality

assumption varies with context and depends on conditions such as deliberation cost, complexity, incentive and experience. The dichotomy in the results of our experiment and the results of DIVIDED are well explained in this context. This is an area of study for researchers to further analyze the role of dominance in high stake games to see if the results follow suit of findings from this thesis.

The contestants in our experiment were not told before the end of stage 1 that the jackpot would be divided among them according to a predefined allocation, whereas in the gameshow DIVIDED the contestants knew of this division beforehand. This would have enhanced the study of dominance in pre-play and bargaining phase, both separately, as a natural characteristic in our experiment. Therefore, in stage 1 it was not an effort by individuals to influence the outcomes of bargaining, which might have been the case in gameshow DIVIDED.

7. Conclusion

The research has examined entitlement and allocation of limited economic resources according to predefined shares in a bargaining experiment, involving low stakes and face-to-face communication, inspired by the British TV gameshow DIVIDED. We have three main findings. Firstly, in a low-stake and collective decision-making environment, the perception of entitlement of limited economic resource depends more on hawkishness rather than equity of the economic agents. Secondly, the hawks are able to secure higher shares in bargaining situations. Out of the 24 Nash equilibria, in 25 out of 28 cases, one of the Nash equilibrium prevailed as the final outcome and hawks were able to secure bigger shares, while in 3 games the fight of hawks led to a result that was not a Nash equilibrium of the game. These results can be explained by bounded rationality in economics. The contestants failed in recognizing statistical dominance of the contribution of each player to the jackpot, committed errors in updating probabilities in the bargaining stage when their information was updated and used irrelevant information in decision-making, and therefore, made decision based on dominance rather than contribution of the players (Conlisk 1996, Simon 1955). Thirdly, the results from gender analysis suggest that gender composition of a group influences the distribution of economic resources. In mixed gender groups the dominance of individuals significantly influenced the payoffs of the individuals, whereas, in exclusive gender groups the dominance had an insignificant influence on the payoffs of the individuals. Male groups were also found to be more efficient and quicker in collective bargaining as compared to the female groups.

Bargaining is an everyday activity of economic agents. The study has widespread policy implications for economics, especially microeconomics and situations of collective decision making, as it highlights the concern for equity and fallouts of dominance and submissiveness to attain a competitive edge in order to win a payoff. It follows from the research that fairness is not a consideration in low stake bargaining situations and dominance derives the outcomes. Therefore, the government should impose such policies for marketplaces that involve strict price checks and price controls in order to curb bargaining at unhealthy price levels. This would also hedge the consumer and producer both from manipulation by the other agent, and reduce exploitation of the weaker segment of the society in marketplaces which otherwise is forced to make transactions at the price quoted by the dominant player. Bargaining over wages between firms and laborers in labor markets may be subject to such situations.

Communal decision making is a common practice to solve problems in the South Asian societies. Although the decisions might affect everyone equally yet the preference and opinion of the mighty and dominating stakeholders is given more weightage. It sometimes even results into the determination of the decision solely by the dominant player, which otherwise should have been a collective decision of the community. Such decisions may be exploitative or even detrimental to the weaker segments of the society and may solely serve the purpose of the powerful and dominating players. As a policy, the legislation by government should be aimed at protecting the interest of the docile and submissive segments of the society as they themselves cannot do the same. An institutional arrangement in this case is required which would provide solicitation for these vulnerable segments, ensure equitable decision making and upholding the principles of fairness.

References

- Auger, P., de la Parra, R. B., & Sánchez, E. (1998). Hawk-dove Game and Competition Dynamics. *Mathematical and Computer Modelling*, 27(4), 89-98.
- Berk, J. B., Hughson, E., & Vandezande, K. (1996). The Price is Right, but are the bids? An Investigation of Rational Decision Theory. *The American Economic Review*, 954-970.
- Berninghaus, S. K., Ehrhart, K. M., & Ott, M. (2012). Forward-looking behavior in Hawk–Dove games in endogenous networks: Experimental evidence. *Games and Economic Behavior*, 75 (1), 35-52.

