Is a Player’s Role in Status Determination Important? 
A Cross-Cultural Study of the Impact of Own and Others’ 
Actions on Ultimatum Game Decisions 

Economic theory suggests that individuals base their behavior in economic games on both payoff and fairness considerations. Cox et al. (2007) propose that fairness is a function of relative status. I propose that players consider not their relative status, but rather how that relative status is determined. Specifically, I test the difference between when that status is determined by the individuals and when it is determined by others. Additionally, I believe that by varying status determination I can test the relative importance of individual determination (self-reliance) and other determination (other-reliance). Apart from the inconclusive findings for responder behavior in one treatment, the results from the experiment I conduct in the United States support my theory that the role that the individual and others have in the determination of roles in the ultimatum game impacts what are perceived as reasonable and fair offers. The next step of my research is to test my predictions about the impact of cultural norms on the relative importance of other- and self-reliance by conducting the same experiment in Bolivia.
I. Introduction

Based on empirical findings from ultimatum games, economic theory predicts that individuals base their behavior in ultimatum games on fairness concerns, in addition to payoff. Although fairness is modeled as a function of relative payoff in basic models, numerous models suggest that players also use beliefs about players’ intentions when determining what constitute fair offers. Cox et al. (2007) suggest that players evaluate offers based on their state of mind, which they model as a function of relative payoff and the relative statuses of the players. Results from a study conducted by Hoffman et al. (1994) confirm this hypothesis. In my model, I propose that players consider not their relative status, but rather how that relative status was determined. I believe that when status determination is the result of the players own actions (self-reliance) players will behave differently than when relative statuses are determined by others’ actions (other-reliance). Additionally, I propose that the significance of self-reliance and other-reliance in the model varies across cultures.

For much of its history, experimental economics operated on the assumption that all humans make decisions based on similar economic reasoning. Early cross-cultural experiments conducted by economists revealed relatively little variation across societies. Oosterbeek et al. (2004) undertook a meta-analysis of the results of 75 ultimatum game experiments from 37 separate papers written between 1991 and 2000. They found that while the behavior of responders (and not of proposers) varied across geographical regions, with one exception, these differences were not attributable to cultural differences. As a result of such empirical findings, economists have conducted experimental research based on the assumption that economic decision-making does not differ systematically across cultures. Cameron (1999) and Kachelmeier and Shehata (1992) have used this assumption to produce high stakes results in
Indonesia and the People’s Republic of China that they extrapolate to economic behavior elsewhere in the world. However, a 1996 experiment conducted by Henrich (2000) using the ultimatum game found that the Machiguenga of the Peruvian Amazon behaved less pro-socially than populations elsewhere in the world. Henrich’s experimental results suggest that economic reasoning may indeed be influenced by cultural differences.

I hope to utilize Henrich’s findings that economic behavior varies across cultures. While Henrich’s study simply confirms the existence of cultural differences, I hope to use game theory to create a more in-depth study of the way economic behavior differs across cultures. I hope to build on Henrich’s initial findings by using a series of ultimatum games to test a theoretical model in which the importance of self-reliance and other-reliance in status determination affects players’ perceptions of fairness. I am interested in not simply how offer size varies between cultures, but rather how acceptable offer size is influenced by the way in which roles are assigned.

I have chosen to use the ultimatum game, as Henrich did, because of its usefulness in detecting fairness norms. In section II, I provide a detailed description of the ultimatum game and how it functions as a means to discern fairness norms within a given population. In section III, I present a summary of the literature on ultimatum games used to test cultural differences across different countries, as well as the literature on games conducted in foreign countries based on the assumption of no significant variation in economic behavior across cultures. Additionally, I provide as summary of experiments based on Henrich’s study that use the ultimatum game to test fairness norms.

In section IV, I present a review of the theories on which I base my theoretical predictions. I create a model based on theories of behavior in economic games that include
fairness considerations in players’ utility functions and model fairness as a function of explicit intentions. In my model, I use state of mind as a proxy for intentions, and base state of mind on the role that self-reliance and other-reliance play in status concerns, as well as relative offers. I argue that the way in which status is determined is an important factor in determining how a given offer is perceived. Specifically, a player’s reliance on herself or others in obtaining her status position impacts how fair offers are perceived to be. I have chosen Bolivia and the United States as my countries for comparison, because they represent cultures in which communal and individual behavior are more dominant, respectively. I predict that other-reliance will have a more significant impact on players’ behavior in Bolivia, whose political system is characterized more by communal norms, whereas self-reliance will have a more significant impact on player behavior in the United States, who society is characterized by individualism.

In section V, I provide an overview of the experimental design. In both experimental locations (Haverford College and Bolivia), I conduct a series of three ultimatum games in which I vary the level of reliance. In each experimental session, I first conduct a standard ultimatum game (the control) in order to establish a base level of offer size. I then conduct two additional treatments in which I allow the levels of self-reliance and other-reliance to vary.

In section VI, I present the econometric model I use to interpret the results. In section VII, I present and interpret results from the experimental sessions conducted at Haverford College. Finally, in section VIII, I present the conclusions of my research and discuss my plans to conduct future research in Bolivia.

II. Ultimatum Games and Fairness
My experiment uses several variations of a classic ultimatum game to test for differences in fairness norms across cultures. In a standard ultimatum game, an amount of money, A, is divided between two subjects. One subject, designated the proposer, divides the money between herself, who gets $A - X$, and the other subject, the responder, who receives $X$. The responder then has the option to either accept or reject the proposal. If the responder accepts, the division is carried out as the proposer indicated; if she rejects the proposal, both subjects receive nothing.

In the ultimatum game, every offer is a Nash equilibrium, but the only outcome that satisfies the subgame perfect Nash equilibrium is if the responder accepts any $X$ greater than zero. However, in experiments proposers repeatedly offer more than non-cooperative game theory would suggest (Thaler 1988; Guth and Tietz 1990). Empirical findings show that proposers commonly offer somewhere between a 60/40 and 50/50 split, and responders commonly reject smaller offers, typically below the 80/20 split (Roth 1995; Guth 1995; Thaler 1988; Camerer and Thaler 1995).

The tendency for offers to approach an equal split is often interpreted as a reflection of “fairness” considerations or “social norms” of distributive justice (Hoffman et al. 1994). Because the game measures whether responders will negatively reciprocate, sacrificing their own money to punish an unfair proposer (Camerer and Fehr 2004), the ultimatum game is a standard instrument used by experimental economists to study norms of fairness. Therefore, I feel comfortable using the ultimatum game to analyze fairness norms in my experiment. In section IV, I will create a theoretical model of behavior in the ultimatum game based on theories of behavior in economic games that incorporate fairness, in addition to payoff size, into players’ utility functions.

Empirical research on ultimatum bargaining has confirmed that proposers behavior is motivated by a concern for fairness, rather than simply self-interest (fear of rejection). Van Dijk,
De Cremer, and Handgraaf (2004) conducted two experiments to determine which consideration had a greater influence on bargainers' thinking. In one experiment, responders were unaware that proposers were dividing chips that were worth twice as much to the proposer as to the responder, allowing proposers to offer unfair offers that appeared fair to the responders. In the second experiment, authors varied the power of responders to "undo" the proposers' offers. Whereas some games in the second treatment were played like a typical ultimatum game, in other games a rejection meant that the offer's value was only diminished by 10%. The authors found that prosocials (those who seek to maximize joint outcomes) were not affected by the change in the power of the responders' retribution; however, proselfs (those who seek to maximize their own outcome) gave significantly less when the responder only had the power to diminish the allocation by 10% opposed to 100%. Similarly, in the asymmetric information treatment, proselfs made offers significantly less than prosocials. Although proselfs gave less in the treatments with asymmetric information, they still appeared to be influenced to some extent by fairness norms, giving more when information symmetry compelled them to. Although they derived less utility from making fair offers than prosocials, proselfs were forced to make fair offers in the symmetric information treatment. Thus, cultural norms forced proselfs to factor fairness into their strategy.

