

ABSTRACT

Title of Document: EFFECTS OF IN-GROUP BIAS IN A GIFT-EXCHANGE TRANSACTION: A THEORY OF EMPLOYEE OWNERSHIP AND EVIDENCE FROM A LABORATORY EXPERIMENT

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This dissertation presents a behavioral model of employee ownership and an experimental examination of the model. Chapter 1 reviews literature on employee ownership, gift-exchange, social preferences in experimental economics, and in-group bias. The model of employee ownership, presented in Chapter 2, incorporates in-group bias into a gift-exchange framework. Predictions of the model include higher productivity, higher profits, higher wages, and greater worker satisfaction in employee owned firms relative to otherwise identical publicly traded or private firms with no employee ownership. Chapter 3 presents the results of a laboratory experiment designed to test both the assumptions and the predictions of the model described in Chapter 2. In-group bias is found to affect the giving and trusting behavior, but *not* the reciprocal behavior of the subjects in the experiment.

EFFECTS OF IN-GROUP BIAS IN A GIFT-EXCHANGE TRANSACTION: A
THEORY OF EMPLOYEE OWNERSHIP AND EVIDENCE FROM A
LABORATORY EXPERIMENT

By

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Chapter 1: Literature

1.1 Introduction

Profit-sharing and employee ownership play a large role in today's economy, with as many as $\frac{1}{3}$ to $\frac{1}{2}$ of private sector American workers receiving a portion of their employer's profits¹. Proponents of employee ownership justify and promote the practice based on the belief that it increases the productivity and profitability of the firm². Yet models that attempt to create a causal link from employee ownership to higher productivity face several obstacles.

An individual worker will only receive a small fraction of the profits produced by his/her effort while enduring the entire cost. As a company grows, N increases, the worker's incentive to improve performance all but vanishes. This is the classic free-rider problem or "1/N" problem. Any effort agreement amongst employee owners would be subject to free-riding. One might argue that co-workers have an incentive to monitor one another under a profit-sharing plan. However, monitoring is also subject to free-riding if there is a significant social or effort cost to monitoring.

In light of these obstacles, how would one explain the belief that employee ownership raises productivity? Many employees report a 'we're all in it together' attitude amongst workers in firms with profit-sharing plans. Perhaps it is not their own profit, but the profit of their co-workers that motivates these workers. An agent who is

¹ See Kruse, Blasi & Park (2008).

² See Ehrenberg & Milkovich (1987).

not purely self-interested may view the profits of her co-worker in a different light than the profits of a rich shareholder who is otherwise uninvolved with the company.

Chapter 2 will model an agent who cares differentially about the profits of her co-workers and the profits of strangers in a gift-exchange transaction with a firm. Chapter 3 describes an experiment that tests both the main assumption and several predictions of this model. The following sections review literature that is relevant to the model, the experiment, or both. Topics covered include employee ownership, gift-exchange, social preferences in economic experiments, and in-group bias.

1.2 Employee Ownership

The theoretical literature has generally shined a negative light on employee ownership in terms of firm profitability and worker well-being, while the empirical literature has suggested (though not conclusively) that employee ownership benefits both firms and workers.³ In contrast to the vast majority of the previous theoretical literature, the model developed in Chapter 2 predicts that employee ownership increases the profitability of the firm and the well-being of workers. Because the model does not draw from the theoretical employee ownership literature, this section includes only a brief note about that literature. The argument against profit sharing that gained the most attention in the literature is that employee ownership creates perverse incentives due to workers having controlling interest in the firm.⁴ The crux of the problem, according to these models, is that employee owners would restrict the amount of labor available to the firm

³ Cramton, Mehran & Tracy (2008) provide a notable exception to the theoretical literature, predicting that employee ownership will ease negotiations between unions and management.

⁴ See Ward (1958), Domar (1966), Meade (1972), and Vanek (1977).

and seek to maximize revenues per worker, instead of profits. See Blair, Kruse & Blasi (2000), Dow & Putterman (1999), and Hansmann (1996) for a review of the perverse incentive argument and other arguments against employee ownership.

Empirical research in this area has consistently found a correlation between employee ownership or profit sharing plans and firm performance.⁵ Averages over many studies suggest that employee ownership increases productivity by 4 to 5%.⁶ However, it would be a stretch to infer causation from these studies. Prendergast (1999) and Ehrenberg & Milkovich (1987) lay out the argument that firms may differentially select into profit sharing plans. Having recognized that selection issues preclude inferring causation from the data, the following paragraphs highlight findings that are consistent with other predictions of the behavioral employee ownership model (in Chapter 2).

Predictions of the behavioral employee ownership model include not only effects on firm welfare (productivity and profitability), but also effects on worker welfare (wages and worker satisfaction). Several studies find that wages and worker satisfaction are higher in firms with profit sharing or employee ownership plans than in comparable firms without any form of profit sharing. Using data from NBER surveys and questions added to the 2002 and 2006 GSS, Kruse, Freeman & Blasi (2008) find that involvement in profit sharing programs is correlated with higher pay and benefits, greater job satisfaction, and other positive worker outcomes.⁷

The employee ownership literature emphasizes human resources policies that promote the “all in it together” culture observed in many profit sharing firms. In case

⁵ See Doucouliagos (1995) and Kruse & Blasi (1995) for meta-analyses. Also see Core & Guay (2001), Lee (2003) and Robinson & Wilson (2006).

⁶ See Blasi, Freeman, Mackin & Kruse (2008) and Prendergast (1999).

⁷ Also see Kruse & Blasi (1995) and Kardas, Scharf & Keogh (1998).

studies, Knez & Simester (2001) find that a firm-wide incentive scheme increased employee performance at Continental Airlines and Bruner & Brownlee (1990) find that both employees and non-employee stockholders benefited from Polaroid's creation of an Employee Stock Ownership Plan.⁸ Blasi, Freeman, Mackin & Kruse (2008) stress the importance of the interaction between profit sharing programs and other corporate policies. Though the behavioral model described in Chapter 2 does not rely on other company policies, it may be imbedded into a richer model where human resource policies matter. These ideas will be discussed further in Section 2.5: Extensions of the Model.

1.3 Gift-Exchange

The idea that concerns about wage fairness might influence a worker's effort decision, and therefore the wage offer made by the firm was introduced by Akerlof (1982) and developed in Akerlof & Yellen (1988; 1990). Fehr et al. (1993) describes a laboratory experiment which supports the fair wage-effort hypothesis. In the one-shot, gift-exchange game, subjects do not behave according to strict self interest, rather they seem to be concerned with the fairness of the transaction. The seller's choice of quality (where a higher quality benefits the buyer) is highly correlated with the buyer's choice of price (where a higher price benefits the seller). The gift-exchange game designed by Ernst Fehr and co-authors is the basis for the structure of the exchange in Chapter 2's behavioral model of employee ownership.

⁸ For further discussion of employee ownership case studies see Rosen et al. (1990) and Blasi & Kruse (1991)

Benjamin (2005; 2006; 2008) refines the structure of exchange in the model by restricting the form of the firm and worker's profit functions. That is, particular assumptions are made about the rate at which worker utility can be transformed into firm profit through effort. In doing so, Benjamin proves that efficient exchange can result from a one time transaction with no enforcement so long as the worker is sufficiently fair-minded. In the 2006 version of his paper, Benjamin attempts to use the model to explain profit sharing.⁹ Benjamin relies on the worker's compensation as a function of his/her own effort (subject to the 1/N problem). Benjamin's use of the gift-exchange model to explain profit sharing is fundamentally different from the model described in Chapter 2. The model in Chapter 2 explicitly ignores Benjamin's mechanism, and instead allows the worker to take into account that *other* workers' compensation will be a function of his/her own effort in a firm with profit sharing.

Inequity aversion preferences, used in Chapter 2 as the preferences of the worker, were first introduced by Fehr & Schmidt (1999).¹⁰ The authors justify the proposed preferences by explaining subject behavior in a wide variety of experimental scenarios, however, critics have found fault with the Fehr-Schmidt utility function. Most notably, Engelmann & Strobel (2004) argue, based on simple distribution experiments, that efficiency and maximin concerns explain experimental data better than inequity aversion. What is important relative to the Chapter 2 model is that the discrepancies between efficiency/maximin and inequity aversion occur entirely in the domain of disadvantageous inequality (where the other agent has a higher payoff than the acting

⁹ The section on profit sharing did not appear in the 2005 version and was removed prior to posting the 2008 version.

¹⁰ Bolton & Ockenfels (2000) offered a similar utility function based on behavior in experimental studies.

agent). Conversely, the action in the gift-exchange model takes place in the domain of advantageous inequality (where the acting agent has a higher payoff than the other agent). Perhaps most importantly, both maximin and inequity aversion preferences have a kink at equality. That is preferences are non-differentiable at any point where the payoff to the two agents are equal. The behavioral model of employee ownership will utilize preferences that reflect both inequity aversion *and* efficiency/maximin concerns at equality and in the domain of advantageous inequality. The formal model will reflect inequity aversion in the domain of disadvantageous inequality, while Section 2.5: Extensions of the Model will explore how the model might operate differently if the workers preferences reflect efficiency/maximin concerns in the domain of disadvantageous inequality.

1.4 In-Group Bias

What are the factors that affect social preferences? Loewenstein et al (1989) find that subject preferences depend on the framing of a dispute between two parties. Subjects preferred distributions that were more generous to the co-disputant when the experimenters induced more positive attitudes toward the co-disputant. Thus it is likely that any factor affecting an individual's attitude or disposition toward another will affect the individual's regard for the welfare of the other. The social psychology literature has identified several of the forces that affect interpersonal attitudes.

Homans (1961) finds that humans are attracted to others who share similar values to one's self, and hypothesizes that in the absence of specific knowledge of another's values, individuals infer similarity of values from similarity of background. Homans also

studied propinquity and found that individuals who were more likely to cross paths also were more likely to have positive attitudes toward one another. It was Zajonc (1968) who identified that the "mere repeated exposure of the individual to a stimulus is a sufficient condition for the enhancement of his attitude toward it." In Zajonc (1968), subjects were repeatedly exposed to pictures of other individuals, and reported a better attitude toward pictures they had seen more frequently.¹¹

In-group bias is used to describe the differential treatment of others based on the perception that one is a member of one's own group and the other is not. A lengthy literature in the 1970's explores how group identification effects evaluation of others and behavioral choices.¹² In many of the studies, groups were artificially created in the laboratory using something as non-divisive as a coin flip. This dissertation will treat in-group bias as the cumulative affect of similarity, exposure and pure group identification bias.¹³ Neither the model in Chapter 2, nor the experiment in Chapter 3, attempt to distinguish between the three. This is justified by the observation that virtually all naturally occurring groups share the characteristics that group members have more exposure to other members than to outsiders and that group members are more similar to other members than to outsiders. Certainly this is true in the case of the group of workers in a firm and in the case of the group of students who share an academic major (the groups used in the experiment in Chapter 3).

¹¹ Other factors that may affect an individual's attraction/attitude toward another include reciprocal liking, physical attractiveness and reinforcement.

¹² See Brewer (1979) for a review of the in-group bias literature.

¹³ Brewer (1979) suggests that effects such as similarity act to enhance the salience of in-group/out-group distinctions, thereby incorporating affects of similarity into in-group bias.

Chapter 2 will model the worker's utility as a function of the material welfare of herself and others given the worker's attitude toward the others. A brief introduction to the worker's utility function is given here. The individual i 's utility is a function of the material welfare of all persons $\mathbf{u} = (u_1, \dots, u_j, \dots, u_N)$ given individual i 's attitude toward each person $\mathbf{a}_i = (a_{i1}, \dots, a_{ij}, \dots, a_{iN})$.

$$U_i = U_i(\mathbf{u}; \mathbf{a}_i)$$

In a game involving only two agents, i and j , individual i 's utility simplifies to $U_i = U_i(u_i, u_j; a_{ij})$. Naturally, a_{ij} will be higher if agent j is in the same group as agent i (in-group) and lower if agent j is an outsider (out-group).

1.5 Gift-Exchange and Dictator Games in Experiments

Chapter 3 will present an experiment involving two games, a gift-exchange game and a dictator game. Each of these games has a history in the experimental economics literature. As previously noted, the gift-exchange game was pioneered by Fehr et al. (1993) to test the fair wage-effort hypothesis. Many experiments involving the gift-exchange game have been published and all find a strong correlation between the actions of the first and second mover even though strict self interest predicts no such correlation. The experiment described in Chapter 3 closely follows the payoff function used in sessions S13-S16 of Fehr et al. (1997). These sessions involve a pure lump sum transfer of wealth (the wage) from the employer to the employee. Previous gift-exchange experiments had wage as a function of effort in the firm's payoff function, negating the possibility that the firm could lose money in the transaction.

The dictator game was originated by Forsythe et al. (1994) in order to distinguish between pure preferences for giving and fear of negative reciprocal action in observed behavior in the ultimatum bargaining game. Andreoni & Miller (2002) modified the dictator game in order to test for the consistency of other-regarding preferences. In a number of rounds, the authors varied the price of giving (i.e. the rate at which an agent can increase another's profits by decreasing his/her own profits) and found that other-regarding behavior is quite rational if an agent takes the other individual's profits into his/her own utility function.¹⁴ The Andreoni & Miller experimental design is useful in the Chapter 3 experiment because it gives a more complete picture of a subject's preferences for giving.

1.6 In-Group Bias in Experimental Economics

In a range of environments, laboratory subjects display behavior that differs greatly from strict self-interest. These "social preferences" allow for efficient outcomes in games which lack other means of contract enforcement. Several studies have demonstrated that a subject's regard for the welfare of others can be altered by adjusting features of the experiment.