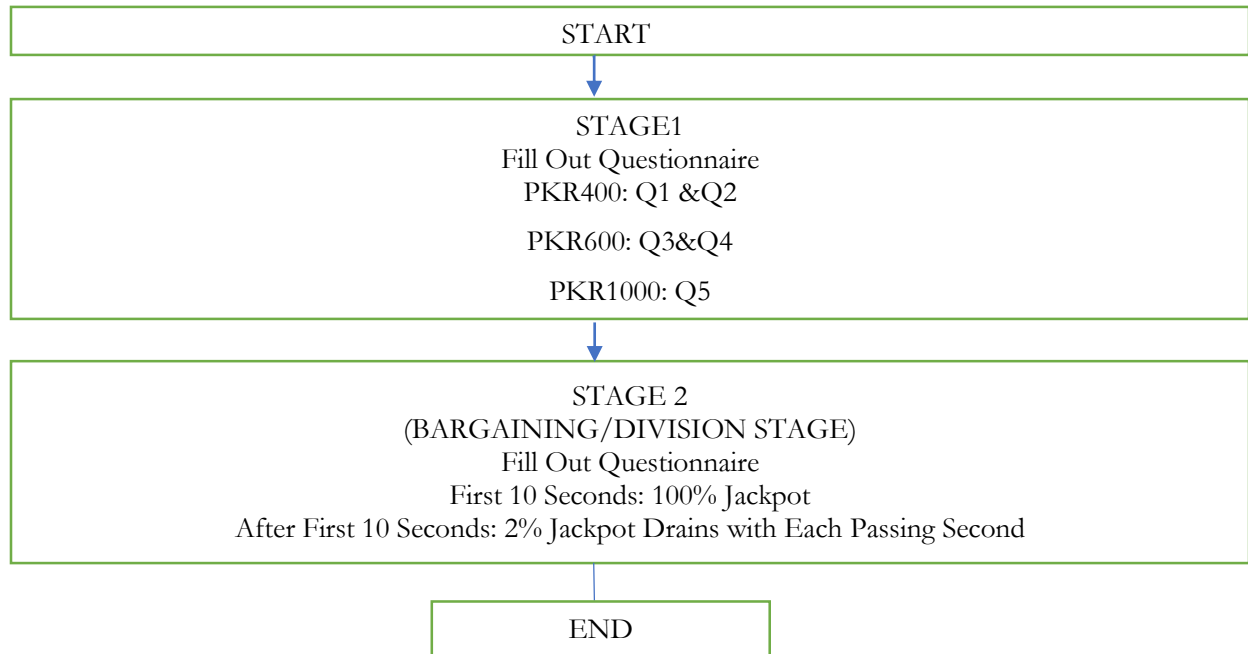
- Bohnet, I., & Frey, B. S. (1999). Social Distance and Other-Regarding Behavior in Dictator Games: Comment. *American Economic Review*, 89(1), 335-339.
- Camerer, C. F., Dreber, A., Forsell, E., Ho, T. H., Huber, J., Johannesson, M., ... & Heikensten, E. (2016). Evaluating Replicability of Laboratory Experiments in Economics. *Science*, 351(6280), 1433-1436.
- Conlisk, J. (1996). Why Bounded Rationality? *Journal of Economic Literature*, 34(2), 669-700.
- Costa-Gomes, M., Crawford, V. P., & Broseta, B. (2001). Cognition and Behavior in Normal-Form Games: An Experimental Study. *Econometrica*, 69(5), 1193-1235.
- Crawford, V. P. (1982). A Theory of Disagreement in Bargaining. *Econometrica: Journal of the Econometric Society*, 607-637.
- De Paola, M., & Gioia, F. (2016). Who Performs Better Under Time Pressure? Results from a Field Experiment. *Journal of Economic Psychology*, 53, 37-53.
- Eichenberger, R., & Oberholzer-Gee, F. (1998). Rational Moralists: The Role of Fairness in Democratic Economic Politics. *Public Choice*, 94(1-2), 191-210.
- Fehr, E., & Falk, A. (2002). Psychological Foundations of Incentives, 46 *Eur. Econ. Rev*, 687, 689.
- Fehr, E., & List, J. A. (2004). The hidden costs and returns of incentives—trust and trustworthiness among CEOs. *Journal of the European Economic Association*, 2(5), 743-771
- Groner, R., Groner, M., & Bischof, W. F. (1983). The Role of Heuristics in Models of Decision. In *Advances in Psychology* (Vol. 16, pp. 87-108). North-Holland
- Gugerty, L. (2006, October). Newell and Simon's Logic Theorist: Historical Background and Impact On Cognitive Modeling. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 50, No. 9, pp. 880-884). Sage CA: Los Angeles, CA: SAGE Publications.
- Guth, W., Schmittberger, R., & Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of economic behavior & organization*, 3(4), 367-388.
- Hall, C. L., Porter, M. A., & Dawkins, M. S. (2019). Dominance, Sharing, and Assessment in an Iterated Hawk--Dove Game. *arXiv preprint arXiv:1907.02160*.
- Hannagan, R. J., & Larimer, C. W. (2010). Does Gender Composition Affect Group Decision Outcomes? Evidence from a Laboratory Experiment. *Political Behavior*, 32(1), 51-67.
- Harsanyi, J. C. (1956). Approaches to the Bargaining Problem Before and After the Theory of Games: A Critical Discussion of Zeuthen's, Hicks', and Nash's Theories. *Econometrica, Journal of the Econometric Society*, 144-157.