Other theoretical and experimental studies also suggest that responder behavior is influenced by fairness concerns. Rotemberg (2008) produces a model of ultimatum behavior, in which individuals react with anger when others do not show themselves to be minimally altruistic, thus rejecting offers below a certain threshold. Straub and Murnighan (1995) find that people reject small offers in ultimatum games, and that there exists a “lowest acceptable offers”. However, they conclude that people reject small offers because of wounded pride, not because
they are resisting unfairness. Yet although Straub and Murnighan do not believe that responders reject small offers out of fairness concerns, they do believe that they are using socially acceptable levels of fairness as a reason to reject small offers. Thus, responders’ rejections are a reflection of cultural notions of fairness nonetheless.

There does exist a subset of ultimatum game literature that attempts to cast doubt upon the validity of the fairness hypothesis in ultimatum games. Guth, Huck, and Muller (2001) highlight the importance of the 50/50 split. The authors conducted three mini-ultimatum games, in which proposers choose between two different allocations (rather than from a continuous set of offers). In the treatment where proposers choose between an equal split and an unequal split (17/3), proposers chose the equal split two-thirds of the time. However, when the equal split was replaced by a nearly equal split that favored the proposer, the proposer chooses the nearly equal offer half of the time, and when the nearly equal split favored the responder, the proposer chose it only a third of the time. Such significant changes in behavior resulting from minor changes in payoff suggest that the significance of fairness in behavior in mini-ultimatum games is not robust.

Similarly, Bereby-Meyer and Niederle (2005) conduct a three-player ultimatum game that also shows a lack of robustness of proposer behavior. Like Guth et al.’s study, this study uses a modified version of the ultimatum game, in this case one that gives responders a variety of rejection payoffs (0%, 50%, and 100%). Despite the fact that these two studies show a lack of robustness of behavior regarding fairness norms in ultimatum experiments, both of the studies use a modified version of the ultimatum game. However, given the number of studies that support the claim that players’ behavior is motivated by a concern for fairness, it seems likely that these results are specific to mini-ultimatum games in which the offer set is limited.
Additionally, these studies do not refute that fairness factors into ultimatum decisions, but rather they suggest the presence of strategic as well as fairness concerns. Thus, I feel confident using the ultimatum game to test the influence of cultural norms on fairness concerns.

III. Cross-cultural Studies Using Ultimatum Games

There exists a substantial collection of studies that use experiments to test for the existence of cultural differences. The ultimatum game, which I will use in my study for reasons noted in section II, is a common experiment used such studies. As I note in section I, early studies found little or no difference in ultimatum game behavior across cultures. I will begin with a summary of such studies. I will then provide examples of studies that base their conclusions on the assumption of that economic behavior does not vary across cultures. Finally, I will conclude this section with a survey studies, including Henrich’s, that have produced results that are more supportive the claim that economic behavior varies across culture.

Early Cultural Experiments

Oosterbeek et al. (2004) undertook a meta-analysis of the results of 75 ultimatum game experiments from 37 separate papers written between 1991 and 2000. The experimental data in their study came from 25 separate countries. They find no significant differences in proposers’ behavior across regions and find differences in responders’ behavior only in that Asian responders have significantly higher rejection rates than responders in the United States. Moreover, they find no relationship between subjects’ behavior and measures of individualism and power. Although their findings seem to suggest that ultimatum games fails to detect cultural differences, there are several significant flaws with Oosterbeek, et al.’s analysis. Firstly, since this is a meta-analysis rather than one coherent experiment, there is very little control for
consistency among the results. Year of experiment, size of the pie, and number of observations all vary greatly between experiments, and even though the experimenters account for these variations in their regression analyses, this control is imperfect at best. More troubling, though, are the numerous other variables related to the design of the experiment that cannot be controlled for in the regression analysis, such as the use double-blind procedures, the instructions of the experiment itself, what the experimenters are testing for, and the experimenters who conduct each experiment. Furthermore, the sample size of the papers that the study uses is small, and as a result, the researchers are forced to sacrifice some precision in their analysis. For example, since there is often only one study per country, Oosterbeek, et al. group studies into broad regional categories, such as Asia, South America, and Europe West.

**The Use of the Assumption of No Cross-cultural Differences**

Given the conclusions of studies like the one done by Oosterbeek et al., numerous studies have been conducted based on the assumption that cross-cultural differences in economic decision making are minimal. In these studies, experiments are conducted in foreign countries, usually to take advantage of lower living costs, but cultural differences are ignored or barely addressed. I present three prominent studies below, in which the authors conduct experiments in countries with lower living costs in order to test their hypotheses under high-stakes conditions.

Cameron (1999) conducted a series of ultimatum games in Indonesia with real money stakes ranging from $2.50 to $100 (three times the monthly expenditure of the average participant). The results almost uniformly conclude that proposer behavior is invariant to stake change, and the results from the low stake games are not statistically different from results observed in low-stakes games conducted in the United States. By implementing the ultimatum
game in Indonesia, Cameron was able to raise the stakes to three times the monthly expenditure of the average participant. However, it is possible that her results are comprised by her assumption of the universality of economic behavior. If economic behavior in Indonesia differs systematically economic behavior of players in the United States, her comparison of her results to results from American studies is invalid.

Sonia and Roth (1998) conducted an experiment in the Slovak Republic that examined not only the effects of raising stakes, but also of learning over several rounds of ultimatum games. The smallest stakes were chosen to correspond with the typical stakes in ultimatum games conducted in the United States, which usually represent between 2 and 3 hours hourly wages. The results suggest that proposers and responders moved toward equilibrium as the stakes increase, and that higher stakes lead responders to care less about fairness and more about maximizing gains, which can be seen through fewer rejections. Kachelmeier and Shehata (1992) also produce results from an experiment conducted in the People’s Republic of China that they use to make general assumptions about risk preferences. Using payoffs equal to three times the normal monthly income, they find that monetary incentives negatively impact revealed risk preferences. As in the previous two studies, they compare their findings to experiments conducted in the United States. If economic behavior is influenced by certain cultural norms, which I believe my findings will indicate, the results of studies conducted abroad may no longer be generalizable to behavior in other societies.

Evidence of Cultural Differences

An often-cited study by Roth et al. (1991) found more evidence for the cultural differences hypothesis than Oosterbeek’s meta-analysis. They conducted games comparing two-person bargaining and multiperson market environments in Jerusalem, Ljubljana, Pittsburgh, and
Tokyo. They found that market behavior was the same across countries; however, substantial differences in bargaining outcomes were observed among countries. Because of the experimental design, the authors concluded that their results supported the hypothesis that bargaining behavior among countries is due to cultural differences, rather than differences in languages, currencies, or experiments. The authors suggest that the difference in results among countries supports the hypothesis that different subject pools share a different common idea about what constitutes fairness rather than the hypothesis that different levels of aggressiveness (i.e. a buyer recognizes that an offer is fair but tries to take more) are driving the results. This is supported by the fact that subject pools where the offers are low do no exhibit higher rates of disagreement than the subject pools where offers are high. Thus although Roth et al.’s results were somewhat mixed, they suggest the validity of the theory that cultural differences vary across cultures.