Bohnet and Frey (1999) provide evidence of the effect of exposure on subject preferences in a laboratory setting. The authors compare giving rates in the dictator game across four treatments in which a) the dictator and recipient are anonymous to one another, b) the recipient is identified to the dictator, c) the recipient is identified with

¹⁴ Fisman, Kariv & Markovits (2007) further analyze other-regarding preferences with a similar set of budget decisions using a graphical representation of the dictator games.

information given, or d) the recipient and dictator are identified to one another. Bohnet and Frey find that dictator giving increases when the exposure of the recipient to the dictator is increased.¹⁵

Results from Hannan et al (2002) suggest that in-group bias affects behavior in laboratory studies. The authors compare treatments of the gift-exchange game with subjects from two different populations - MBA students and undergraduates. Smaller numbers in MBA programs would suggest that subjects would have more exposure to one another. In addition, more specialized schooling implies more similarity within the MBA group than within the undergraduate group. Therefore, the in-group effect for the MBA group should be larger than that of the undergraduate population, predicting higher wages and effort levels in the MBA treatment. In fact higher wage and effort levels were observed for the MBA sessions in Hannan et al (2002).¹⁶

Several studies use artificially created team identity to test for in-group bias in economic experiments.¹⁷ These studies differ notably from the experiment described in Chapter 3 which utilizes naturally occurring groups. Hamoudi and Thomas (2006) report the results of a dictator game that was part of a field study on inter-generational exchanges. The authors compare a treatment where the recipient is a neighbor of the dictator and a treatment where the recipient is a stranger from another village. No in-group bias is detected; giving rates for neighbors and for strangers are equal.

¹⁵ On average, dictators offered 26, 35, 52 and 50 percent of the pie in treatments a, b, c and d, respectively. Bohnet and Frey characterize these findings as "the identification effect."

¹⁶ There may be other systematic differences between undergrads and MBAs that would cause differences in behavior. Hannan et al (2002) hypothesize that MBAs are more generous because they have more work experience.

¹⁷ Eckel & Grossman (2005) find in-group bias in cooperation rates in a public goods game where subjects participate in a group task. Chen & Li (2009) find that subjects are more altruistic toward in-group matches across a number of games. Klor & Shayo (2008) find that in-group bias affects voting on tax regimes.

Chapter 2: A Behavioral Model of Employee Ownership

2.1 Introduction

As discussed in Chapter 1, empirical evidence consistently shows a correlation between employee ownership and higher productivity. Theorists have a difficult time explaining this relationship due to the $1/N$ problem. Purely self-interested agents would see so little of the profit from their effort that it is unlikely to affect their behavior. The model presented here supposes that employee-owners are motivated not by the profit that they receive from their effort, but by the profit that their co-workers will receive from their effort.

Is a worker more motivated to exert effort when the beneficiary of the effort is her co-workers than when the beneficiary is an anonymous shareholder in the firm? The literature on in-group bias suggests that this is likely to be the case. In-group bias is a topic that has yet to get much attention in economics; however, group status may play an important role in the field to the extent that it can be manipulated for individual gain, mutual gain, or social gain. A firm can manipulate its ownership structure if it believes that it can take advantage of the bias its workers have toward each other. As I will show in Section 2.6, a policymaker may be justified in creating tax breaks for employee owned firms if they believe that there are social gains from employee ownership.

The model laid out in the following sections is a one-shot gift-exchange transaction between a profit maximizing employer and a worker with inequity-averse preferences. The key feature of the worker's preferences is a kink at equality. That is, the worker's utility function is non-differentiable at any point where the worker's profit is

equal to the firm's profit. The justification for the kink at equality is the worker's concern for fairness, a concern that is evident in the majority of laboratory subject in economics experiments.

Several predictions are given for employee owned firms relative to otherwise identical private or publicly owned firms. Employee owned firms will be more productive, more profitable and will pay higher wages than their counterparts. Employees of employee owned firms will exert more effort and will have higher job satisfaction than employees of firms with no employee ownership. Section 2.2 describes the gift-exchange environment and the preferences of the agents in the transaction. Section 2.3 solves for the optimal actions of the worker and the firm and presents the predictions of the model. Section 2.4 and 2.5 discuss applications and extensions of the model, respectively. Finally, Section 2.6 provides a discussion of policy implications.

2.2 Set-up and Preferences

The gift exchange model presented is that proposed by Akerlof (1982) and refined by Benjamin (2006). Worker i has preferences, $U_i = U_i(u_i, \pi_j; a_{ij})$, over her own material payoff, u_i , and the profits of the firm, π_j . The firm is profit-maximizing, or alternatively, the controlling owner(s) of the firm is/are purely selfish with $U_j = \pi_j$.

The firm offers a wage, w , to the worker. The worker may choose to accept or decline the wage offer. If she accepts, she then selects an effort level, e . The game is not repeated. The worker and firm's material payoffs are calculated by the following functions.

$$u_i(w, e) = w - c_i(e) \qquad \pi_j(w, e) = p_j(y_i(e)) - w$$

The functions $c_i(\cdot)$, $p_j(\cdot)$ and $y_i(\cdot)$ are twice differentiable with $c_i'(\cdot) > 0$, $c_i''(\cdot) > 0$, $p_j'(\cdot) > 0$, $p_j''(\cdot) \leq 0$, $y_i'(\cdot) > 0$ and $y_i''(\cdot) < 0$. The function $c_i(e)$ represents the cost of effort to the worker, while $y_i(e)$ reflects the benefit of effort to firm production. The function $p_j(\cdot)$ represents the price of the output good for the firm, taking into account the possibility that the firm has market power and therefore increasing productivity may decrease the price of the good. For convenience, I assume the following: $\lim_{e \rightarrow \infty} c'(e) = 0$ and $\lim_{e \rightarrow \infty} c''(e) = \infty$.

The worker's preferences take on the inequity aversion form suggested by Fehr and Schmidt (1999). Inequity aversion specifies that U_i is non-differentiable with respect to u_i and π_j at equality, $u_i = \pi_j$.¹⁸ In the domain of advantageous inequality, $u_i > \pi_j$, individual i regards person j 's payoff non-negatively, meaning $\partial U / \partial \pi_j \geq 0$. In the domain of disadvantageous inequality, $u_i < \pi_j$, individual i regards person j 's payoff non-positively, meaning $\partial U / \partial \pi_j \leq 0$. The assumption on preferences in the domain of disadvantageous inequality is not supported by efficiency or altruism concerns, which would cause person i to regard π_j positively in the domain of disadvantageous inequality. See figure 2.1 for preferences that satisfy the above assumptions.

While the norm of equality is straightforward in many contexts, it may not be as salient in the worker-firm relationship. The worker's concern for equality in this model is a stylized way to represent the worker's concept of a fair transaction with the firm. Some would argue that the worker's concept of fairness with the firm is reference

¹⁸ Rawlsian preferences justify this assumption as well.

dependent, and therefore not static. In this case, the assumption must be made that the worker's concept of fairness (their line of equality) remains stable across different types of firms.

Preferences are assumed to be convex, where differentiable, and homothetic. The homothetic assumption is included to ensure that $-(\partial U/\partial u_i)/(\partial U/\partial \pi_j)$ is non-decreasing as payoffs increase along the line of equality $u_i = \pi_j$. Lastly, I will assume that the single-crossing property holds for attitude in the domain of advantageous inequality.¹⁹ That is

$$(\partial^2 U/\partial u_i \partial a_{ij})/(\partial^2 U/\partial \pi_j \partial a_{ij}) < 1 \text{ for all } (u_i, \pi_j) \text{ such that } u_i > \pi_j.$$

Figure 2.2 demonstrates how preferences change as a_{ij} changes. After solving the worker's maximization problem, I will compare the equilibrium contract, (w, e) , between worker i and firm $j = 1$ with the contract between worker i and firm $j = 2$, where firms 1 and 2 differ only a_{ij} . Specifically, the worker's attitude toward her employer when working for firm 2 is greater than his/her attitude toward her employer when working for firm 1, $a_{i2} > a_{i1}$.

2.3 Solving the Gift-Exchange Game

The two-stage gift-exchange game is easily solved by backward induction. We begin by considering the worker's effort decision after a wage offer has been made by the

¹⁹ Evidence from Chapter 1 and Loewenstein et al (1989) suggests that the same property does not hold in the domain of disadvantageous inequality. Furthermore, no assumption on the effect of attitude on preferences in the domain of disadvantageous inequality is needed for this model.

firm. Given the wage offer, the worker is faced with the following maximization problem.

$$\begin{aligned} \max_e U_i &= U_i(u_i, \pi_j; a_{ij}) \\ \text{s.t. } u_i(w, e) &= w - c_i(e) \\ \text{and } \pi_j(w, e) &= p_j(y_i(e)) - w \end{aligned}$$

Define $m_{ij}(\cdot) = p_j(y_i(c_i^{-1}(\cdot)))$. The maximization conditions simplify to:

$$\pi_j(w, e) = m_{ij}(w - u_i) - w$$

Given the assumptions on $c_i(\cdot)$, $p_j(\cdot)$ and $y_i(\cdot)$ from the previous section, this function is decreasing and concave. The wage curve shifts down and to the right as wage increase. See figure 2.3.

Consider the worker's utility maximization problem for different wage levels. At low wages, the worker will choose an effort level such that $u_i = \pi_j$. This corner solution will prevail as long as $-(\partial U/\partial u_i)/(\partial U/\partial u_j) \geq m_{ij}'(w - u_i)$ at $u_i = \pi_j$. That is, the worker's marginal rate of substitution from π_j to u_i is less than the rate at which the worker can actually trade firm profit for her material payoff. The worker does not exert more effort because doing so would put her in the domain of disadvantageous inequality. As wage increases, the function $\pi_j(w, e) = m_{ij}(w - u_i) - w$ crosses $u_i = \pi_j$ at higher levels of effort and therefore lower levels of $m_{ij}'(w - u_i)$. Meanwhile, the worker's marginal rate of substitution, $(\partial U/\partial u_i)/(\partial U/\partial u_j)$, is constant along $u_i = \pi_j$, due to the assumption of

homotheticity. If wage is increased sufficiently such that $-(\partial U/\partial u_i)/(\partial U/\partial u_j) < m_{ij}'(w - u_i)$ at $u_i = \pi_j$, an interior solution will prevail with the standard tangency condition, $(\partial U/\partial u_i)/(\partial U/\partial u_j) = m_{ij}'(w - u_i)$ at the effort level chosen by the worker. See figure 2.4 for an example of a wage-effort path for a given set of worker preferences and $m_{ij}(\cdot)$.

The firm's wage decision follows easily from the worker's maximization problem discussed above. The firm chooses the wage that will result in the maximum profit, given the preferences of the worker. See, for example, the profit maximizing wage offer highlighted in figure 2.4.

The following paragraphs consider how the worker's effort decision changes when her attitude toward the firm changes and how the firm's wage offer changes in anticipation of the worker's behavior. Under standard microeconomic preferences an increase in the worker's attitude toward the firm would cause an increase in the worker's effort. However, inequity aversion preferences create a boundary which the worker does not want to cross. The firm can move the worker away from the boundary, and allow for more effort, by offering the worker a higher wage. Both the worker and the firm benefit from the worker's improved attitude toward the firm creating an efficiency gain. However, there is a limit to the efficiency gains from raising the worker's attitude toward the firm, highlighted by Definition 1 and Lemma 1, below. The exact limit depends on $c_i(\cdot)$, $p_j(\cdot)$ and $y_i(\cdot)$, which determine the rate at which the worker (through the exertion of effort) can transform her own material payoff into profit for the firm.²⁰

²⁰ The first derivatives of $c_i(\cdot)$, $p_j(\cdot)$ and $y_i(\cdot)$ have rather intuitive interpretations. The rate that effort transforms into profit, $y_i'(\cdot)$, is high for high ability workers. The rate that effort reduces the material payoff of the worker, $c_i'(\cdot)$ is low for workers who enjoy their jobs. The term, $p_j'(\cdot)$ is high for firms that are able to better capitalize on the production of their workers, due to better technology or more market power. Within this framework, high ability workers, workers who enjoy their jobs, and workers who are hired by

Definition 1. Given $m_{ij}(\cdot)$, let the Rawlsian wage, w^* , be the wage that the profit maximizing firm offers to a worker with pure Rawlsian preferences, $U_i = \min(u_i, \pi_j)$.

Lemma 1. Given $m_{ij}(\cdot)$ and $U_i(u_i, \pi_j; a_{ij})$, there exists an a_i^* , such that for any $a_{ij} \geq a_i^*$, the profit maximizing firm will offer the worker the Rawlsian wage, $w = w^*$, and for any $a_{ij} < a_i^*$, the firm will offer the worker a wage strictly less than the Rawlsian wage, $w < w^*$.²¹

For a graphic depiction of Definition 1 and Lemma 1 see Figure 2.5.²²

Theorem 1 will be the basis for making comparisons between firms with different corporate structures. Let w_{ij} be the optimal wage offer for firm j to make to worker i . Let $e_{ij}(w)$ describe the utility maximizing effort level for worker i for a given wage offer received from firm j . Let $e_{ij} = e_{ij}(w_{ij})$ be the equilibrium effort level for the worker in a contract with firm j . Let $\pi_{ij} = \pi_{ij}(w_{ij}, e_{ij})$ be the profits of firm j from a contract with worker i at the equilibrium effort and wage levels. And let $u_{ij} = u(w_{ij}, e_{ij})$ be the material payoff of worker i from a contract with firm j at the equilibrium effort and wage levels.