- Hauk, E. (2003). Multiple Prisoner's Dilemma Games with (Out) An Outside Option: An Experimental Study. *Theory and Decision*, 54(3), 207-229.
- Healy, P., & Noussair, C. (2004). Bidding Behavior in The Price Is Right Game: An Experimental Study. *Journal of Economic Behavior & Organization*, 54(2), 231-247.
- Kamenica, E. (2012). Behavioral Economics and Psychology of Incentives. *Annu. Rev. Econ.*, 4(1), 427-452.
- Kunst, J. R., Fischer, R., Sidanius, J., and Thomsen, L. (2017). Preferences for Group Dominance Track And Mediate the Effects of Macro-Level Social Inequality and Violence Across Societies. *Proceedings of the National Academy of Sciences*, 114(21), 5407-5412.
- Magee, J. C., and Galinsky, A. D. (2008). 8 Social Hierarchy: The Self-Reinforcing Nature of Power and Status. *The Academy of Management Annals*, 2(1), 351-398.
- Matsumura, S., and Kobayashi, T. (1998). A Game Model for Dominance Relations Among Group-Living Animals. *Behavioral Ecology and Sociobiology*, 42(2), 77-84.
- Mehta, P. H., DesJardins, N. M. L., van Vugt, M., & Josephs, R. A. (2017). Hormonal Underpinnings of Status Conflict: Testosterone and Cortisol Are Related to Decisions and Satisfaction in The Hawk-Dove Game. *Hormones and Behavior*, 92, 141-154.
- Neugebauer, T., Poulsen, A., & Schram, A. (2008). Fairness and Reciprocity in The Hawk–Dove Game. *Journal of Economic Behavior & Organization*, 66(2), 243-250.
- Payne, J. W., Payne, J. W., Bettman, J. R., & Johnson, E. J. (1993). *The Adaptive Decision Maker*. Cambridge University Press.
- Powell, M., & Ansic, D. (1997). Gender Differences in Risk Behaviour in Financial Decision-Making: An Experimental Analysis. *Journal of Economic Psychology*, 18(6), 605-628.
- Price, J. S. (1969). *Ethology and Behaviour [Abridged] The Ritualization of Agonistic Behaviour as a Determinant of Variation along the Neuroticism/Stability Dimension of Personality*.
- Rege, M., & Telle, K. (2004). The Impact of Social Approval and Framing On Cooperation in Public Good Situations. *Journal of Public Economics*, 88(7-8), 1625-1644.
- Roux, C., Goldsmith, K., & Bonezzi, A. (2015). On the Psychology of Scarcity: When Reminders of Resource Scarcity Promote Selfish (And Generous) Behavior. *Journal of Consumer Research*, 42(4), 615-631. Sbp.org.pk
- Simon, H. A. (1955). A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics*, 69(1), 99-118