Henrich (2000) finds evidence that economic experiments pick up cultural differences in his study of the Machiguenga of the Peruvian Amazon. He conducted identical experiments with two separate subject pools, one consisting of UCLA anthropology graduate students, and the other of Machiguengas. The players came from similarly sized communities and the stakes in both games were equivalent to 2.3 days’ pay. Mean offers in Los Angeles were 48 percent, while Machiguenga proposers offered only 26 percent. Typically responders in ultimatum games conducted in industrialized societies reject offers below 20 percent. However, Machiguenga responders always accepted offers below 20 percent, which accounted for nearly half of the total offers. Furthermore, the mode offer of the Machiguenga was 15 percent, compared with 50 percent for other experiments conducted elsewhere. Thus, Henrich’s experiment provides evidence that economic behavior does differ across cultures, and experimental games are capable of picking up cultural differences between societies.
Henrich’s findings in the Amazon renewed an interest among researchers to conduct experiments with the explicit purpose of testing for differences in cultural norms. Although the results of these experiments are less conclusive than Henrich’s findings, I propose that this is a result of flaws in their experimental design, rather than the invalidity of the cultural differences hypothesis or a failure of economic experiments to detect cultural differences. McElreath (2004) conducted a series of ultimatum games in Tanzania in order to determine the strength of norms within African society. He examined sharing norms of the Sangu using a simple ultimatum game. The subjects for the experiment were recruited from the villages of Utengule, which is populated by farmers, and Ukwaheri, whose residents are herders. He found that offer size did not differ between the farmer and herder samples and were similar to offers in experiments conducted in the United States; however, farmers were more likely to reject a given offer than are herders. He proposes several explanations for the findings, which include weaker sharing norms among herders and the fact that the average age of participants in the Utengule sample was lower than that in the Ukwaheri sample, which may influence the results.

Similarly, Marlowe (2004) used a combination of ultimatum and dictator games to test norms of cooperation and sharing among the Hadza, a group of hunter-gatherers in Tanzania. Based on ethnographic literature, he expected that hunter-gatherers would exhibit stronger sharing norms than subjects in more industrialize societies. However, his findings reveal that mean and modal offers in both the dictator and ultimatum games are lower than those found in experiments conducted in "complex societies," but the rejection rate in the ultimatum game is rather high, more similar to those of complex societies than other small-scale societies like the Machiguenga. These findings are inconsistent with Marlowe’s characterization of the Hadza as a highly egalitarian society. His explanation of this is that the Hadza tire of the never-ending
sharing: "Perhaps the more frequently one must share, the wearier one grows of it, and the more one looks for any opportunity to escape it" (187).

Gil-White (2004) used ultimatum games to model norms relating to punishment among the Kazakhs of Western Mongolia. He found that responders were reluctant to punish low offers, but proposers made offers well above the empirically ascertained income-maximizing level. He attributes such behavior in the ultimatum game to local culture, which stresses the importance of behaving morally but condemns active punishment itself as amoral.

Despite the wealth of experiments conducted following Henrich’s experiment in Peru, many of the results from the studies are inconclusive. I believe that this is a result of the methodology of the experiments, which were often times conducted by non-economists. Both McElreath and Gil-White's experiments have very low sample sizes (McElreath, n=40, Gil-White, n=20). Additionally, McElreath's sampling method itself was suspect. While he selected half of the sample randomly, the other half sought him out after hearing about the experiment from other villagers. And finally, his sample of farmers consisted of a much larger proportion of young people than did his sample of herders. McElreath himself acknowledges that such sampling bias is problematic because young people may be more risk adverse or more familiar with rational market behavior, which may cause them to play the game more strategically. As a result, his results offer no conclusive findings on the sharing norms of the farmers from Utengule and the herders from Ukwaheri. Additionally, none of the three previous experiments use a double-blind testing procedure to ensure the anonymity of the players. McElreath acknowledges in his paper that some of his results may have been influenced by players' desire to appear generous in front of the experimenter by offering large sums of money equal to almost the entire size of the pie.
In my experiment I attempt to improve on the methodology of the experiments described above. One improvement I make is to use a double-blind procedure to maintain subject-subject and subject-experimenter anonymity. I also attempt to select subjects so that they do not vary in a systematic way. The final problem that must be resolved is the small number of observations in previous cultural studies. First of all, the $n$ in my experiment is larger than the experiments discussed in the last paragraph. I conduct my experiment in the United States with 58 subjects, and I plan to recruit a comparable number of subjects in Bolivia. Additionally, method I use the "strategy method" (Mitzkewitz and Nagel 1993, Solnick and Schweitzer 1999) to generate more observations. Responders indicate in advance whether they would accept or reject each possible allocation, and their responses are then randomly paired up with proposers' allocations to determine the outcome of the experiment by the experimenters after each experimental session. By using the strategy method, I gain information about how a responder would behave in response to all possible allocations, not just the one that the proposer offers.

III. Theory

As a result of previously cited empirical findings regarding the role of fairness in economic games, theoretical models often include fairness considerations in the utility functions of players in such games. Bolton (1991) suggests a comparative model that incorporates distributional concerns into utility functions. Bolton’s model is based on conventional economic theory that derives its predictions from utility maximization and perfect equilibrium. However, contrary to the what Nash’s subgame perfect equilibrium predicts, Bolton incorporates both fairness and strategy considerations into his model. His subgame-perfect-equilibrium model
incorporates money and fairness (relative money) into bargainers’ utility functions as substitutable goals.

One point of interest in Bolton’s model is his characterization of responder behavior in ultimatum games. He claims that the probability of rejection is 0 if the proposer offers an amount greater than or equal to half of the total pecuniary payout, and 1 if the proposer offers nothing. He also claims that the probability of rejection is strictly increasing in the player’s relative share of the payoff for offers less than half of the total payout. Finally, his model suggests that, fixing the relative size of the responder’s share of the total payout, probability of rejection is non-increasing in the absolute value of total pecuniary payout. What is particularly significant about Bolton’s characterization of responder behavior is that he is able to use his model to correctly predict results from actual ultimatum games. Thus, while I will not incorporate Bolton’s model into my own, it is important to note that the accuracy of his theoretical model, whose claims are based on the assumption of fairness in responder behavior, adds strength to the validity of game theoretic models that incorporate fairness considerations.

Fehr and Schmidt (1999) also present a model of game equilibrium that incorporates fairness, in addition to pecuniary payoff, into a player’s utility function. They model utility as a function of both monetary payoff and relative payoff. One assumption they make, which is important but that I will not include in my model, is that subjects suffer more from inequity that is to their material disadvantage than from inequity that is to their material advantage. Although empirical evidence supports this claim, because I am looking at relative rather than absolute levels of utility, it is not central to my analysis, and thus I will exclude it from my model for simplicity. In addition to a model for $n$ players, Fehr and Schmidt also define a simplified model...
for two players, indexed by $i \in \{1, 2\}$, with the vector of monetary payoffs $x = x_1, x_2$. The utility function for player $i$ is given by

$$U_i(x) = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\}, i \neq j$$

where $\alpha_i \leq \beta_i$ and $0 \leq \alpha_i \leq 1$, so that the utility loss from disadvantageous inequality is larger than the utility loss from advantageous inequality. Other relative payoff, or distributional, models include those of Bolton and Ockenfels (2000), as well as Charness and Rabin’s (2002) basic “intentions-free” model.