Theorem 1. Suppose that the worker's preferences satisfy the standard assumptions of completeness, transitivity and continuity. Suppose that in the domain of advantageous

profitable firms receive higher wage offers in equilibrium. Together, $m_{ij}(\cdot) = p_j(y, c_i^{-1}(\cdot))$ determines the possible gains from trade between the firm and the worker, incorporating both firm and worker characteristics.

²¹ See Appendix 2.1 for proofs.

²² Benjamin(2006) shows that for a sufficient a_{ij} , a fully efficient allocation (u_i, π_j) will be achieved.

inequality the worker regards π_j positively and preferences are homothetic, quasi-convex and satisfy the single-crossing property, and in the domain of disadvantageous inequality, the worker regards π_j non-positively. Finally, suppose that $0 < a_{i1} < a_i^*$ and $a_{i1} < a_{i2}$. Then,

1. $w_{i2} > w_{i1}$
2. (a) For all $w > w_{i1}$, $e_{i2}(w) > e_{i1}(w)$
(b) For all $w \leq w_{i1}$, $e_{i2}(w) = e_{i1}(w)$
3. $e_{i2} > e_{i1}$
4. $\pi_{i2} > \pi_{i1}$
5. $u_{i2} > u_{i1}$
6. $U(u_{i2}, \pi_{i2}; a_{i2}) > U(u_{i1}, \pi_{i1}; a_{i1})$

For a graphic depiction of Theorem 1, see Figure 2.6. Notice that in item 1, the worker *does not* give a higher effort level in firm 2 at low wage levels, $w \leq w_{i1}$.

2.4 Applications

What comparisons can be made using Theorem 1? Before applying the theory to employee ownership we must deal with the fact that the firms we are considering are owned by multiple shareholders rather than one individual. Because the worker is making only one effort decision and the material welfare of all of the shareholders are affected, we will assume that the worker considers the collective welfare of the shareholders rather than the welfare of the shareholders individually. I will also assume

that the worker's attitude toward the firm is the weighted sum of the worker's attitude toward the shareholders.

Employee Ownership vs. Conventional Ownership

Consider a firm that is fully employee owned and a firm that has no employee ownership. As long as $a_{iCOF} < a^*$, a likely proposition, Theorem 1 applies. The employee owned firm is more profitable and pays higher wages than the otherwise identical publicly owned firm.

Large vs. Small Employee Owned Firms

Consider a small, 100% employee owned firm with $n > 0$ workers and a large, 100% employee owned firm with $m*n$ workers. Suppose that the large firm is divided into $m > 1$ offices, with each office identical in size, n , to the small firm, and there is minimal personnel interaction between the offices. Exposure is greater between persons i and j who work in the same office than between persons i and j who work in different offices. The *average* exposure level to fellow employees is smaller in the large firm. Due to greater average exposure to coworkers, $a_{in} > a_{i,m*n}$, where a_{in} is the value of person i 's attitude toward a 100% employee owned firm of size n , and $a_{i,m*n}$ is the value of person i 's attitude toward a 100% employee owned firm of size $m*n$. Consider a third 100% employee owned firm with $p*n$ workers, where $1 < p < m$, and the firm is divided into p offices, each with n workers. Again due to greater *average* exposure to coworkers, we have $a_{ip*n} > a_{i,m*n}$. Does increasing the size of the firm dampen the benefit of employee ownership? If $a_{i,m*n} < a^*$ then yes, the firm loses some of the benefit of employee ownership as size increases. The firm faces a tradeoff between the advantages of growth and the disadvantages of reduced employee effort. If, however, $a_{in} < a^*$, then

the firm will be able to grow, at least up to some level, without losing the productivity advantages of employee ownership.

Partial Employee Ownership

Let q_j be the fraction of the stock, $0 \leq q_j \leq 1$, in firm j that is owned by the employees of that firm.²³ Consider two partially employee owned firms where, $q_2 > q_1$. Due to greater average similarity and exposure to shareholders we would expect the attitude of the firm 2's workers toward the firm will be greater than the attitude of firm 1's workers toward the firm, $a_{i2} > a_{i1}$. As long as $a_{ij} < a^*$, the firm can increase productivity by increasing the number of shares owned by the workers. However, it might be costly for the firm to maintain a high level of employee ownership.²⁴ If so, the firm faces a tradeoff between the increased productivity from employee ownership and the cost of maintaining that ownership structure.²⁵

Family Ownership

Similar results apply to family owned businesses. The model predicts that productivity will decrease as a result of a family business going public. This model may help to explain some of the struggles of businesses that were previously family owned.

²³ Of course, the fully employee owned firm ($q=1$) and the conventionally owned firm ($q=0$) are the extremes.

²⁴ For example, Science Applications International Corporation (SAIC) was the third largest by revenues, 100% employee owned firm in the US until October 2006, when they held a public offering of shares totaling \$1.245 billion. In their SEC filings, SAIC officials stated that, "The principal purpose of this offering is to better enable us to use our cash and cash flows from operations to fund organic growth and growth through acquisitions, as well as to provide us with publicly traded stock that can be used for future acquisitions. Creating a public market for our common stock will ultimately eliminate our use of cash to provide liquidity to our stockholders by repurchasing their shares in the limited market or in other transactions."

²⁵ According to the National Center for employee Ownership, the median percentage ownership for ESOPs in privately owned firms is between 30 and 40%.

2.5 Extensions of the Model

There are several ways in which the behavioral model of employee ownership may be enriched. The first two extensions discussed relate to the robustness of the model. In particular, how robust is the model with regard to the preference structure given to the worker? And how robust is the model with regard to the firm's knowledge of worker preferences? The third extension relates to the emphasis of "corporate culture" in the employee ownership literature. Can the model be expanded to explain the importance of corporate culture to the productivity of employee owned firms?

The model laid out in this chapter relies on worker preferences that have a kink at equality and feature a negative regard for firm profits in the domain of disadvantageous inequality. How would the predictions of the model change if these assumptions were relaxed? Consider a worker who has a positive regard for the firm in the domain of disadvantageous inequality, but retains a kink at equality. In other words, the worker continues to be willing to trade his/her own material payoff for firm profits in the domain of disadvantageous inequality, but *not at the same rate* at which he/she makes the trade in the domain of advantageous inequality. In this case, Theorem 1 may be applied as long as the following condition holds true:

$$-(\partial U/\partial u_i)/(\partial U/\partial \pi_j) \leq m_{ij}'(w - u_i) \text{ for all } (u_i, \pi_j) \text{ such that } u_i = \pi_j,$$

where $-(\partial U/\partial u_i)/(\partial U/\partial \pi_j)$ is the slope of the worker's preferences approaching from above the line of equality. If this condition does not hold, then there will exist wage levels such that the worker will choose an effort level that generates (u_i, π_j) such that $\pi_j > u_i$. When

this occurs, the firm no longer has an incentive to raise its wage in order to generate more effort from the workers. Another way to look at it is that the worker is not punishing the firm for offering a low wage.

In the model described previously in this chapter, the firm knows the preferences of the worker. How would the firm's decision change if there is uncertainty in the worker's preferences? What about a firm that is constrained to offer the same wage to all of its workers? How would firm's wage offer change if a small fraction of its workers displayed selfish rather than inequity averse preferences.

A third extension of the model could help explain the importance of corporate culture in employee owned firms. It could be argued that corporate culture affects the salience of the distinction between in-group workers and out-group non-employee shareholders. This could create a greater effect of employee ownership when the ownership culture is emphasized. While this argument is certainly valid, a model where workers make effort decisions simultaneously may shed more light on the importance of corporate ownership. Consider that the worker's concern for fairness may take into account not only the wage offer of the firm, but also the effort level of other workers. Others workers shirking reduces the total compensation of the worker. In the model described above, one can view other workers shirking as taking away some material payoff from the worker, shifting his/her wage offer (or total compensation) curve to the left. The worker would respond with a reduction in his/her own effort. The model would generate dual equilibria: a) all workers give optimal effort according to their preferences (as in Figure 2.6) and b) all workers give zero effort destroying the benefits of employee

ownership. A positive corporate culture that promotes hard work on the behalf of others would help steer the firm toward the optimal effort equilibrium.

2.6 Discussion

Employee stock ownership plans (ESOPs) in the United States, and similar plans worldwide, are a hot topic for debate because firms that use these plans receive significant tax breaks from the federal government. The model presented here contributes to the debate by providing appealing predictions that are *not* driven by the worker as a residual claimant. The model achieves both of the following: 1) it overcomes the 1/N problem, and 2) the driving force behind the model is in harmony with antidotal evidence on employee ownership.

So why have more firms not voluntarily adopted employee ownership? Becker (2007) writes that if "employee ownership is said to induce employees to work harder... owners would not need a tax advantage to create a sizable employee ownership since they would subsidize stock ownership by employees in order to improve productivity." The behavioral model of ownership structure brings a new element to this debate. Consider the possible transaction of an owner selling/giving a number of shares of the firm to worker X. The social benefit of worker X's stock ownership is derived from the increased productivity of *other* workers in the firm. However, only a fraction of the increased revenue goes to the firm as profits. The remaining fraction of the revenue goes to other workers in the form of higher wages.²⁶ Therefore, only part of the total social

²⁶ The firm must pay higher wages because according to the model, higher productivity does not happen automatically. A worker will increase her effort only after the firm has increased her wage.

benefit of worker X's stock ownership is enjoyed by those involved in the transaction. The other portion of the social benefit is an externality enjoyed by the other workers in the firm. This externality forces a wedge between the Pareto optimal level of stock ownership by worker X and the socially optimal level of stock ownership. Market failure will occur when there is a social benefit to employee ownership, but the firm's benefit of is smaller than the difference between the market value of firm stock and the employee's value of firm stock. Clearly, no market failure would exist if the firm's benefit of employee ownership is so large that it would gain by giving stock to its employees at a price of zero. Thus, if the government deems that one of its functions is to promote socially efficient outcomes, and believes that there is a market failure as described above, then it is justified in providing tax incentives for employee ownership.

One might argue that if an externality wedge is preventing an agreement that reaches the socially efficient outcome, then the workers' union should be able to negotiate a price at which workers would purchase shares from the firm. After all, the entirety of the social benefit is enjoyed by the aggregate of the workers and the owners of the firm. However, there are two reasons why the union would be unlikely to accept this deal. First, some firms may not have unions if workers are unable to organize for various reasons. Second, and more importantly, the deal would necessarily involve a mandate that workers purchase a certain quantity of stock at a particular price. Furthermore, the price would be below the worker's value of the stock. This plan would seem to be a hard sell to the workers despite the benefits that all parties would enjoy in the end.

The general equilibrium consequences of the employee ownership model presented here are ambiguous with respect to employment. Classic efficiency wage

models predict equilibrium unemployment as a result of increasing wages.²⁷ While the employee ownership model considered here also involves “above equilibrium” wages, the above equilibrium portion of the statement refers to an economy of non-employee owned firms. The shift to employee ownership increases the productivity of the workers. In the standard supply and demand model, where the firm’s demand curve reflects the marginal revenue productivity of its workers, employee ownership causes an outward shift in demand. The increase in demand may or may not fully offset the wage increase in terms of whether or not full employment is reached.

Let’s also consider how paying above equilibrium wages might affect employee owned firms in a mixed economy with both employee-owned and non-employee-owned firms. In this case, the employee owned firms would have first pick of workers, and would hire those workers who are inherently most productive (e.g. due to ability). Therefore, any observed effect of employee ownership on productivity in a mixed economy would include both the pure employee ownership effect and the effect of higher wages through attracting better workers.

The next chapter examines experimental evidence on the behavioral model of employee ownership. In particular, the assumptions on worker preferences in an in-group environment will be tested against subject behavior in an out-group environment. Further, the experiment will test subject behavior in a gift-exchange game that mirrors the model described above. Observed behavior of workers in the in-group and out-group environments will be compared to the predictions of the model.

²⁷ See Shapiro & Stiglitz (1984).

Chapter 3: A Laboratory Experiment on In-Group Bias in Trusting Behavior and Preferences for Giving

3.1 Introduction

Would you trust a stranger on the street as much as your own brother or sister? Who would you be more likely to help in a time of need? For most people, the answers to these questions are obvious, yet, economic theories of other-regarding (social) behavior fail to consider the relationship between the individual and the “other.”²⁸ The extent to which the relationship between agents may affect economic outcomes is unknown – in fact, it is the goal of this paper to shed some light on this unknown. However, the *potential* for relationships to have real economic consequences occurs any time behavioral motives (fairness, altruism, etc.) influence an agent’s decision making.

Consider the labor relationship. It is well known that family-owned businesses struggle when they move away from the family-ownership model. Perhaps the change in the relationship between employees and owner affects the productivity of the workers. Similarly, should employee-owned firms be viewed differently from firms with conventional ownership structures? Surely, the relationship between employees and owners is different. Team performance based pay schemes, such as team bonuses, allow the benefit of a worker’s effort to go to fellow team members rather than unknown owners of the firm. Do these schemes utilize the relationship between team members to improve economic outcomes, namely the productivity of the firm?

²⁸ For theories of other-regarding behavior see Rabin (1993), Fehr and Schmidt (1999), Bolton and Ockenfels (2000), Dufwenberg and Kirchsteiger (2004), and Cox et. al. (2007).

There are two primary reasons to test the Chapter 2 model using experimental rather than naturally occurring data. First, empirical tests of the effects of employee ownership are subject to endogeneity problems. As discussed in Chapter 1, firms differentially select into employee ownership plans, often as part of a larger restructuring effort. Second, there are general equilibrium effects on the productivity of employee-owned firms in an economy with both employee-owned and non-employee-owned firms. By paying higher wages, employee-owned firms attract better workers and increase productivity. Yet, this increase in productivity is not inherent in employee ownership. An experiment allows for a test of the employee ownership model in a vacuum, free from endogeneity and general equilibrium concerns.