- Smith, J. M. (1982). *Evolution and the Theory of Games*. Cambridge University Press.
- Smith, J. M., and Price, G. R. (1973). The Logic of Animal Conflict. *Nature*, 246(5427), 15.
- Snyder, G. H. (1971). "Prisoner's Dilemma" and "Chicken" Models in International Politics. *International Studies Quarterly*, 15(1), 66-103.
- Testosterone Disrupts Human Collaboration by Increasing Egocentric Choices. *Proceedings of the Royal Society B: Biological Sciences*, 279(1736), 2275-2280.
- Tiedens, L. Z., Unzueta, M. M., and Young, M. J. (2007). An Unconscious Desire for Hierarchy? The Motivated Perception of Dominance Complementarity in Task Partners. *Journal of Personality and Social Psychology*, 93(3), 402.
- Van Dolder, D., Van den Assem, M. J., Camerer, C. F., and Thaler, R. H. (2015). Standing United or Falling Divided? High Stakes Bargaining in a TV Game Show. *American Economic Review*, 105(5), 402-07.
- Van Vugt, M., & Tybur, J. M. (2015). The Evolutionary Foundations of Status Hierarchy. *The Handbook of Evolutionary Psychology*, 1-22.
- Van Winden, F. (2007). Affect and Fairness in Economics. *Social Justice Research*, 20(1), 35-52.
- Williams, M. J., and Tiedens, L. Z. (2016). The Subtle Suspension of Backlash: A Meta-Analysis of Penalties for Women's Implicit and Explicit Dominance Behavior. *Psychological Bulletin*, 142(2), 165.

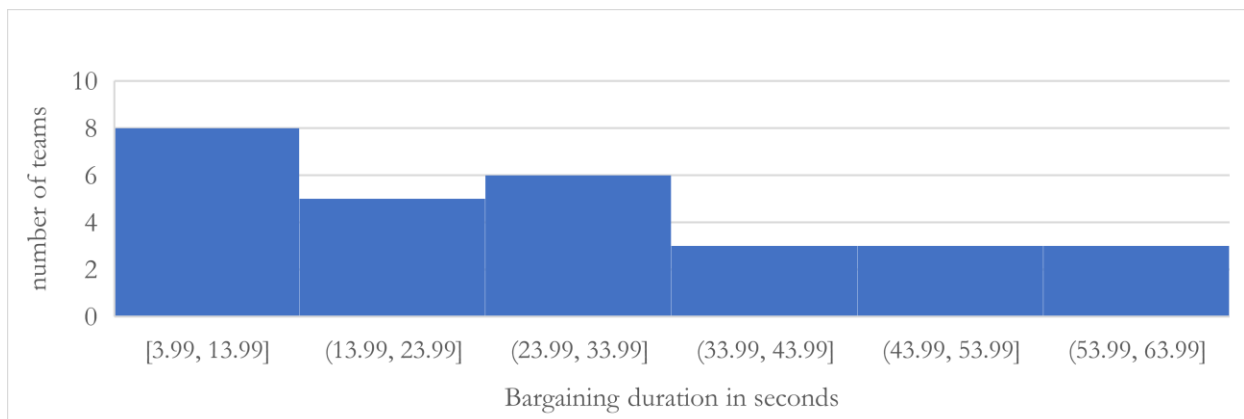
Appendix

Figure A1: Flow Chart of the Game



In stage 1 the four contestants fill a form asking questions on demographic characteristics followed by a question answer round in which the team unanimously answers questions. A correct answer leads to accumulation of reward in the jackpot while an incorrect answer does not lead to accumulation of reward in the jackpot. In stage 2 the contestants are told about the criterion and rules for division of the jackpot. They fill the form preceded by a bargaining phase in which they bargain for the highest possible share of the amount banked, with unanimous consensus of all players.