While they acknowledge the importance of intentions in the determination of fair offers, Fehr and Schmidt do not model intentions explicitly. Although such models are more complicated because they require the use of psychological game theory, which is more difficult to apply than standard game theory, there does exist a set of literature that models intentions explicitly. Rabin’s model (1993) is one of the first to incorporate intentions into utility functions for players in economic games. Although Rabin’s model is limited to simple two-person normal form games, more recent theories have produced utility functions that incorporate explicit intentions that model behavior in games where players make a series of sequential decisions (Falk and Fischbacher 2006; Charness and Rabin 2002; and Dufwenberg and Kirchsteiger 2004, Cox et al. 2007). In order to develop an understanding of models incorporating explicit intentions, I begin with a review of Rabin’s model. I then discuss Cox et al.’s model, which somewhat simplifies the complicated explicit intentions models for games with sequential decisions by defining relative preferences rather than equilibrium predictions and substituting emotional states based on experience for beliefs about intentions.

Rabin believes that in two-person economics games, player 1’s payoff does not depend simply on the actions taken, but also on his beliefs about player 2’s motives. Thus Rabin
proposes explicitly incorporating beliefs into the model of utility for such games. Formally, Rabin defines \( a_i, b_j, \) and \( c_i \), respectively, as the strategy chosen by player \( i \), the belief of player \( i \) about the strategy chosen by player \( j \), and player \( i \)’s belief about the player \( j \)’s belief about the strategy chosen by player \( i \). He subsequently defines expected utility as a function of \( a_i, b_j, \) and \( c_i \). Player \( i \)’s expected utility is given by

\[
U_i(a_i, b_j, c_i) = \pi_i(a_i, b_j) + \bar{f}_i(b_j, c_i)[1 + f_i(a_i, b_j)]
\]

where \( \pi_i(a_i, b_j) \) is player \( i \)’s monetary payoff, \( \bar{f}_i(b_j, c_i) \) is player \( i \)’s belief about how kind player \( j \) is being to him, and \( f_i(a_i, b_j) \) is a measure of how kind player \( i \) is being to player \( j \), relative to the “equitable offer”, which Rabin defines as the average of the highest and the lowest possible offers. In Rabin’s model, both negative and positive reciprocity increase utility.

Although Rabin’s model is a relatively simple explicit intentions model of utility in simple games, it is insufficient to model behavior in the ultimatum game, in which players make sequential decisions. Therefore, I will consult Cox et al.’s explicit intentions model of behavior in more complicated games to generate my model of economic behavior in the ultimatum game. I have chosen their model over other explicit intentions models because of several advantages it possesses. Firstly, as noted above, it is relatively simple compared to other similar models because it models preferences, not equilibrium outcomes; and secondly, the use of emotional states, rather than beliefs, in their model facilitates the inclusion of reliance in my model.

Cox et al. present a model that incorporates variables, \( s \) and \( r \), that capture the effects of reciprocity and status considerations, respectively, on preferences in a two player extensive form games with perfect information. Following their notation, the first mover, \( F \), receives a material payoff \( y \), and the second mover, \( S \), receives a material payoff \( m \). Their model shows how the emotional state of \( S \) responds to the values of \( r \) and \( s \) that arise from \( F \)’s choice and relative
status. The model separates concerns regarding relative payoff and other status aspects. Relative payoff concerns are captured in the model in the convexity of indifference curves in the \((m, y)\) payoff space.

Cox et al. use a constant elasticity of substitution (CES) utility function to represent player preferences in economic games. The preference model is given by

\[
u(m, y) = (m^\alpha + y^\alpha)/\alpha, \quad \alpha \in (-\infty, 0) \cup (0,1]
\]

where \(\alpha\) is the substitution parameter and \(\theta\) is the emotional state, which is a function of reciprocity and status. If \(\alpha = 0\), \(u(m, y) = my^{\theta}\). Reciprocity, \(r\), is defined as a function of \(x\):

\[r(x) = m(x) - m_0,\]

where \(m(x)\) is the maximum offer the second mover can guarantee himself given the first mover’s choice of \(x\), and \(m_0\) is an equal split. Status, \(s\), is defined as \(s = s_F - s_S\), where \(s_F\) and \(s_S\) are the status of the first and second player, respectively. Emotional state, \(\theta\), is a function of \(r\) and \(s\). In addition to the assumption that individuals maximize their utility subject to the function above, Cox et al. also impose the assumption that the emotional state function, \(\theta = \theta(r, s)\), is distributed identically across individuals, such that \(\theta_i = \theta(r, s) + \epsilon_i\), where \(\epsilon_i\) is an error term with mean zero across individuals. They incorporate an emotional state function instead of beliefs about intentions based on the assumption that attitudes towards payoffs depend on the players’ states of mind.

In order to make predictions about the impact of self-reliance and other-reliance on status determination across cultures, I will create a theory for behavior in ultimatum games that incorporates both payoff and fairness considerations into players’ utility functions. Like Cox et al., I will use an emotional state function because I believe that changes in reliance alter players’ attitudes towards a given payoff. However, in my model emotional state will be a function of relative payoff and reliance, rather than relative payoff and status. It is important to note that the
model I present, like Cox et al.’s model, is a model of relative preferences, and not an equilibrium prediction model. It models how players’ attitudes toward a given offer change as a result of changes in the reliance function, which I describe below.

Cox et al. specify that the utility function in their preference model is a constant elasticity of substitution (CES) function. Because it is a simple and frequently-used function, I will follow their lead and use a CES utility function in my model. However, because I am not interested in making exact predictions about economic behavior as Cox et al. are, but rather my goal is to identify general trends, I further simplify their utility function. I assume that preferences are linear and the marginal rate of substitution (MRS) between both players’ payoffs is constant. Fehr and Schmidt (1999) show that many experimental findings can be modeled by a utility function that has a constant MRS between monetary income and inequality. Because inequality is a function of the other player’s payoff, I will use their findings as a justification for using constant MRS in my model. Thus, instead of allowing $\alpha$ to vary between $-\infty$ and 1, $\alpha = 1$ in my model. For two players, where $P$ denotes the proposer and $R$ denotes the responder, utility given by

$$u(x_p) = \lambda x_p + (1 - \lambda) \theta(r, \rho)(1 - x_p)$$

In the model, I normalize the size of the total offer set to 1 based on the assumption that the “size of the pie” does not influence the structure of the utility function. In the model I define $x_p$ as the size of the offer player $P$ proposers and $x_R = 1 - x_p$ as the size of the offer player $R$ receives, not as the actual payoff (since $x_p = x_R = 0$ if the responder reject the offer). $\bullet_i$ represents individual $i$’s weighting on the her offer and her partners offer. I define $\bullet_i$ so that $0 < \bullet_i < 1$. It is possible that $\bullet_i = 0$ or 1, in which case fairness considerations would be eliminated from player proposer and responder utility functions, respectively; however, most models
assume that players incorporate fairness considerations into their utility functions to some extent. Thus, I will follow their lead.