The experiment reported below reveals that the impact of relationships on decision making is more complex than might be expected. Perhaps one's prior might be that individuals are willing to give more to members of their own group than to outsiders. I find in-group bias in giving behavior, but only when the price of giving was high – that is, when the gift from player 1 was multiplied by a number *less than one* before it was received by player 2.²⁹ When the price of giving was one (no multiplier) there was some evidence of in-group bias, and there was no evidence of in-group bias when the price of giving was lower than one. Together these results suggest that individuals place more importance on equality within their group than with outsiders.

In-group bias was observed in trusting behavior, but not reciprocal behavior. These results together are particularly surprising because a lack of in-group bias in

²⁹ In-group bias means that individuals favor members of their own group over outsiders. In-group bias as it relates to giving, trusting and reciprocal behavior will be discussed further along with the experimental design.

reciprocal behavior implies that subjects were *not* justified in trusting their own group members more than outsiders. In other words, group members were more *trusting* of each other than of outsiders, but they were not more *trustworthy* toward each other than toward outsiders.

One difficulty in testing for in-group bias is attempting to also satisfy the desire for anonymity among subjects. Experimental economists often insist on anonymity in order to avoid confounding explanations for behavior such as the anticipation of future reciprocal action outside the laboratory. I address the issue of in-group bias while maintaining anonymity, by recruiting subjects into treatments based on pre-existing groups. Subjects in the experiment did not know the identity of the other person who was affected by their decision, but knew that that person was one of the other subjects in the laboratory. Groups were used in order to keep relatively constant the relationship between any two subjects in the session. Treatment 1 consisted of two sessions involving subjects recruited exclusively from the Hearing and Speech Sciences department and the Physics department, respectively, while treatment 2 consisted of three sessions involving subjects recruited from a variety of departments. Undergraduate majors were chosen as groups for the experiment for two reasons. First, because relationships among members are relatively innocuous compared to other groups such as family groups, ethnic groups and religious groups, any results found in this experiment could arguably be viewed as a “lower-bound” on in-group bias. Second, sorting into majors occurs based on academic

interest and not based on preferences for other group members.³⁰ Therefore, reverse causality will not be an issue in interpreting the results.

3.2 Literature

Several recent papers have explored the effects of group membership and identity in economic games. Eckel and Grossman (2005) create team identity in the laboratory by having subjects participate in a group task. When subjects are then asked to play a repeated public goods game, the authors find that artificially created team identity increases cooperation. Chen and Li (2009) also utilize an artificially created team identity design. Across a number of games, they find that subjects are more altruistic toward an in-group match than toward an out-group match. Chen and Li provide a thorough review of the social identity literature in the fields of social psychology and experimental economics. Klor and Shayo (2008) study how social identity influences preferences for redistribution in a game where subjects vote on a tax regime. Subjects in the experiment tended to vote for regimes that benefited their group the most whether or not it was optimal for the individual subject. As part of a larger study on inter-generational exchanges, Hamoudi and Thomas (2006) conduct a dictator game with participants in Mexico. The authors find that subjects are equally generous toward strangers as they are toward neighbors.

³⁰ As a contrast, consider fraternities, where group membership is determined based on preferences for other individuals.

3.3 Experimental Design

The experiment reported here was conducted in five sessions at the University of Maryland in February of 2008. Undergraduate subjects were recruited from the Hearing and Speech Sciences department and the Physics department for sessions 1 and 2, respectively, and were recruited from various departments for sessions 3, 4 and 5. Subjects were informed during recruitment that sessions 1 and 2 were restricted to undergraduate Hearing and Speech and Physics (HESP) majors, respectively, and sessions 3-5 were open to all undergraduates at the University of Maryland. Session 1 consisted of 15 subjects, while sessions 2-5 held 20 subjects. No more than five subjects from a single undergraduate major participated in a particular session of the out-group treatment (sessions 3-5). Notably, all of the subjects in session 1 (HESP majors) were female, while 17 out of 20 subjects in session 2 (physics majors) were male. Sessions 3-5 each contained between eight and ten females. Other individual characteristics were similar across treatment and majors. See Table 3.1 for details of the subject pool composition.

The experimental design utilizes pre-existing, rather than artificially constructed, groups to test for in-group bias in preferences for giving and trusting behavior.³¹ Procedures and instructions in the laboratory were identical across all sessions with a few minor exceptions to accommodate an odd number of subjects in session 1. Full instructions are given in the appendix.

³¹ To some extent a “group” is constructed when subjects are brought together in an experimental laboratory and asked to participate in a common task. Any group effect that was created in the laboratory is presumed to be identical across treatments and therefore should not affect the results of the experiment.

In each session, subjects participated in two games, the first of which was a modified dictator game introduced by Andreoni and Miller (2002). The modified dictator game was chosen because it directly measures an individual's preferences for giving. Subjects were presented a menu of linear budget sets, $\pi_s + p\pi_o = m$, which varied in endowment, m , and the price of giving, p , and where π_s and π_o are the monetary payoff to one's *self* and an *other* subject, respectively. The set of choice problems presented to subjects allows for the possibility that in-group bias affects preferences for giving differentially across different value of p . Additionally, Andreoni and Miller (2002) were able to identify three clusters of individual preferences, selfish, Leontief and perfect substitutes, which will be defined later. To the extent that an individual's giving behavior may be characterized by different utility functions under different circumstances (different "*others*"), the experimental design permits an examination of in-group bias in the formation of preference structures.

Upon entering the laboratory subjects were seated at computer stations with screen guards and were asked to remain quiet during the experiment.³² Instructions were read aloud by the experimenter while subject read along on their monitors. In random order, subjects were presented eleven allocation choices listed in Table 3.2. An example of a decision screen is given in Figure 3.1a. In the example, tokens held are worth 1 point and tokens passed are worth 2 points. After the allocation choice was entered, subjects were presented the outcome of their decision, as in Figure 3.1b. The subject has chosen to hold 50 tokens and pass 10 tokens. The subject earns $50 * 1 = 50$ points for the

³² The experiment was programmed and conducted with the software z-Tree (Fischbacher 2007).

round, and the recipient earns $10 * 2 = 20$ points. Points were converted to dollar earnings as a rate of \$0.06 per point.³³

After all subjects had made their decisions, subjects were randomly paired and *one* decision from each pair was randomly chosen to be executed.³⁴ The results from the modified dictator game were not presented to the subjects until the conclusion of the session. Therefore, subjects did not learn of their profits in the first game, until after they participated in the gift-exchange game.

The gift-exchange game reveals both trusting and reciprocal preferences. The action of the first player indicates their level of trust in the other player, and the action of the second player indicates their desire to reciprocate a positive or negative act. The profit functions of the gift-exchange game involved a pure lump-sum price transfer similar in spirit to sessions S13-S16 of Fehr et al (1997):

$$u = p - c$$

$$\pi = q(c) - p$$

Lower case u is the payoff of the seller which is determined by price, p , chosen by the buyer and cost, c , chosen by the seller.³⁵ The profits of the buyer, π , are defined by a commonly known, concave function of cost, $q(c)$, and price, p . The buyer chooses price first and the seller chooses cost after observing the price offer of the buyer. The choice of price across treatments will constitute a test for in-group bias in the trust of buyers.

³³ Five tasks of a different nature were presented to subjects following the 11 rounds described above. Results from the additional tasks do not appear in this paper.

³⁴ This procedure differs from previous experiments. In Andreoni and Miller (2002) each subject was both a dictator and a recipient, whereas in this experiment a subject was either a dictator or a recipient.

³⁵ Traditionally, the gift-exchange game is presented as an employer-employee interaction in the literature while presented as a buyer-seller interaction in the laboratory. For simplicity, I present the game as a buyer-seller interaction here as in the lab.

Likewise, the cost response function of sellers, $c(p)$, will allow for the observation of in-group bias in reciprocal behavior.

During the instructions to the gift-exchange game, subjects were randomly selected to be either a buyer or seller. The game was presented to the subjects as a three step procedure in which the seller sells a good to the buyer. In stage 1, the buyer chose an integer price between 0 and 25, inclusive, see Figure 3.2a. In stage 2, the price was displayed to the seller and then the seller chose an integer cost between 0 and 20, inclusive, see Figure 3.2b. The cost chosen determined the quality of the good according to a discrete approximation of the function $q(c) = 50 - 250/(c+5)$, presented to the subjects in table form.³⁶ In stage 3, the price, cost and quality were displayed to both the buyer and the seller along with the buyer's profit and the seller's profit; see Figures 3.2c and 3.2d.

In the example given in figure 3.2, the buyer chose a price of 12 and the seller chose a cost of 3. The cost of 3 translated into a quality of 18.8. Therefore, the seller earned $12 - 3 = 9$ points in the round, while the buyer earned $18.8 - 12 = 6.8$ points. Suppose instead that the seller had chosen a cost of 0. A cost of 0 translates into a quality of 0, which would result in a profit of $0 - 12 = -12$ points for the buyer. Thus, the buyer is displaying trust in the seller when choosing a high price.

The game was repeated ten times in sessions 2-5 and eight times in session 1. A subject maintained the same role (buyer or seller) for all rounds and was never paired with the same subject twice. All pairings were anonymous.

³⁶ See Figure 3.2 for the cost-quality table presented to the subjects.

At the end of the scheduled number of rounds, one round was randomly selected to be executed. Points earned in the selected round were worth \$0.30. Subjects were informed during the instructions for the gift-exchange game that they would receive a show-up fee of \$18.00 for participating in the experiment, but that it was possible to make negative profits in the gift-exchange game. In the case of negative profits, that value was subtracted from the subject's show-up fee. Sessions lasted between 80 and 90 minutes and subjects earned between \$14.10 and \$31.20 in the experiment, with average earnings of \$21.90.

The session concluded with a questionnaire which asked for personal information about the subject, as well as information about the subject's familiarity with, friendliness with, and attitude toward the other subjects in the session.

Groups

University students are likely to identify as both a member of the university in which they attend, and a member of the undergraduate population of the department in which they major. If students have an in-group bias toward each group, then the results of this experiment measure the difference between the physics (HESP) students' in-group bias toward other physics (HESP) students and their in-group bias toward other University of Maryland students in general. We would expect the undergraduate major bias to be larger than the university bias due to higher levels of similarity and exposure

within undergraduate majors and possibly a greater sense of group identity within majors as well.³⁷

According to the University of Maryland, there were 240 undergraduate physics majors and 151 undergraduate HESP majors registered during the Spring 2008 semester compared with 25,370 total undergraduates.³⁸ In-group subjects are likely to be more similar to one another than out-group subjects due to their shared academic and career interests. In-groups subjects were also more similar to one another in terms of gender (see Table 3.1). Questionnaire data show that in-group subjects were more familiar with their fellow session participants than the out-group subjects. Participants in the in-group (out-group) treatment reported that, on average, approximately 10 (2) of the other 19 subjects in their session were at least “vaguely familiar” to them.³⁹ The difference in reported other-subject familiarity between the treatments is statistically significant at the 1% level.

Loewenstein et. al. (1989) reveals a link between an individual's attitude toward another and the individual's regard for the other's well-being. This paper does not directly address the mode through which group membership biases preferences for giving and trusting behavior, however, data are consistent with attitude as a possible avenue. On average, subjects in the in-group (out-group) treatment described their attitude toward approximately 6 (2) of the other 19 subjects in their session as at least “somewhat

³⁷ The degree to which subjects identify themselves as a University of Maryland undergraduate or a physics or HESP major was not addressed in the questionnaire.

³⁸ This data is publicly available through the University of Maryland's Institutional Research Planning & Assessment at <https://www.irpa.umd.edu/Enroll/ebm-200801.pdf>.

³⁹ The familiarity data is reported after normalizing the responses of session 1 subjects to reflect a session involving 20 subjects (rather than 15).

positive.”⁴⁰ The difference in reported attitude toward other subjects between the treatments is statistically significant at the 1% level.

3.4 Predictions

This section lays out the experimental predictions generated by the model in chapter 2. First, the model assumes the single crossing property; that in-group agents will have preferences in favor of the other agent relative to out-group agents in the domain of advantageous inequality. In the modified dictator game, this means that the in-group subjects will pass more tokens than out-group subjects, particularly when the price of giving is high. A subject who values equality will pass more tokens when the price of giving is high. Therefore, the difference between the selfish action and the “fair” (equality-seeking) action is largest when the price of giving is high.

Prediction 1: In-group subjects will pass more tokens in the dictator game, particularly in rounds where the price of giving is high.

Chapter 2 models a game involving a profit maximizing firm and an inequity averse worker, whereas the experiment described here involves only laboratory subjects, who routinely display behavior that is inconsistent with revenue maximization. Therefore, the predictions tested here will all concern the behavior of the employee/seller,

⁴⁰ As with the familiarity data, the attitudinal data is reported after normalizing the responses of session 1 subjects to reflect a session involving 20 subjects.

and not the behavior of the buyer.⁴¹ Still, we can ask what a profit maximizing firm would do given the actions of the employees/sellers. All of the following predictions come from Theorem 1 of Chapter 2 and are tied together because all relate to the choice of the seller.

Prediction 2: At all prices above some threshold price level, sellers in the in-group treatment will choose a higher cost for a given wage than sellers in the out-group treatment, on average.