Figure A2. Bargaining Duration of 28 Teams



S³H Working Paper

- 01: 2017 What Explains the Success and Failure of the World Bank Projects? A Cross Country Analysis by Rabbia Tariq and Abdul Jalil (2017), 32 pp.
- 02: 2017 A Dynamic Stochastic General Equilibrium Model of Pakistan's Economy by Gulzar Khan and Ather Maqsood Ahmed (2017), 32 pp.
- 03: 2017 Trade Creation Versus Trade Diversion and General Equilibrium Effect in Regional and Bilateral Free Trade Agreements of Pakistan by Hina Ishaque Khan and Zafar Mahmood (2017), 31 pp.
- 04: 2017 The Relative Effectiveness of Public versus Private Social Safety Nets in Mitigating the Impact of Shocks in Rural Pakistan by Ayesha Imran Malik, Iqra Shahid and Samina Naveed (2017), 29 pp.
- 05: 2017 Domestic Violence and Woman's Functional Capabilities: Circularity Analysis in Sen's Development Framework by Mahnoor Ibad and Saeeda Batool (2017), 27pp.
- 06: 2017 Efficiency Wages and Employee Work Effort: A Case Study of Pakistan's Telecom Sector by Maham Muneer and Verda Salman (2017), 30 pp.
- 07: 2017 Valuing Non-Marketed Benefits of Khanpur Dam by Using Travel Cost Method by Gul Habiba and Faisal Jamil (2017), 25 pp.
- 01: 2018 Impact of the 18th Amendment on Energy Security and Governance Parameters in Energy Sector of Pakistan by Hafiz Fawad Khan and Faisal Jamil (2018), 33 pp.
- 02: 2018 Role of Hi-Tech Trade, Foreign Investment and Intellectual Property in Stimulating Innovation and Economic Growth in the South Asian Economies by Nimra Shahid and Zafar Mahmood (2018), 37 pp.
- 03: 2018 Factor Affecting International Outsourcing Decision: Evidence from Plant-level Data of Pakistan's Surgical Instruments Industry by Sidra Nazir and Zafar Mahmood (2018), 29 pp.
- 01: 2019 Income Differentials between Police and Taxation Departments in Risk Prone Peshawar City by Sanam Khan and Faisal Jamil (2019), 23 pp.
- 02: 2019 Pakistan's Experience with the IMF by Ashfaq Hasan Khan (2019), 21 pp.
- 03: 2019 DEMYSTIFYING *RIBA*: *Riba* in the Method of the Muslim Jurists by Muhammad Zahid Siddique and Muhammad Mushtaq Ahmad (2019), 33 pp.

- 04: 2019 Should Microfinance Institutions Diversify or Focus? Evidence from Pakistan by Mohammad Hassam Afgun, Ammar Bin Zafar, Arish Batool and Ashfaq Hasan Khan (2019), 16 pp.
- 05: 2019 A Critical Evaluation of the IMF Program: A Case Study of Pakistan by Oroba Tasnim Siddiqui, Sehrish Shoaib, Maham Bilal and Ashfaq Hasan Khan (2019), 29 pp.
- 06: 2019 Non-linear Model of Aggregate Credit Risk for Banking Sector of Pakistan: A Threshold Vector Autoregressive Approach by Muhammad Anwaar Alam Khokhar and Ather Maqsood Ahmed (2019), 30 pp.
- 07: 2019 Modern Money and Islamic Banking in the Light of Islamic Law of *Riba* by Muhammad Zahid Siddique (2019), 23 pp.
- 08: 2019 Offsetting the Beggar-thy-neighbour Effect of Chinese Exchange Rate Policy on Pakistani Textile Exports by Saba Arif and Zafar Mahmood (2019), 41 pp.
- 01: 2020 Preferences for Truthfulness: An Experimental Analysis by Fizzah Najm and Muhammad Zahid Siddique (2020), 27 pp.
- 02: 2020 Investigating the Nexus between Fiscal Decentralization, Social Development and Economic Growth in Pakistan by Tuaha Adil and Faisal Jamil (2020), 28 pp.
- 03: 2020 Consumer's Perception towards Electricity Theft: A Path Analysis by Zainab Babar, Faisal Jamil and Wajiha Haq (2020), 24 pp.
- 04: 2020 An Investigation into the Trade Pattern of Goods Exported from Pakistan to China through FTA Analysis by Imran Ali Khan, Sameer Sajjad and Ayesha Nazuk (2020), 36 pp.
- 05: 2020 The Effects of Import and Export Determinants on the Balance of Trade: A Case of Pakistan by Laila Yamin, Ayesha Javaid, Bahlol Khan Orakzai and Zafar Mahmood (2020), 31 pp.

Chinese Studies:

- CS-01: 2016 China's Development Experience by Syed Hasan Javed (2016), 15 pp.

Development Studies:

- DS-01: 2016 Rehabilitation of 2010 Flood Affected People in Pakistan: Role of Development Partners by Sheeba Farooq (2016), 39 pp.

DS-01: 2019 Spatial and Temporal Changes in the Tropospheric Ozone Concentration due to Developmental Projects under China-Pakistan Economic Corridor (CPEC) by Ramsha Munir and Umer Khayyam (2019), 29 pp.