The emotional state $\Theta$ is a function of reciprocity and reliance variables $r$ and $\rho$, respectively. I include reciprocity in the model based on empirically observed preferences for fairness. I define reciprocity in a manner common in theoretical models of fairness as

$$r(x_p, \rho) = x_p(\rho) - x_0$$

where $x_0$ is equal to the fair offer when $\Theta$ equals 0, that is, when there is no reciprocity in the model. I propose that $x_i$ is a function of reliance based on the assumption that the manner in which the roles are assigned in the ultimatum game is an important factor in the perception of fairness of given offers. I also make the assumption that players with favorable status are assigned to the role of proposer and players with unfavorable status are assigned to the role of responder. Because I believe that the part that player and others have in the assignment of roles impacts the perceptions of assignments, I model this by including a reliance function in my model, which incorporates the influence that both player $i$ and others have in the determination of player $i$’s status. The reliance function is given by

$$\rho_i = \rho_{io} - \rho_{is}$$

where $\Theta_{io}$ and $\Theta_{is}$ are measures of the extent to which player $i$’s relative status is determined by reliance on others and herself, respectively. Thus, if player $i$’s obtains a favorable status with the help others, $\Theta_{io}$ will be positive, and if she obtains favorable status by helping herself, then $\Theta_{is}$ is positive. The opposite equalities hold for unfavorable status.

I treat $\Theta$ as a given in the model because players’ status is determined exogenously from the ultimatum decisions made in my experiment. As a result, players base their choice of $x$ based on $\Theta$. I model the interaction between $\Theta$ and $r$ using the emotional state function $\Theta_i(\Theta, r)$,
which I define as the product of the reciprocity and reliance function. I use the interaction of these two terms to predict the impact that changes in $\rho$ will have on offer size and probability of acceptance.

When reliance on others (other-reliance) dominates status determination, $\rho$ will be positive. Therefore, I predict that $r$ will be positive to give $\rho$ a positive sign. In the ultimatum game, I predict that when other-reliance dominates, proposers will offer more than they do when $\rho$ equals 0. Based on empirical evidence that offers and acceptances tend to converge to a culturally accepted level, I also expect that responders will be less to accept lower offers. When self-reliance dominates status determination, $\rho$ will be negative, and thus I predict that $r$ will be negative to compensate. I therefore expect responders to offer less than they do when $\rho$ equals 0. I also expect that responders should be more willing to accept lower offers. Simply, when players are helped by others, they give more and are expected to give more, and when players help themselves, they give less and are expected to give less. The opposite hold for when players are hurt by others and themselves.

I also predict that the reliance on others will have a stronger influence on $\rho$ in cultures with communal norms or in countries where patronage politics are present. Similarly, I predict that self-reliance will have a stronger influence in countries where individualism is the norm. I therefore expect $\rho_{\text{io}}$ to influence offer size and the probability of acceptance more in Bolivia, whose political system is characterized by communalism, and $\rho_{\text{is}}$ to influence offer size and the probability of acceptance more in the United States, given its individualistic reputation. Thus, I predict that $\rho_{\text{Bolivia}} > \rho_{\text{oust}}$ and $\rho_{\text{Bolivia}} < \rho_{\text{sues}}$. In my experiment, which I present in the following section, I vary levels of $\rho_{\text{io}}$ and $\rho_{\text{is}}$ in order to test these hypotheses.
IV. Experimental Design

I recruited 58 undergraduate students from Haverford College to participate in the experiment, and conducted 6 sessions of the experiment over the course of two weeks, with the help of an assistant. In each experimental session, 8 to 12 subjects participated simultaneously. When all subjects had arrived, they first read and then had read to them a set of general instructions describing the experiment and the first ultimatum game (Appendix C). All sessions were conducted double blind, so that subject-subject and subject-experimenter anonymity were maintained. Three treatments of the ultimatum game were conducted in each session. Participants were told that they would not be paired with the same partner twice, and they were informed that although they would be making several allocation decisions throughout the experiment, only one would be randomly selected to be paid out.

The experiment consisted of three different treatments of the ultimatum game, in which I varied $\phi_i$, $\phi_s$, and $\phi_{is}$. In the first treatment, the control, subjects performed the roles of both the proposer and responder. All subjects first acted as the proposer. They were told to divide $10 between themselves and another player in their session, with whom they would randomly matched after the session. As the proposer, they were told to only make offers in whole value amounts. They were then given a list of all possible offers they could receive as the responder, and asked to mark which ones they would accept and which ones they would reject. After the experimental session they were randomly (and anonymously) paired with another subject and their action as either the proposer or responder was randomly selected for potential payoff. If the offer of the proposer corresponded to an offer the responder had accepted, the division would be carried out as indicated by the proposer. However, if the responder rejected the proposal’s offer, neither participant would receive any money. Subjects were aware that although they are
playing both roles, if the standard treatment was selected to for payoff, they would receive payment for only one of their decisions (proposer or responder).

Because the roles of the players were assignment randomly, neither player \(i\) nor her fellow participants had any influence on the assignments. Thus, in the control treatment, \(\square_p\) and \(\square_s\) both equal 0. As noted in the model, \(x_0\) is equal to the fair offer when \(\square\) equals 0. Because I cannot observe the actual value of \(x_0\), and I am more concerned about changes in offer size rather than absolute offer size, I use player \(i\) ’s offer size in the control treatment as a proxy for \(x_0\). I therefore will compare offer size in the subsequent treatments in which I vary \(\square_p\) and \(\square_s\) to test my hypotheses about the impact of reliance on determining fair offers within a given culture.

In treatment A, I let \(\square_s\) be positive. Participants were told that they were assigned to the role of proposer and responder based on their performance on a simple arithmetic quiz. By scoring well on the quiz, proposers relied on themselves to obtain a favorable status in the game, and by scoring poorly on the quiz, responders relied on themselves to obtain a favorable status. In order to minimize endogeneity between performance on the arithmetic exercise and ultimatum game, I randomized the assignments as in the first treatment. However, participants believed that those who with the highest scores were selected to be the proposers and those with the lowest scores the responders. Thus, a participant who was selected as a proposer believed that he had scored above average on the arithmetic quiz and was making an offer to someone who had scored below average. In order to maintain anonymity, participants were given a code number for the arithmetic exercise distinct from the code number used in the ultimatum allocations.

In treatment B, I vary both \(\square_p\) and \(\square_s\). Both values are positive. Subjects participated in a group anagram exercise and were then asked to vote for the teammate they believed had contributed most to the team. As in treatment A, subjects were randomly assigned to the roles;
however, they believed that their teammates with the highest number of votes were selected as the proposers and the lowest number of votes were selected as the responders. At the end of each experimental session, participants were informed that all ultimatum game roles were randomized. They were told that the information would be used in a later exercise. Proposers earned the right to be the first mover by performing well on the anagram exercise, but they were also dependent on others to help them obtain their favorable status. Similarly, responders were assigned to their role based on their own performance but also the decisions of other participants.