Prediction 3: Given the behavior of the sellers, the profit maximizing price level will be higher for buyers in the in-group treatment than buyers in the out-group treatment.

Prediction 4: The cost level chosen by in-group sellers who receive the in-group profit maximizing price will be higher, on average, than the cost level chosen by out-group sellers who receive the out-group profit maximizing price.

Prediction 5: The profits of a buyer who offers the in-group profit maximizing price to in-group sellers will be higher, on average, than the profits of a buyer who offers the out-group profit maximizing price to out-group sellers.

Prediction 6: The profits (material payoff) of an in-group seller who receives the in-group profit maximizing price will be higher, on average, than the profits of an out-group seller who receives the out-group profit maximizing price.

Note that if Prediction 2 fails, then Predictions 3-6 are likely to fail as well. Also regarding Prediction 2, we should expect to see that, at all price below the threshold price

⁴¹ The behavior of the in-group and out-group buyers in the experiment will be analyzed in the following section, notwithstanding the absence of buyer behavior predictions generated from the Chapter 2 model.

level, both the in-group sellers and the out-group sellers give the Rawlsian predicted cost level. The Rawlsian predicted cost level is the choice that comes closest to equalizing the payoffs for the buyer and seller.

3.5 Results

This section presents tests for in-groups bias in five distinct outcomes: giving in standard dictator game (price of giving is 1); giving across all dictator games; individual preference types; trusting behavior in the gift-exchange game; and reciprocal behavior in the gift-exchange game.

Giving in Standard Dictator Games

In the standard dictator games, subjects gave away, on average 33.2% of their tokens. This number is considerably high relative to previous studies where the average fraction of the pie given to others is typically between 20% and 25%. A breakdown of subject generosity by treatment and area of study at the bottom of Table 3.1 sheds light on the discrepancy. Science and humanities majors have been grouped for two reasons. First, there were only seven subjects with humanities majors in the experiment, and second the giving rates of science and humanities majors are similar (36.9% and 35.4%, respectively, in games where the price of giving is 1). Notice that out-group subjects majoring in the social sciences are the only group to display a giving rate, 24.6%, that is similar to previous studies.

A t-test shows that the difference in means between the in-group fraction tokens passed (37.4%) and out-group fraction tokens passed (30.8%) is not statistically

significant ($p = 0.11$). Table 3.3 presents a linear regression on tokens passed controlling for endowment. The treatment effect is not statistically significant. The difference in giving rates between social science and non-social science majors is large (7-8 tokens) and statistically significant (at the 5% level before controlling for gender and 10% level after controlling for gender).⁴² Because there were no male, Hearing and Speech majors in Session 1, the in-group effect in Table 3.3 is identified by social science females, non-social science females, and non-social science males, but not by social science males.⁴³

To give a better sense of the differences between in-group and out-group giving, Figure 3.3 presents the cumulative distribution of the average fraction of tokens passed by treatment from the three allocation choices where the price of giving is one. A Wilcoxin rank-sum test does not reject the hypothesis that the in-group and out-group choices came from the same underlying distribution ($p = 0.28$). Both the in-group and out-group distributions have a focal point at 50%, a common finding for the dictator game. Approximately 38% of subjects in each treatment gave away half of their tokens. Perhaps in-group bias is not detected in the full sample because a 50-50 split acts as an upper bound on generosity for some subjects. After eliminating subjects that give 50% (or more) of their tokens, a Wilcoxin rank-sum test shows that the in-group and out-group distributions are statistically different at the 5% level ($p = 0.02$). Using a probit regression, the difference in percentage of in-group subjects that give zero tokens (5.7%)

⁴² Fehr and Schmidt (2004) also find significant differences in other-regarding behavior between subject pools recruited from different disciplines.

⁴³ Likewise, the gender effect is identified by in-group non-social science majors, out-group non-social science majors, and out-group social science majors, but not in-group social science majors. The social science effect is identified by in-group females, out-group females, and out-group males, but not in-group males.

and out-group subjects that give zero tokens (18.3%) is statistically significant at the 10% level.

Giving Across All Budget Sets

The relationship between in-group and out-group levels of giving is not constant across price levels. In-group subject gave slightly, but not statistically significantly, *less* than out-group subjects when the price of giving was *low*, but gave substantially *more* when the price of giving was *high*. The difference between in-group and out-group giving when the price of giving was 2, 3 and 4 is statistically significant at the 5%, 5% and 1% level, respectively. Why do in-group subjects give more when the price of giving is high? It appears that in-group subjects favor payoff equality more so than out-group subjects. Figure 3.4 gives a graphical depiction of the percentage tokens passed by treatment across different price levels. In addition, the choices produced by three common utility functions are overlaid on the graph. These three preference types, $U(\pi_s, \pi_o) = \pi_s$ (Selfish), $U(\pi_s, \pi_o) = \min\{\pi_s, \pi_o\}$ (Leontief), and $U(\pi_s, \pi_o) = \pi_s + \pi_o$ (Perfect Substitutes) will be discussed further in the following subsection. The choices of in-group subjects tend more toward Leontief preferences relative to the choices of out-group subjects.

The regression results in Table 3.4 again show that in-group subjects reacted differently to the price changes than did out-group subjects. When the price of giving doubled, out-group subjects *decreased* their rate of giving by 1.4 tokens, on average, while the same price change caused in-group subjects to *increase* their rate of giving by

an average of 3.4 tokens. The difference in price elasticity is significant at the 1% level.⁴⁴

Regressors were added to the price elasticity regression to control for population effects. Notice that the coefficient representing the difference in the price elasticity of giving between in-group and out-group subjects remains quite constant under different specifications of the regression equation, suggesting that the result is robust.

Again, we observe the generosity of science and humanities majors across all price levels relative to social science majors. Over all allocation choices, non-social science majors gave an average of 5 or 6 more tokens than social science majors.

Also of note is that the coefficients on Female and Log Price * Female are both negative, though not statistically significant after controlling for academic discipline. In this data, females give less, on average, than males, and have a lower price elasticity of giving than males. These results do not support the findings of Andreoni and Vesterlund (2001) who observe that females are more altruistic at high prices of giving, while males are more altruistic at low prices of giving.

Behavioral Clusters/Preference Types

Andreoni and Miller (2002) identify clustering of behavior around the previously mentioned utility functions, $U(\pi_s, \pi_o) = \pi_s$ (Selfish), $U(\pi_s, \pi_o) = \min\{\pi_s, \pi_o\}$ (Leontief), and $U(\pi_s, \pi_o) = \pi_s + \pi_o$ (Perfect Substitutes). Collectively, these utility functions account

⁴⁴ The term ‘elasticity’ is used loosely. In this data, there are many instances where Tokens Passed was observed to be zero, rendering a true elasticity regression difficult. The regression aims to measure the sensitivity of giving to changes in price, and so the term elasticity fits, at least in spirit.

for the behavior of 19 subjects (20%) in the present experiment.⁴⁵ Following the literature, subjects whose behavior does not fit into precisely into one of the three preference types are classified as weak selfish, weak Leontief or weak perfect substitutes, based on the Euclidean distance between the subjects' observed behavior and the behavior that would result from each of the three utility functions stated above.

Figure 3.5 illustrates the type classifications that would occur if choices under budgets 3 and 4 only were considered. The x-axis measures tokens passed under budget 4, while the y-axis measures tokens passed under budget 3. A subject with Leontief preferences would pass 20 tokens when faced with budget 4 and 40 tokens when faced with budget 3. A subject with Perfect Substitutes preferences would pass 60 tokens when faced with budget 4 and zero tokens when faced with budget 3. Of course a Selfish subject would pass zero tokens in either case. In Figure 3.5, bubble sizes represent frequencies of actual couplets of choices by subjects in the experiment.

The preference types represented by out-group and in-group subjects are displayed in Figures 3.6a and 3.6b. In-group subjects are more likely to display Leontief preferences than out-group subjects, see Table 3.5. This result holds, at the 10% significance level, after controlling for academic interest and gender effects. Also, note that science and humanities students are more likely than social science students to exhibit Leontief preferences, significant at the 5% level.

⁴⁵ Five subjects were perfectly selfish, 13 subjects displayed Leontief preferences, and one subject displayed perfect substitutes preferences. Andreoni and Miller (2002) report 43% of subjects fit neatly into one of the three preference types described above, whereas Fisman et. al. (2007) report that 31.6% of subjects exactly fit one of the preference types. Fisman et. al. (2007) and this experiment share the characteristic that subjects entered decisions *sequentially* on a computer, while Andreoni and Miller (2002) used pencil and paper and asked subjects to submit all decisions *simultaneously*. This procedural discrepancy may account for the difference in percentage of subjects that exactly matched a preference type.

The result that in-group subjects are more likely to display Leontief preferences is consistent with the inequity aversion preferences used for the worker in Chapter 2's model of employee ownership. To see this connection, consider Figures 3.7a and 3.7b. Figure 3.7a contains the interpersonal budget constraint that corresponds to budget 4 of the dictator game. The subject can keep all 60 tokens and receive a payoff of 60, give all 60 away, in which case the recipient gets a payoff of 120, or choose to pass some tokens and keep some. The green lines represent indifference curves for an in-group subject, while the red lines represent indifference curves for an out-group subject. In this case, both the in-group and out-group subjects choose to pass 20 tokens. The indifference curves used in Figure 3.7b are identical in slope to the corresponding indifference curves in Figure 3.7a. However, in Figure 3.7b (budget 3) the in-group subject passes 25 tokens, while the out-group subject passes only 4. Two results from the experiment are reflected in this example. First, the in-group subject is classified as displaying Leontief preferences (see the point (20, 25) on Figure 3.5), while the out-group subject is classified as displaying selfish preferences (see the point (20, 4) on Figure 3.5). Second, at low prices of giving, budget 4, the in-group and out-group subjects display similar giving rates, while at high prices of giving, budget 3, the in-group subject gives considerably more than the out-group subject.

Trusting and Reciprocal Behavior in the Gift-Exchange Game

The backward induction Nash equilibrium of the gift-exchange game consists of a zero price offer by the buyer and a zero cost offer by the seller. As in the dictator game, deviations from the Nash equilibrium occur with regularity in laboratory experiments. A

high price offer by the buyer indicates a high level of trust that the seller will respond with a generous cost/quality. Similarly, a high cost choice by the seller indicates a propensity to reciprocate a generous action.

How does in-group bias affect trusting and reciprocal behavior in a gift-exchange game? The average price offered by buyers from the in-group treatment (10.6) is about 64% higher than the average price offered by buyers from the out-group treatment (6.5), see Table 3.6. The difference in price offers is statistically significant at the 5% level and holds after controlling for academic interest and gender. Figure 3.8 gives the cumulative distribution of price offers for both in-group buyers and out-group buyers. Notice that 33.7% of out-group buyers offered a price of 0, while only 11.5% of in-group buyers offered a price of zero. The difference is significant at the 5% level using a logit regression.

Is in-group bias in trusting behavior constant over time or do in-group and out-group trust levels converge? Figure 3.9 charts the average price chosen by buyers over the ten rounds for each treatment. In-group trust remains relatively constant over time, while out-group price levels trend downward before flattening out. Perhaps out-group buyers interpret negative actions by sellers more strongly than in-group buyers do. Certainly, the trust levels of in-group and out-group buyers do *not* seem to converge, a fact that is surprising given the actions of in-group versus out-group sellers that we are going to consider shortly.

Previous studies on gift-exchange games have reported a strong correlation between the price offered by the buyer and the cost level of the seller. This experiment was no exception. Among all sellers, a one point increase in price was associated with

an increase in cost by an average of 0.21, a statistic that is significant at the 1% level with clustering over subject ID (see the first column of Table 3.7). The quality of the good increased by an average of 0.936 points for every one point increase in the price, also significant at the 1% level. However, because quality increased by less than price, on average, a one point increase in price is associated with a (slight and not statistically significant) *decrease* in profit for the buyer.

One might conjecture that in-group buyers are more trusting (offer higher prices) than out-group buyers because in-group sellers tend to reciprocate with higher cost. Surprisingly, this conjecture is not supported by the data.⁴⁶ Figure 3.10 shows the average cost of sellers by treatment for five different ranges of price offers. Notice that there is no trend in terms of which treatment offers the higher cost levels. The only statistically significant difference in cost levels is the second set of bars where the price offer is between 5 and 9 points, inclusive. Figure 3.11 demonstrates the similarity between cost responses of in-group and out-group sellers at the median. Regression results confirm that, on average, in-group subjects neither give more cost for a given price than out-group subjects, nor change their cost at a different rate than out-groups subjects when the price offer changes (see Table 3.7 again).⁴⁷

⁴⁶ Without considering price, the average cost given by in-group sellers (2.74) is statistically significantly larger than the average cost of out-group sellers (1.92) at the 10% level. However, this discrepancy appears to be due entirely to the higher price offered by in-group buyers.

⁴⁷ Interestingly, female subjects give more cost in general than male subjects, but their cost is less dependent on the price offered by the buyer. Both results are statistically significant at the 5% level.

3.6 Discussion and Conclusions

The results from the gift-exchange game leave two puzzles. First, why are in-group buyers more trusting than out-group buyers? Their behavior is not justified by the behavior of the sellers. One wonders whether this is an anomaly or whether it is representative of a broader phenomenon. Do people systematically misjudge whom they should trust?

Second, why are in-group sellers no more or less generous than out-group sellers? Particularly in light of the dictator game results, it is hard to reconcile the fact that there is no in-group bias in the actions of sellers. The following insights could help explain the discrepancy. Perhaps the action of the buyer in the gift-exchange game “crowds out” in-group effects. Due to the reciprocal nature of the gift-exchange game, the action of the buyer changes the relationship between the buyer and the seller, before the seller makes his/her decision. The buyer’s action would conceivably crowd out in-group effects when the in-group bias is weak. In fact, academic major could be considered a weak grouping relative to other groups where members have more interaction with one another.

Subjects in the experiment appear to value equality more in transactions with members of their own group than in transactions with outsiders, and are more trusting of members of their own group. Yet, out-group and in-group subjects display an equal level of trustworthiness in a reciprocal environment. More experimental research is necessary to understand how relationships and groups affect behavior in different economic situations. Future theoretical work should take into account the relationship between persons when describing the other-regarding preferences of an individual.

Appendices

Appendix 2.1 – Proofs

Proposition 1. *Given $m_{ij}(\cdot)$, there exists a maximum feasible π_j along the line of equality.*

More formally, there exists a π_j^ such that $\pi_j^* > \pi_j$ for all π_j that satisfy $\pi_j(w, e) = m_{ij}(w - u_i) - w$ and $u_i = \pi_j$. In addition, $\partial m_{ij} / \partial u_i = -1$ at $(u_i, \pi_j) = (\pi_j^*, \pi_j^*)$.*

Proof. We know that the function $\pi_j(w, e) = m_{ij}(w - u_i) - w$ is concave and downward sloping with respect to u_i , and $\lim_{u \rightarrow -\infty} \pi^2(\cdot) = 0$ and $\lim_{u \rightarrow \infty} \pi^2(\cdot) = \infty$ due to the assumptions on $c(\cdot)$, $y(\cdot)$ and $p(\cdot)$. Therefore, there exists a maximum of the expression $u_i + \pi_j$. The maximum π_j conditional on $u_i = \pi_j$ is half of the maximum of $u_i + \pi_j$. Furthermore, $\partial m_{ij} / \partial u_i = -1$ at $(u_i, \pi_j) = (\pi_j^*, \pi_j^*)$ because $(u_i, \pi_j) = (\pi_j^*, \pi_j^*)$ maximizes $u_i + \pi_j$.

Lemma 1. *Given $m_{ij}(\cdot)$ and $U_i(u_i, \pi_j; a_{ij})$, there exists an a_i^* , such that for any $a_{ij} \geq a_i^*$, the profit maximizing firm will offer the worker the Rawlsian wage, $w = w^*$, and for any $a_{ij} < a_i^*$, the firm will offer the worker a wage strictly less than the Rawlsian wage, $w < w^*$.*

Proof. The worker with pure Rawlsian preferences, $U_i = \min(u_i, \pi_j)$, will always choose a point along the line of equity given that $\pi_j(w, e) = m_{ij}(w - u_i) - w$ is downward sloping. Therefore, the Rawlsian wage, w^* , is the wage that generates the maximum feasible profit along the line of equity, π_j^* . The attitude level a_i^* is that which satisfies the

following: $-(\partial U/\partial u_i)/(\partial U/\partial \pi_j) = m_{ij}'(w - u_i)$ at the effort level that generates $(u_i, \pi_j) = (\pi_j^*, \pi_j^*)$.

- 1) For $a_{ij} \geq a_i^*$, the profit maximizing firm will offer the worker the Rawlsian wage, $w = w^*$, because w^* ensures a corner solution, $-(\partial U/\partial u_i)/(\partial U/\partial \pi_j) > m_{ij}'(w - u_i)$, involving the maximum feasible profit, π_j^* .
- 2) For any $a_{ij} < a_i^*$, $-(\partial U/\partial u_i)/(\partial U/\partial \pi_j) > m_{ij}'(w - u_i) = -1$ at the point $(u_i, \pi_j) = (\pi_j^*, \pi_j^*)$. The tangency condition ensures that the worker will choose an effort level such that $-(\partial U/\partial u_i)/(\partial U/\partial \pi_j) = m_{ij}'(w - u_i) < -1$ and away from the line of equity. Consider a drop in wage by one unit. There direct increase in profit by one unit and an indirect effect on profit due to a decrease in effort by the worker. The wage drop decreases u_i by one unit at the worker's original effort level, causing the worker to readjust her effort level to maximize U_i . Because the worker, at the margin, is trading one unit of u_i for less than one unit of π_j , the indirect profit loss from lowering the wage is smaller than the direct gain. The firm's profit maximizing wage is less than w^* .

Proposition 2. For all $m_{ij}(\cdot)$ and $U_i(u_i, \pi_j; a_{ij})$ where $a_{ij} \leq a_i^*$, the firm will choose the wage, w_{ij} , that satisfies the following: at the wage and effort level that generates $u_i = \pi_j$, $-(\partial U/\partial u_i)/(\partial U/\partial \pi_j) = m_{ij}'(w - u_i)$.

Proof. Suppose the firm chooses a wage less than w_{ij} . The effort level chosen by the worker will generate a corner solution along the line of equity with lower profits than the profit generated by w_{ij} . Suppose the firm chooses a wage greater than w_{ij} . –

$(\partial U/\partial u_i)/(\partial U/\partial \pi_j) = m_{ij}'(w - u_i) < -1$ since $a_{ij} \leq a_i^*$. Therefore, the profits generated by $w > w_{ij}$ will be less than the profits generated by w_{ij} because the direct profit loss due to raising the wage is larger than the indirect profit gain generated by higher effort.

Theorem 1. *Suppose that the worker's preferences satisfy the standard assumptions of completeness, transitivity and continuity. Suppose that in the domain of advantageous inequality the worker regards π_j positively and preferences are homothetic, quasi-convex and satisfy the single-crossing property, and in the domain of disadvantageous inequality, the worker regards π_j non-positively. Finally, suppose that $0 < a_{i1} < a_i^*$ and $a_{i1} < a_{i2}$. Then,*

1. $w_{i2} > w_{i1}$
2. (a) For all $w > w_{i1}$, $e_{i2}(w) > e_{i1}(w)$
 (b) For all $w \leq w_{i1}$, $e_{i2}(w) = e_{i1}(w)$
3. $e_{i2} > e_{i1}$
4. $\pi_{i2} > \pi_{i1}$
5. $u_{i2} > u_{i1}$
6. $U(u_{i2}, \pi_{i2}; a_{i2}) > U(u_{i1}, \pi_{i1}; a_{i1})$

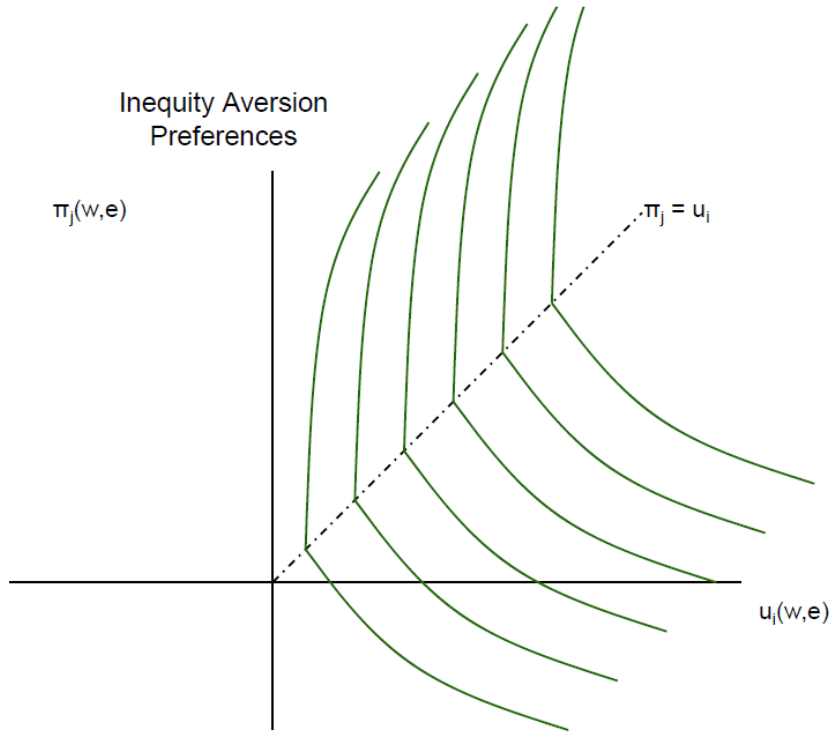
Proof.

- 1) Suppose $a_{i2} \geq a_i^*$. By Lemma 1, $w_{i2} = w^*$ and $w_{i1} < w^*$. Therefore, $w_{i2} > w_{i1}$.
 Suppose $a_{i2} < a_i^*$. We know that $-(\partial U/\partial u_i; a_{i2})/(\partial U/\partial \pi_j; a_{i2}) > -(\partial U/\partial u_i; a_{i1})/(\partial U/\partial \pi_j; a_{i1})$ by definition. By Proposition 2, w_{i1} and w_{i2} must be chosen to satisfy $-(\partial U/\partial u_i; a_{i2})/(\partial U/\partial \pi_j; a_{i2}) = m_{ij}'(w - u_i)$ at $u_i = \pi_j$, and $-(\partial U/\partial u_i;$

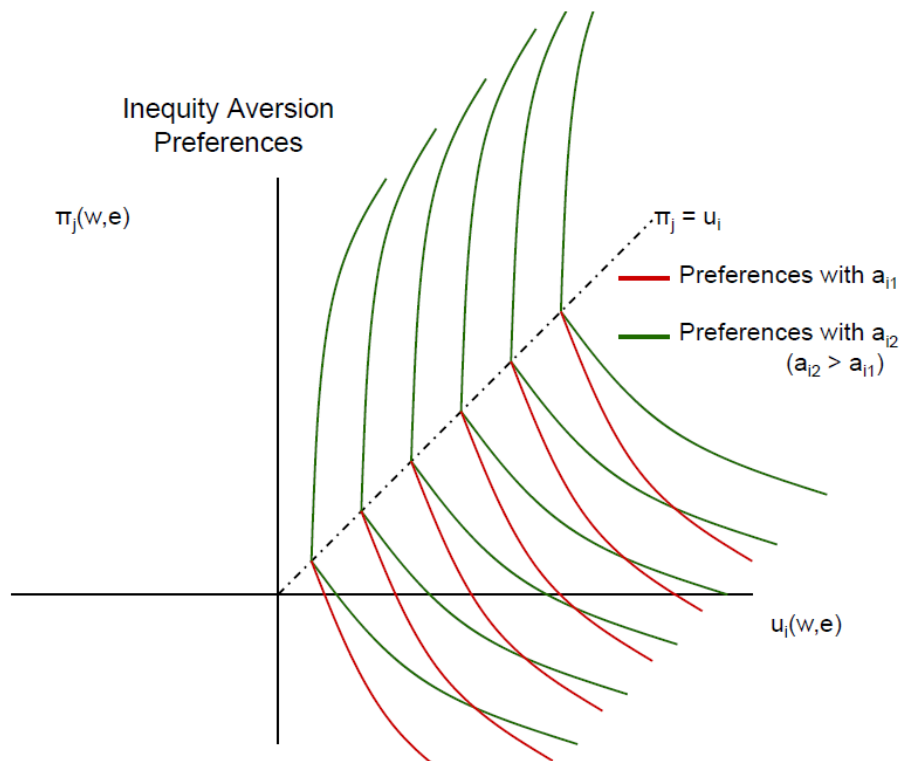
$a_{i1})/(\partial U/\partial \pi_j; a_{i1}) = m_{ij}'(w - u_i)$ at $u_i = \pi_j$. Because $m_{ij}'(w - u_i)$ is strictly increasing in w along the line $u_i = \pi_j$ for $w \leq w^*$, it must be that $w_{i2} > w_{i1}$.

- 2) (a) For all $w > w_{i1}$, the firm 1 worker's effort choice is not bounded by $u_i = \pi_j$. Therefore, $e_{i2}(w) > e_{i1}(w)$, because $-(\partial U/\partial u_i; a_{i2})/(\partial U/\partial \pi_j; a_{i2}) > -(\partial U/\partial u_i; a_{i1})/(\partial U/\partial \pi_j; a_{i1})$.
 (b) For all $w \leq w_{i1}$, both the firm 1 worker's and firm 2 worker's effort choices are bounded by $u_i = \pi_j$. Therefore, $e_{i2}(w) = e_{i1}(w)$.
- 3) Both e_{i2} and e_{i1} satisfy $u_i = \pi_j$ given w_{i2} and w_{i1} , respectively, by Proposition 2. As w increases, a greater effort is required to satisfy $u_i = \pi_j$ since u_i is increasing in w and decreasing in effort, while π_j is decreasing in wage and increasing in effort. Therefore, $w_{i2} > w_{i1}$ implies $e_{i2} > e_{i1}$.
- 4) Firm 2 has the option to choose w_{i1} and generate the transaction (e_{i1}, w_{i1}) . However, firm 2 strictly prefers w_{i2} and generates the transaction (e_{i2}, w_{i2}) as previously shown. Therefore, (e_{i2}, w_{i2}) must be more profitable than (e_{i1}, w_{i1}) or in other words, $\pi_{i2} > \pi_{i1}$.
- 5) Both (e_{i1}, w_{i1}) and (e_{i2}, w_{i2}) satisfy $u_i = \pi_j$. Therefore, $\pi_{i2} > \pi_{i1}$ implies $u_{i2} > u_{i1}$.
- 6) $U(u_{ij}, \pi_{ij}; a_{ij})$ is increasing in u_{ij} and π_{ij} as long as $u_{ij} \geq \pi_{ij}$, which is always true in equilibrium. Because $\pi_{i2} > \pi_{i1}$ and $u_{i2} > u_{i1}$ (by Theorem 1 (4) and (5)), $U(u_{i2}, \pi_{i2}; a_{i2}) > U(u_{i1}, \pi_{i1}; a_{i1})$.