For treatment A, $\Box_A = 0 - \Box_{sA} < 0$, so I expect offer size to be lower than $x_o$ and probability of acceptance to increase. For treatment B, $\Box_B = \Box_{oB} - \Box_{sB}$, so I expect offer size to be greater and the probability of acceptance to decrease relative to treatment A. As stated in the theory section, I predict that $\Box_{oBolivia} > \Box_{oUS}$ and $\Box_{sBolivia} < \Box_{sUS}$ for an equivalent change in reliance across cultures. Because I predict that the Bolivia sample will be more affected by other-reliance than self-reliance, I expect the change in offer size and the probability of acceptance between the control and treatment A will be smaller in the Bolivia sample than in the Haverford College sample. Similarly, the change in offer size and the probability of acceptance between the control and treatment B will be greater in Bolivia than in the United States. In order to separate the effects of other-reliance and self-reliance, I will compare the effects of treatments A and B. Assuming $\Box_{sA} \oplus \Box_{sB}$ in each culture, subtracting $\Box_A$ from $\Box_B$ should yield the effect of $\Box_{oB}$ on offer reciprocity, as measured by changes in offer size and the probability of acceptance. Additionally, the sign of $\Box_A$ will provide information about the relative importance of self-reliance and other-reliance. I expect $\Box_{ABolivia}$ to be positive because other-reliance will dominate and $\Box_{AUS}$ to be negative because self-reliance will dominate.
V. Model and Estimation

In order to test my hypotheses about the impact of reliance on reciprocity, I will examine the change in participants’ behavior in treatments A and B relative to the control treatment. In an effort to minimize heterogeneity within my sample, I estimate fixed effects models to predict proposer behavior. I use dummy variables for treatments A and B to estimate the impact that the treatments have on offer size and acceptance regions. My hypotheses involve both proposer and responder behavior, so I will run separate regressions using offer size and the probability of acceptance as dependent variables.

In the ultimatum game, proposers’ behavior is measured by the size of the offers they propose, so I will run a series of regressions with offer size as the dependent variable. Because proposers’ behavior is constrained to the finite set of integers between 0 and 10, I use a tobit model to estimate proposer behavior. The true model of offer size is given by

\[ \text{Offer}_i = \beta_0 + X_i \beta_1 + \beta_2 \text{Treatment}_A + \beta_3 \text{Treatment}_B + \eta_i + \varepsilon_i \]

where \( X_i \) is a vector of observable characteristics of individual \( i \), \( \text{Treatment}_A \) is a dummy variable for treatment A, \( \text{Treatment}_B \) is a dummy variable for treatment B, \( \eta_i \) captures the treatment-invariant unobservable characteristics of individual \( i \) that affect offer size, \( \varepsilon_i \) is the error term, and \( t \) indicates the treatment during which the offer was proposed.

It is possible that the unobservable, treatment-invariant characteristics, \( \eta_i \), are correlated with offer size and the treatment dummies, which will cause the OLS estimators to be biased. Indeed, treatment-invariant characteristics do need appear to be exogenous from the model. \( \bullet \) in equation (2) appears to be correlated with social and risk preferences. Subjects with smaller values of \( \bullet \) place more weight on the payoff of their partner. This could occur because players are either inequity averse or risk averse. Because of their concerns for equitable distributions
(either because they reduce inequity or risk), player with higher values of $\mathcal{Q}$ may be more responsive to changes in the reliance function. If this is the case, there will be a positive correlation between $\mathcal{Q}$ and offer size. Since the emotional state function is weighted more heavily in these players’ utility functions, and emotional state is a function of $\mathcal{Q}$, subjects with higher values of $\mathcal{Q}$ will be more heavily impacted by changes in $\mathcal{Q}$. Therefore, estimating equation (2) using cross-sectional data will produce biased estimators. We can eliminate the endogeneity of the treatment-invariant characteristics $\mathcal{Z}_i$ in the model by performing a within (or fixed effects) transformation of equation (2). I have chosen to performed fixed effects rather than random effects because the endogeneity I would like to control for is treatment-invariant, not individual-invariant. Note the following equation

\begin{equation}
\text{Offer}_i = \beta_0 + \overline{X}_i \beta_1 + \beta_2 \overline{\text{TreatmentA}}_i + \beta_3 \overline{\text{TreatmentB}}_i + \epsilon_i
\end{equation}

where $\overline{\text{Offer}}_i = T^{-1} \sum \text{Offer}_i$ and $t$ is an index of the treatments, $t \in \{1, 2, \ldots, T\}$. $\overline{X}_i$, $\overline{\text{TreatmentA}}_i$, $\overline{\text{TreatmentB}}_i$, and $\epsilon_i$ are defined analogously. Subtracting (3) from (2) gives us the fixed effects transformation. Consequently, we can write

\begin{equation}
\text{Offer}_{it} - \overline{\text{Offer}}_i = \beta_1 (\text{TreatmentA}_{it} - \overline{\text{TreatmentA}}_i) + \beta_3 (\text{TreatmentB}_{it} - \overline{\text{TreatmentB}}_i) + \epsilon_i
\end{equation}

Estimating (4) eliminates the treatment-invariant error, $\mathcal{Z}_i$, and gives us the within-person impact of both treatments on offer size. $X_{it}$ drops out of the fixed effects regression because the controls in $X_{it}$ vary across individual but not treatment.

In my experiment, responders’ behavior is measured by their acceptance or rejection of a given offer. The model of responder behavior I estimate therefore uses the probability of acceptance as the dependent variable. Because acceptance is a binary choice variable, I use the
probit models to estimate the impact of the treatments on the probability of acceptance. The true model for the probability of acceptance is given by

\( P(\text{accept})_{it} = \beta_0 + X_{it} \beta_1 + \beta_2 \text{Offer}_{it} + \beta_3 \text{Treatment A}_{it} + \beta_4 \text{Treatment B}_{it} + A_i + \varepsilon_i \)

where \( \text{Offer}_{it} \) is a variable indicating the size of the offer. I expect that the effect of the treatment dummies on the probability of acceptance may vary with offer size. Thus I also estimate a model that includes interaction terms between the treatment dummies and offer size to capture the change in slope. This model is given by

\( P(\text{accept})_{it} = \beta_0 + X_{it} \beta_1 + \beta_2 \text{Offer}_{it} + \beta_3 \text{Treatment A}_{it} + \beta_4 \text{Treatment B}_{it} + \beta_5 \text{Offer A}_{it} + \beta_6 \text{Offer B}_{it} + \eta_i + \varepsilon_i \)

where \( \text{Offer A}_{it} \) and \( \text{Offer B}_{it} \) denote the interaction terms. I perform a within transformation of equation (5) to yield

\( P(\text{accept})_{it} - \overline{P(\text{accept})}_{i} = \beta_2 (\text{Offer}_{it} - \overline{\text{Offer}}_{i}) + \beta_3 (\text{Treatment A}_{it} - \overline{\text{Treatment A}}_{i}) + \beta_4 (\text{Treatment B}_{it} - \overline{\text{Treatment B}}_{i}) + \varepsilon_i \)

Transforming (6) produces a similar equation. I estimate both equations using fixed effects probit regressions. Because players very rarely reject offers above the 50/50 split (only two do so in my experiment), I restrict my regressions to offers between $0 and $5. By doing so I am able to generate more significant results.

VI. Empirical Results

In this section I estimate the impact that changes in \( \square \) have on proposer and responder behavior in the ultimatum games I conduct. Histograms in Appendix A summarize proposer and responder behavior in each treatment. As one will note, the histograms do not reveal any clear differences in trends between the treatments. Therefore, I will use summary data and regression analysis to interpret my findings. I first present an overview of the summary statistics from each
treatment in Table 1 (Appendix B). I then present the results from the regressions discussed in section V. I begin first with an overview of behavior in treatment A of my experiment.

**Proposer Behavior**

As discussed in the previous section, I use offer size to analyze the impact that the alternative treatments have on proposer behavior. Table 1 summarizes mean offer size within each of the treatments. Because self-reliance, the model predicts that proposer offer smaller offers on average. As expected, the mean offer in treatment A is lower than the mean offer in the control treatment (3.73 versus 4.17). Although the model does not predict the exact sign of the change in offer size in treatment B, it does predict that offer should be larger than those in treatment A. Again, as expected, the mean offer in treatment B is larger than the mean offer in treatment A (3.89 versus 3.73). This also conforms to my expectations about the relative importance of self-reliance and other-reliance in the United States.

I also perform a fixed effects regression analysis of the data in order to assess the impact of the treatments on proposer behavior. Tobits using offer size as the dependent variable reveal that treatment A has a negative impact on offer size (significant at the 5% level), which is again consistent with my predictions. In my experiment, treatment A reduces offer size by about $0.39. Treatment B also has a negative coefficient of -0.39 (significant at the 5% level). Although it is slightly greater than the coefficient on treatment A, a Wald test of the null hypothesis that the coefficients on treatment A and treatment B are equal produces an F-statistic of 0.00. Thus, we cannot reject the null that the coefficients are equal.

Although this finding is not entirely consistent with my predictions, it is not inconsistent with my model. The section IV, I suggest that the difference between the effects of treatments A and B captures the impact of other-reliance on players’ behavior. I also predict that in the United
States, self-reliance will dominate and the impact of other-reliance will be relatively small. Thus, it is possible that the similarity between the two treatment coefficients is due to the minimal impact that other-reliance has on economic behavior in the United States. Also, the model predicts that if $\rho_o < \rho_s$, $\rho$ will be positive for proposers. This should result in a negative change in offer size from the $\rho = 0$ treatment, which is what we observe from the negative coefficient on treatment B.

It is possible that offers in treatments A and B are lower than offers in the control treatment because of a learning affect that takes place. Although I attempt to control for the effects of learning by switching the order of treatments A and B, they are always given to subjects after the control treatment. Slonim and Roth (1998) find that offer size decreases as players gain experience. If it is the case that experience is causing offer size to decrease in my experiment, then the lower offer size in treatments A and B is due simply to the adaptive learning of the players rather than the change in reliance. However, there are several differences between my experiment and Slonim and Roth’s experiment that suggest that the decrease in offer size is not simply due to experience. First of all, players in my experiment are not matched with the same player in multiple treatments of the ultimatum game, so players never learn any information about the other play to use in later rounds. Additionally, even if players use the behavior of their previous partners as a proxy for the preferences of their current partner, players in my experiment never know whether or not their offers have been accepted in previous rounds. Thus, there is no information available from the early rounds for players to use in future rounds.

**Responder behavior**

I use acceptance rates to analyze the impact that the alternative treatments have on responder behavior. Table 1 summarizes mean minimum acceptance levels within each of the
treatments. Because self-reliance is positive for responders, the model predicts that responders should accept offer smaller offers. As expected, the mean minimum accepted offer in treatment A is lower than the mean minimum accepted offer in the control treatment (2.32 versus 2.36). Although the model does not predict the exact sign of the change in acceptance rates in treatment B, it does proposers should be less willing to accept low offers than in treatment A.

Additionally, given the discussion above, I expect that minimum accepted offers are lower in treatment B than in the control. Although the mean minimum accepted offer in treatment B is lower than in the control (1.83 versus 2.36), the mean minimum offer in treatment B is actually lower than the mean minimum accepted offer in treatment A. It is possible that this is a result of the small sample size used in my study rather than a failure of my model to accurately predict the impact of reliance on the probability of acceptance.

I also use fixed effects probits to estimate the impact of the alternative treatments on responder behavior, with the probability of acceptance as the dependent variable. I conduct the probits without and with interaction terms between offer size and the treatment dummies. The coefficients on the treatment B dummies are both positive (0.1038 and 0.1074, respectively) and significant at the 5% level in the regression run without the interaction terms. Given the assumption that self-reliance is weighted more than other reliance in the United States, these results are consistent with the model presented in section IV.

The results for treatment A are inconclusive. Since self-reliance is positive, we would accept the probability of acceptance to increase. However, in both regressions, the coefficients on the treatment A dummy are negative (-0.0292 and -0.0961, respectively). Although these coefficients contract the predictions of the model, they are both highly insignificant, and thus cannot be viewed as significantly different from 0. It is possible that the failure of my
experiment to produce significant and positive coefficients on the treatment A dummy is a result of my limited sample size. I would therefore like to reproduce my experiment using a larger sample.

In the regression that includes the interaction terms between offer size and the treatment dummies, neither of the interaction terms are significant. Additionally, a Wald test of the null hypothesis that the interaction terms are jointly equal to 0 produces a F statistic of 0.00. Thus, we can assume that their impact on the model is negligible. Therefore, it appears that changes in reliance result in an intercept shift of the probability of acceptance, but do not cause the slope of the acceptance curve to change as offer size increases.

VII. Conclusion

Apart from the inconclusive findings for responder behavior in treatment A, the results from the experiment I conduct in the United States support my theory that the role that the individual and others have in the determination of roles in the ultimatum game impacts what are perceived as reasonable and fair offers. The next step of my research is to test my predictions about the impact of cultural norms on the relative importance of other- and self-reliance by conducting the same experiment in Bolivia. I plan to travel to Bolivia this summer and work with a group of graduate students from the University of San Francisco to conduct the experiment using Bolivian subjects. As discussed above, I expect that other-reliance will have a greater impact than self-reliance on proposer and responder behavior in my experiment, given Bolivia’s history of communal politics.
APPENDIX A: Histograms

Proposer Behavior
Responder Behavior

![Histograms of offer sizes for different conditions and samples.](image-url)
### APPENDIX B: Results Tables

**Table 1: Mean Offers and Acceptances Across Treatments**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean Offer</th>
<th>Mean Minimum Accepted Offer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>4.17</td>
<td>2.36</td>
</tr>
<tr>
<td>Treatment A</td>
<td>3.73</td>
<td>2.32</td>
</tr>
<tr>
<td>Treatment B</td>
<td>3.89</td>
<td>1.83</td>
</tr>
</tbody>
</table>

**Table 2: Fixed Effects Tobit Estimation of (4)**

Dependent Variable: Offer size

<table>
<thead>
<tr>
<th>Variable</th>
<th>(7) without interaction terms</th>
<th>(7) with interaction terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>5.000 (0.7555)*****</td>
<td></td>
</tr>
<tr>
<td>Treatment A</td>
<td>-0.3941 (0.1812)**</td>
<td>-0.0961 (0.1333)</td>
</tr>
<tr>
<td>Treatment B</td>
<td>-0.3898 (0.1972)**</td>
<td></td>
</tr>
</tbody>
</table>

| Observations | 116                             |
| Pseudo $R^2$ | 0.4250                           |

**Table 3: Fixed Effects Probit Estimation of (7)**

Dependent Variable: P(acceptance)

<table>
<thead>
<tr>
<th>Variable</th>
<th>(7) without interaction terms</th>
<th>(7) with interaction terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer size</td>
<td>0.3157 (0.0430)*****</td>
<td>0.3126 (0.0466)*****</td>
</tr>
<tr>
<td>Treatment A</td>
<td>0.0292 (0.0657)</td>
<td>-0.0961 (0.1333)</td>
</tr>
<tr>
<td>Treatment B</td>
<td>0.1038 (0.0371)**</td>
<td>0.1074 (0.0580)</td>
</tr>
</tbody>
</table>

| Observations | 594                             |
| Pseudo $R^2$ | 0.7958                           |

* denotes variables significant at the 10% level
** denotes variables significant at the 5% level
*** denotes variables significant at the 1% level
APPENDIX C: Experiment Instructions

CONTROL TREATMENT

Instructions:

In the first part of the study, we are going to ask you to make several decisions about what to do with a sum of money. Person A will act as the first decision-maker and Person B will be the second decision-maker. Each of you will be making decisions acting first as Person A and then as Person B. If you have an even number you will be paired with someone with an odd number (and vice-versa) to ensure that you do not get your own form.