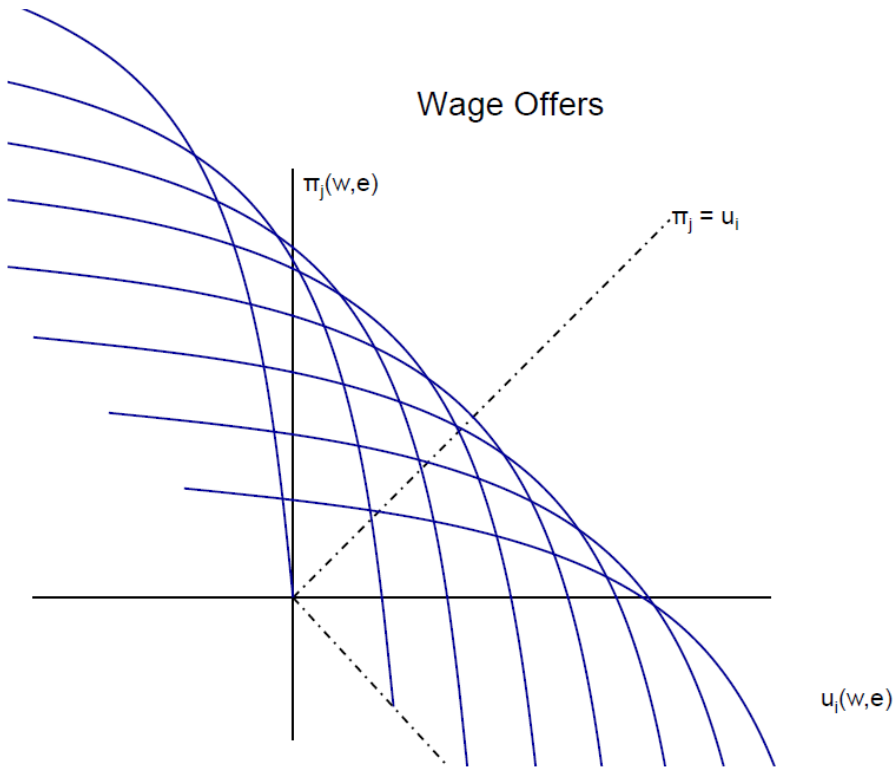
Appendix 2.2 – Figures



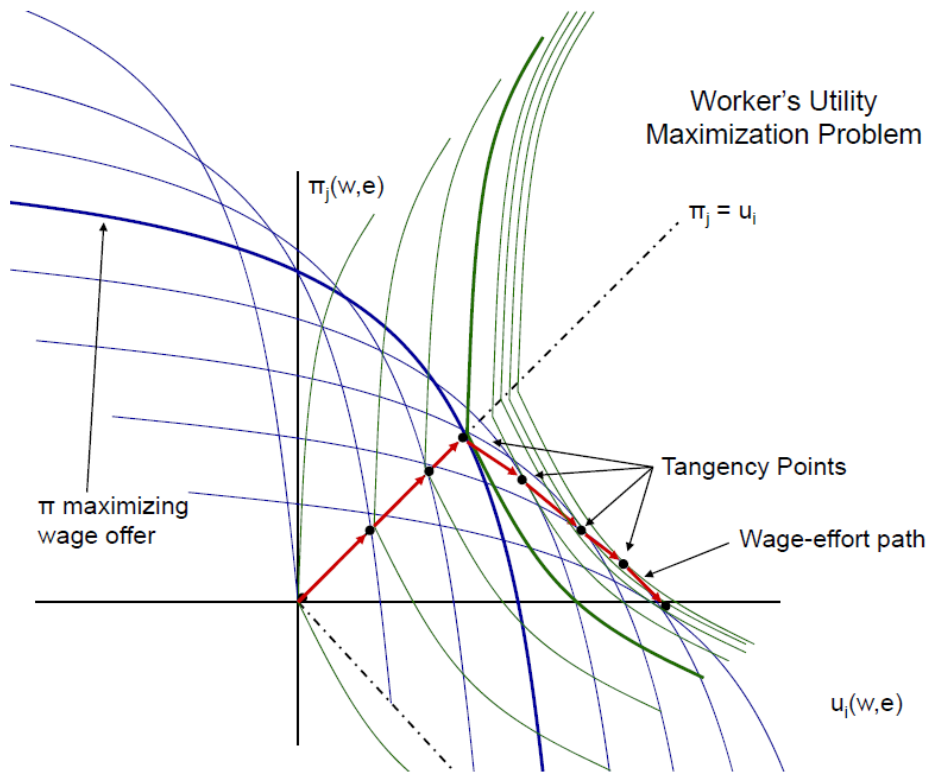
1 Figure 2.1: Inequity Aversion Preferences



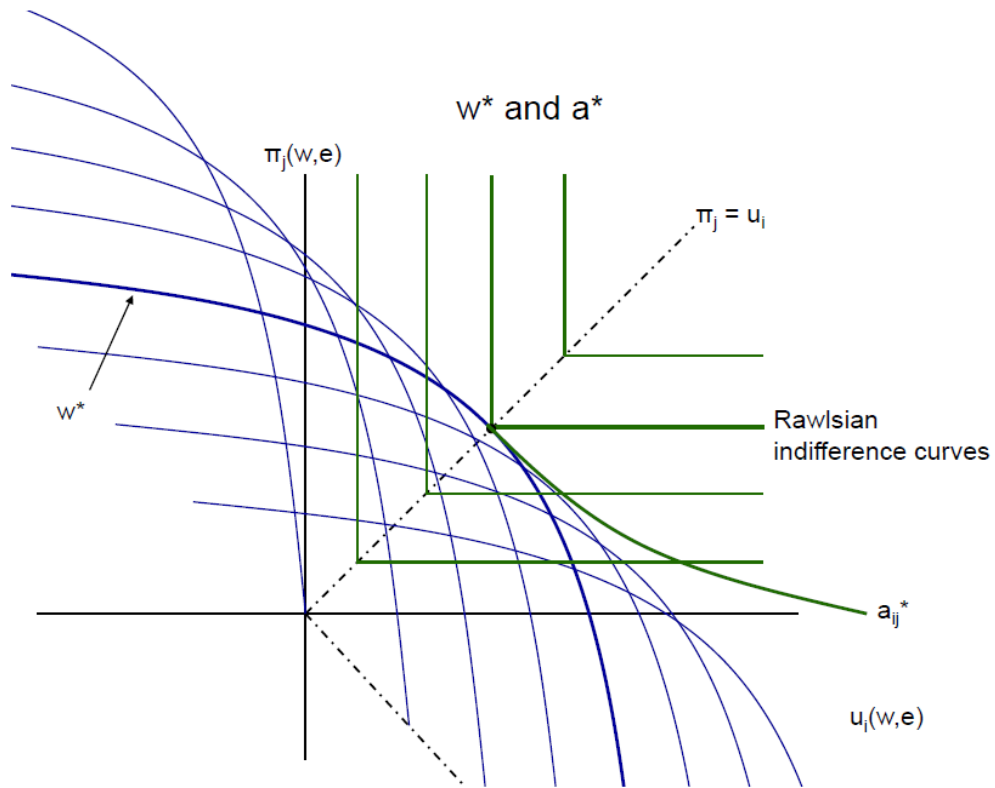
2 Figure 2.2: Inequity Aversion Preferences for the Worker in Firm 1 and in Firm 2



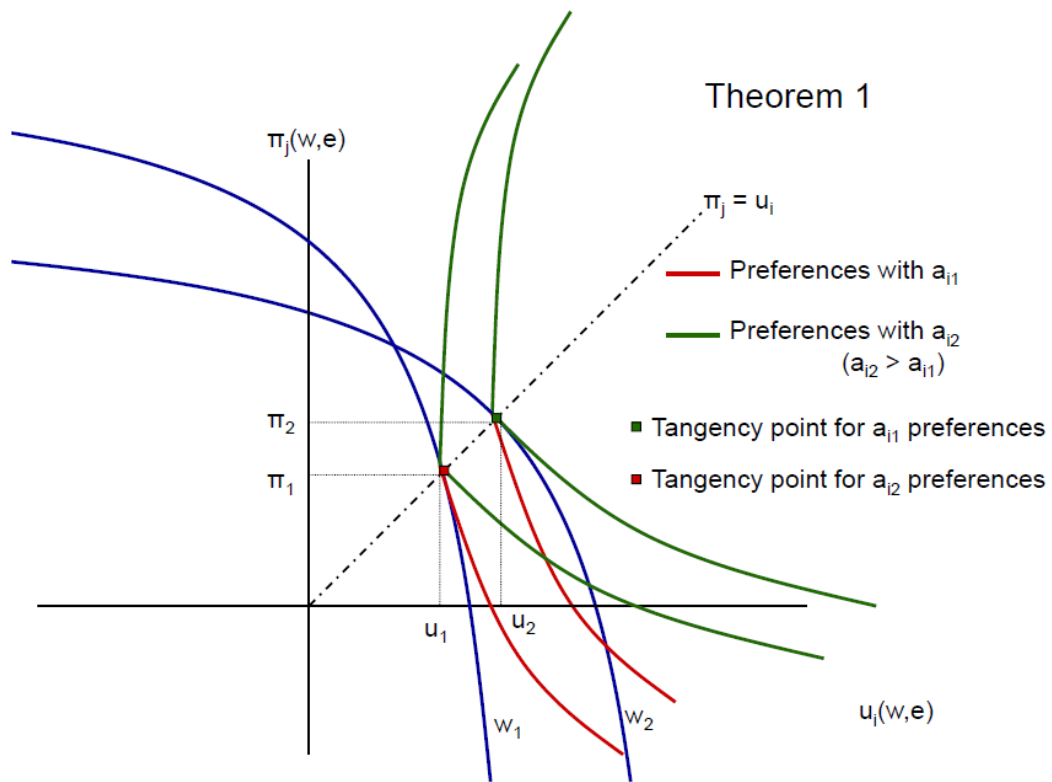
3 Figure 2.3: Wage Offers



4 Figure 2.4: Worker's Utility Maximization Problem



5 Figure 2.5: w^* and a^*



6 Figure 2.6: Theorem 1

Appendix 3.1 – Tables

Table 3.1: Composition of subjects in in-group and out-group treatments

	In-Group Treatment			Out-Group Treatment		
	Sci Hum	Soc Sci	Total	Sci Hum	Soc Sci	Total
N	20	15	35	31	29	60
% Female	0.15	1.00	0.51	0.32	0.59	0.45
Age	19.9	20.5	20.2	20.0	19.7	19.9
% Freshman	0.20	0.13	0.17	0.23	0.24	0.23
% Sophomore	0.35	0.00	0.20	0.35	0.38	0.37
% Junior	0.25	0.33	0.29	0.10	0.21	0.15
GPA	3.38	3.55	3.45	3.20	3.41	3.30
% African-American	0.05	0.00	0.03	0.10	0.14	0.12
% Hispanic	0.00	0.00	0.00	0.03	0.03	0.03
% Asian	0.10	0.00	0.06	0.16	0.10	0.13
Household Income	98	111	103	108	100	104
Mother's Education	16.0	15.6	15.8	16.1	15.9	16.0
Father's Education	17.0	16.5	16.8	16.8	16.6	16.7
Familiar	6.5	14.3	9.8	2.2	1.9	2.1
Friendly	3.5	8.0	5.4	1.2	0.9	1.1
Positive	4.2	8.2	5.9	3.3	1.0	2.2
% Tokens Passed	40.2	33.6	37.4	36.5	24.6	30.8

Notes:

1. Sci Hum includes subjects whose major is in the sciences or humanities including all natural sciences, engineering, math, languages, education, history and arts majors.
2. Soc Sci includes all subjects whose major is in the social sciences including traditional social sciences, business and hearing and speech sciences majors.
3. All data is self-reported.
4. GPA is an approximate measure of average GPA based on interval reporting.
5. Household Income is an approximate measure of the household income at the subject's permanent residence based on interval reporting and measured in thousands of dollars per year.
6. Mother's and Father's Education are measured in years, where a high school degree = 12, a bachelor's degree = 16, etc.
7. Familiar measures the number of fellow subjects in a session which a subjects reports as vaguely familiar, familiar looking, familiar, very familiar, or highly familiar. Responses in session 1 were normalized to reflect a session involving 20 subjects. Please see the questionnaire instructions in the Appendix for details.
8. Friendly measures the number of fellow subjects in a session with which a subjects reports (s)he has had somewhat friendly, friendly, or very friendly interactions. Responses in session 1 were normalized to reflect a session involving 20 subjects. Please see the questionnaire instructions in the Appendix for details.
9. Positive measures the number of fellow subjects in a session toward whom a subjects reports (s)he has a somewhat positive, positive, or highly positive attitude. Responses in session 1 were normalized to reflect a session involving 20 subjects. Please see the questionnaire instructions in the Appendix for details.
10. Percent tokens Passed measures the average fraction of tokens that a subject passed when faced with budgets 7, 8 and 9.