The study consists of several similar exercises. At the end of this session, we will randomly choose one of the exercises to be paid out, either where you acted as Person A or Person B. You should make each decision assuming it is the one to be paid, that is, each decision should not be influenced by your other decisions. It is important to remember that the person you are paired with will be different in each of these exercises. The money you earn from the experiment will be placed in an envelop with your codename on the front. You can pick up the money from Angela Hanna at the economics department, and she will have no knowledge of the amount of money in each envelope.

In Exercise 1, Person A will decide how to divide $10 between him- or herself and another anonymous person in the room. This form will be randomly matched with another player in the room, who will be asked as Person B to accept or reject the division. If Person B accepts the offer, the money is split according to Player A’s division; if Person B rejects the offer, neither player will receive any money. You will make decisions acting as both Person A and Person B. You will first make a decision acting as Person A.

PROPOSER FORM

PERSON A (FIRST DECISION-MAKER): Please write your code number below.

CODE NUMBER______________________________

In this part of the session, you are asked to decide how to divide $10 between yourself and another anonymous person in this room. You will write down the amount you pass to the other person and the amount you will keep below. Your division must be in whole dollars. This form will be randomly matched with the Person B form of another player in this room by the experimenters. If he or she accepts an offer of equal value to that which you propose, the money will be split according to this division. If he or she rejects an offer of equal value to that which you propose, neither player will receive any money.

PASS TO PERSON B_____________________ KEEP_________________

(TOTAL MUST EQUAL $10)
In order to ensure that you receive your payment, please specify a code name below that only you will know. It will be used for payment purposes only, and the experimenters will have no way to connect you to your codename.

CODENAME_________________________________

RESPONDER FORM

PERSON B (SECOND DECISION-MAKER): Please write your code number below.

CODE NUMBER____________________________

In this part of the session, you are asked to decide what offers you will accept and which offers you will reject from Person A, with whom you will be randomly matched. If his or her offer is equal to one of the offers you have accepted, the division will be paid out as proposed. If his or her offer is equal to one of the offers you have rejected, neither player will receive any money.

<table>
<thead>
<tr>
<th>OFFER (amount you receive)</th>
<th>KEPT (amount kept by Person A)</th>
<th>ACCEPT</th>
<th>REJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>$10</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$1</td>
<td>$9</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$2</td>
<td>$8</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$3</td>
<td>$7</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$4</td>
<td>$6</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$5</td>
<td>$5</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$6</td>
<td>$4</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$7</td>
<td>$3</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$8</td>
<td>$2</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$9</td>
<td>$1</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>$10</td>
<td>$0</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

TREATMENT A
We are now going to repeat the first exercise. However, instead of randomly assigning the role first decision-maker, the first decision-makers will be those who have earned the right by earnings the highest scores on the arithmetic exercise. The second decision-makers are those with the lowest scores.

As in Exercise 1, Person A will decide how to divide $10 between him- or herself and another anonymous person in the room. This form will be randomly matched with another player in the room who scored in the bottom half on the arithmetic exercise, who will be asked as Person B to accept or reject the division. If Person B accepts the offer, the money is split according to Player A’s division; if Person B rejects the offer, neither player will receive any money.

PROPOSER FORM

PERSON A (FIRST DECISION-MAKER): Please write your code number below.

CODE NUMBER______________________________

Congratulations! Your score on the last exercise has qualified you to act as the first decision-maker in this exercise. You are asked to decide how to divide $10 between yourself and another anonymous person in this room who scored in the bottom half of the arithmetic exercise. You will write down the amount you pass to the other person and the amount you will keep below. Your division must be in whole dollars. This form will be randomly matched with the Person B form of another player in this room who scored in the bottom half of the arithmetic exercise by the experimenters. If he or she accepts an offer of equal value to that which you propose, the money will be split according to this division. If he or she rejects an offer of equal value to that which you propose, neither player will receive any money.

PASS TO PERSON B_____________________ KEEP_________________

(TOTAL MUST EQUAL $10)

RESPONDER FORM

PERSON B (SECOND DECISION-MAKER): Please write your code number below.

CODE NUMBER______________________________

Your score on the last exercise has designated you the second decision-maker for this exercise. In this exercise, you are asked to decide what offers you will accept and which offers you will reject from Person A, who scored in the top half of the arithmetic exercise and with whom you will be randomly matched. If his or her offer is equal to one of the offers you have accepted, the division will be paid out as proposed. If his or her offer is equal to one of the offers you have rejected, neither player will receive any money.

________________________  ________________________
OFFER  KEPT
### TREATMENT B

We would now like you to vote for one person from your team who you feel exhibited who contributed the most to your group’s success. You may not vote for yourself. We will use this information in the next exercise.

**VOTE (seat number)______________________**

**PROPOSER FORM**

We are now going to repeat the first exercise. However, instead of randomly assigning the first decision-maker, the first decision-makers are those who received the highest number of votes from the last exercise. The second decision-makers are those with the lowest number of votes from the last exercise.

As in Exercise 1, Person A, who received a high number of votes in the last exercise, will decide how to divide $10 between him- or herself and another anonymous person in the room, who received votes in the bottom half on the last exercise. This form will be randomly matched with another player in the room, who will be asked as Person B to accept or reject the division. If

<table>
<thead>
<tr>
<th>(amount you receive)</th>
<th>(amount kept by Person A)</th>
<th>ACCEPT</th>
<th>REJECT</th>
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<tbody>
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Person B accepts the offer, the money is split according to Player A’s division; if Person B rejects the offer, neither player will receive any money.

**PROPOSER FORM**

PERSON A (FIRST DECISION-MAKER): Please write your code number below.

CODE NUMBER______________________________

Congratulations! Your score on the last exercise has qualified you to act as the first decision-maker in this exercise. You are asked to decide how to divide $10 between yourself and another anonymous person in this room. You will write down the amount you pass to the other person and the amount you will keep below. Your division must be in whole dollars. This form will be randomly matched with the Person B form of another player in this room who received a low number of votes in the last exercise by the experimenters. If he or she accepts an offer of equal value to that which you propose, the money will be split according to this division. If he or she rejects an offer of equal value to that which you propose, neither player will receive any money.

PASS TO PERSON B_____________________KEEP_________________

(TOTAL MUST EQUAL $10)

**RESPONDER FORM**

PERSON B (SECOND DECISION-MAKER): Please write your code number below.

CODE NUMBER______________________________

The number of votes you received in the last exercise has designated you the second decision-maker for this exercise. In this exercise, you are asked to decide what offers you will accept and which offers you will reject from Person A, who received votes in the top half of the group and with who you will be randomly matched. If his or her offer is equal to one of the offers you have accepted, the division will be paid out as proposed. If his or her offer is equal to one of the offers you have rejected, neither player will receive any money.

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<tr>
<th>OFFER (amount you receive)</th>
<th>KEPT (amount kept by Person A)</th>
<th>ACCEPT</th>
<th>REJECT</th>
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References