Table 3.2: Allocation Choices

Budget	Token Endowment	Hold Value	Pass Value	Price of Giving
1	40	3	1	3
2	40	1	3	1/3
3	60	2	1	2
4	60	1	2	1/2
5	75	2	1	2
6	75	1	2	1/2
7	60	1	1	1
8	100	1	1	1
9	80	1	1	1
10	40	4	1	4
11	40	1	4	1/4

Table 3.3: Linear Regression Results for Giving when Faced with Budgets where the Price of Giving is One (Budgets 7, 8 and 9)

	Tokens Passed	Tokens Passed	Tokens Passed	Tokens Passed
Endowment	0.296 [7.98]***	0.296 [7.97]***	0.296 [7.97]***	0.296 [7.96]***
In-Group	5.326 [1.59]	4.879 [1.47]	5.72 [1.77]*	5.14 [1.57]
Social Science		-8.172 [2.55]**		-6.791 [1.74]*
Female			-6.13 [1.93]*	-2.896 [0.76]
Constant	0.778 [0.31]	4.728 [1.49]	3.537 [1.11]	5.363 [1.62]
Observations	285	285	285	285
R-squared	0.09	0.14	0.12	0.14

Robust t-statistics in brackets: t-statistics reflect clustering at the subject level

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 3.4: Linear Regression Results for All Allocation Choices

	Tokens Passed	Tokens Passed	Tokens Passed	Tokens Passed
Endowment	0.327	0.327	0.327	0.327
	[12.64]***	[12.63]***	[12.63]***	[12.62]***
Log Price	-1.393	0.389	0.104	0.834
	[1.25]	[0.27]	[0.07]	[0.57]
In-Group	3.191	2.862	3.45	2.997
	[1.37]	[1.26]	[1.54]	[1.34]
Log Price * In-Group	4.78	4.578	4.994	4.762
	[2.88]***	[2.88]***	[3.11]***	[2.98]***
Social Science		-6.017		-5.302
		[2.78]***		[2.12]**
Log Price * Social Science		-3.685		-2.716
		[2.26]**		[1.37]
Female			-4.023	-1.498
			[1.89]*	[0.62]
Log Price * Female			-3.325	-2.031
			[2.04]**	[1.02]
Constant	-0.41	2.498	1.4	2.827
	[0.31]	[1.39]	[0.77]	[1.45]
Observations	1045	1045	1045	1045
R-squared	0.16	0.2	0.18	0.2

Robust t-statistics in brackets: t-statistics reflect clustering at the subject level

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 3.5: Logit Regression Results for Preference Types

	Leontief	Leontief	Leontief	Leontief
In-Group	0.784	0.794	0.867	0.827
	[1.78]*	[1.71]*	[1.92]*	[1.75]*
Social Science		-1.348		-1.236
		[3.04]***		[2.50]**
Female			-0.796	-0.248
			[1.85]*	[0.50]
Constant	-0.134	0.501	0.218	0.559
	[0.52]	[1.47]	[0.68]	[1.55]
Observations	95	95	95	95

Absolute value of z-statistics in brackets

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 3.6: Linear Regression on Price Offers by Buyers in the Gift-Exchange Game

	Price	Price	Price	Price
In-Group	4.148 [2.41]**	3.77 [2.47]**	4.615 [2.84]***	4.037 [2.61]**
Social Science		-5.075 [3.62]***		-4.59 [2.92]***
Female			-3.039 [1.86]*	-1.502 [0.92]
Constant	6.493 [6.71]***	8.692 [7.29]***	7.506 [6.81]***	8.983 [7.40]***
Observations	456	456	456	456
R-squared	0.08	0.2	0.12	0.21

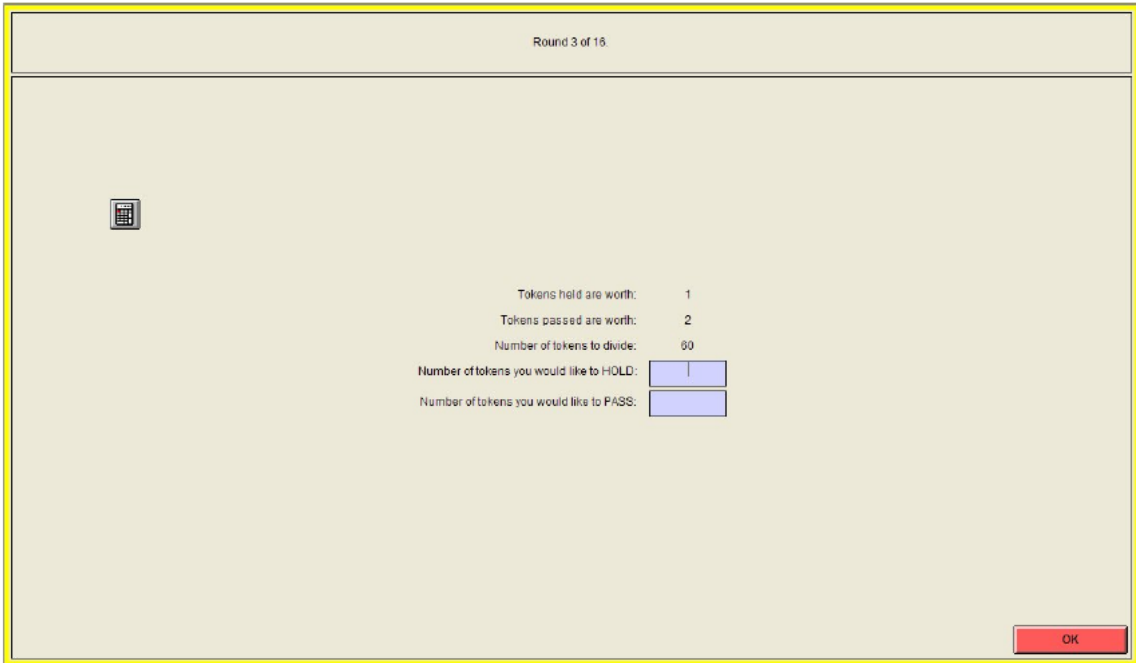
Robust t-statistics in brackets: t-statistics reflect clustering at the subject level
 * significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 3.7: Linear Regression on Cost of Sellers in the Gift-Exchange Game


	Cost	Cost	Cost	Cost	Cost
Price	0.209 [5.90]***	0.19 [4.69]***	0.269 [5.36]***	0.295 [6.19]***	0.308 [6.79]***
In-Group		-0.316 [0.49]	-0.279 [0.46]	-0.442 [0.74]	-0.392 [0.66]
Price * In-Group		0.044 [0.60]	0.004 [0.06]	0.025 [0.39]	0.011 [0.18]
Social Science			0.708 [1.29]		-0.032 [0.06]
Price * Social Science			-0.133 [2.11]**		-0.038 [0.53]
Female				1.355 [2.62]**	1.374 [2.47]**
Price * Female				-0.187 [3.14]***	-0.168 [2.32]**
Constant	0.588 [2.09]**	0.69 [2.10]**	0.281 [0.68]	-0.061 [0.19]	-0.068 [0.18]
Observations	464	464	464	464	464
R-squared	0.15	0.15	0.17	0.18	0.19

Robust t-statistics in brackets: t-statistics reflect clustering at the subject level
 * significant at 10% level; ** significant at 5% level; *** significant at 1% level

Appendix 3.2 – Figures



Round 3 of 16.



Tokens held are worth: 1
Tokens passed are worth: 2
Number of tokens to divide: 60

Number of tokens you would like to HOLD:
Number of tokens you would like to PASS:

OK

7 Figure 3.1a: Dictator Game Screen Shot - Decision



Round 3 of 16.

Tokens held: 50
Hold Value: 1
Your profit is 50 points.

Tokens passed: 10
Pass Value: 2
Your recipient's profit is 20 points.

Continue


8 Figure 3.1b: Dictator Game Screen Shot - Results

Round
1 out of 10

Buyer's Profits = Quality - Price
Seller's Profits = Price - Cost

Price Minimum: 0
Price Maximum: 25

Cost	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Quality	0.0	8.3	14.3	18.8	22.2	25.0	27.3	29.2	30.8	32.1	33.3	34.4	35.3	36.1	36.8	37.5	38.1	38.6	39.1	39.6	40.0



You have been paired with a new seller.
Please select a price for the good:

OK


9 Figure 3.2a: Gift-Exchange Game Screen Shot - Buyer Decision

Round
1 out of 10

Buyer's Profits = Quality - Price
Seller's Profits = Price - Cost

Price Minimum: 0
Price Maximum: 25

Cost	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Quality	0.0	8.3	14.3	18.8	22.2	25.0	27.3	29.2	30.8	32.1	33.3	34.4	35.3	36.1	36.8	37.5	38.1	38.6	39.1	39.6	40.0



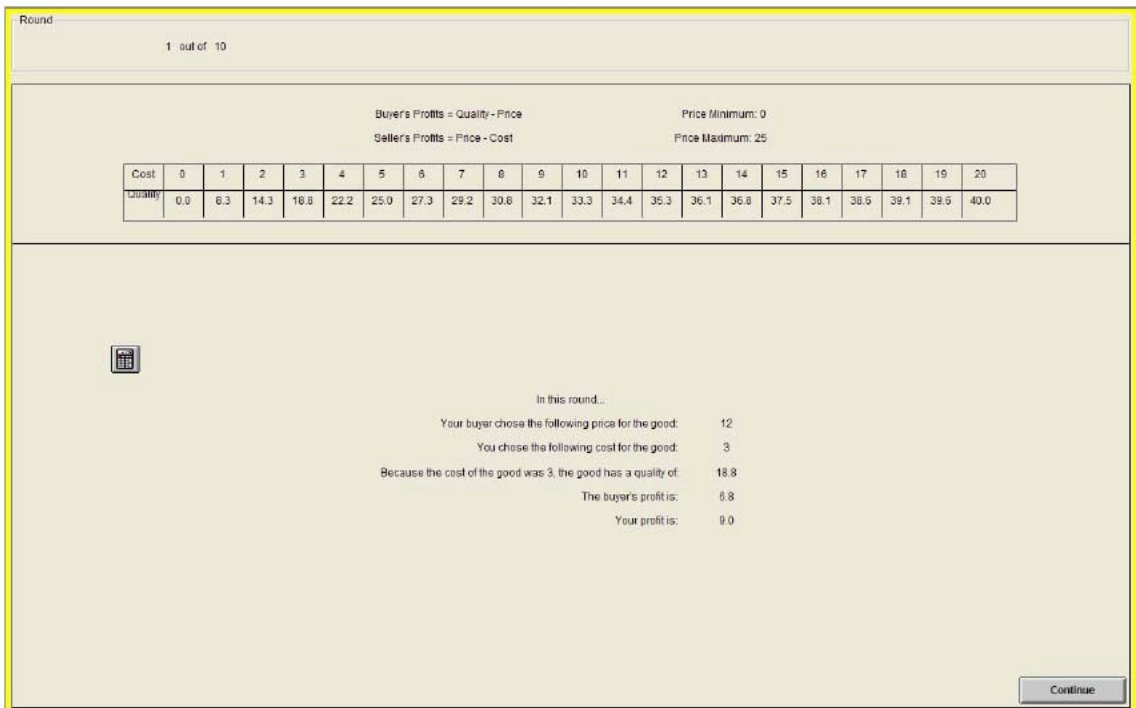
Your buyer for this round has selected a price of: 12
Please choose the cost of the good:

OK

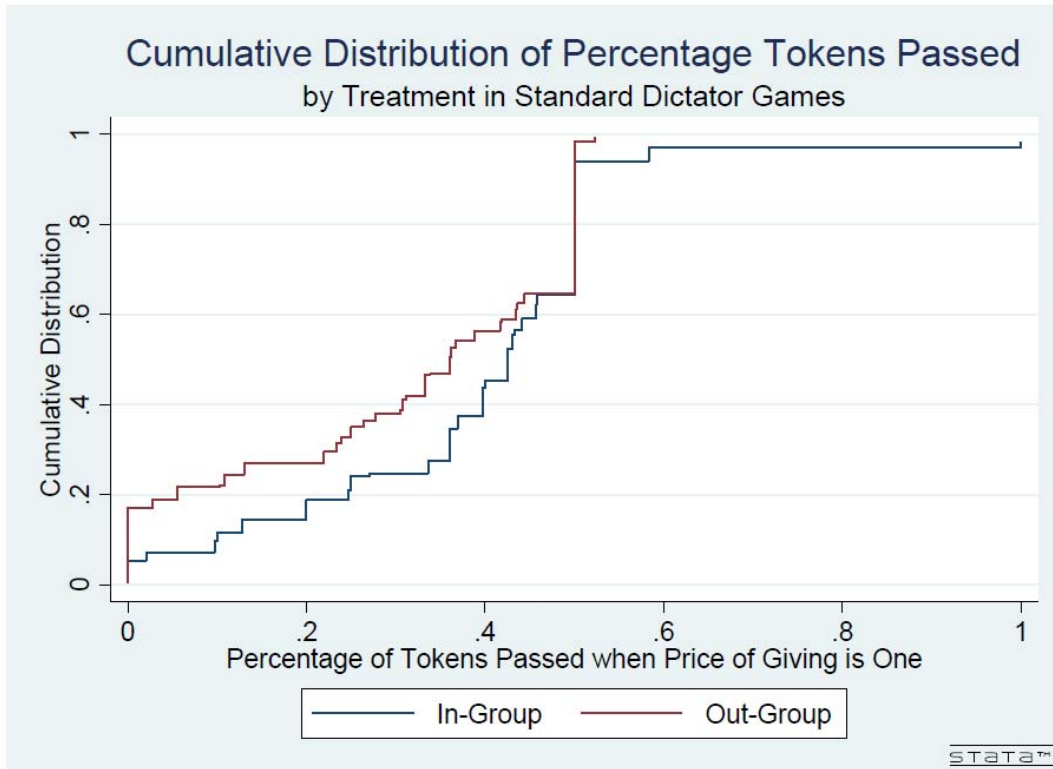
10 Figure 3.2b: Gift-Exchange Game Screen Shot - Seller Decision



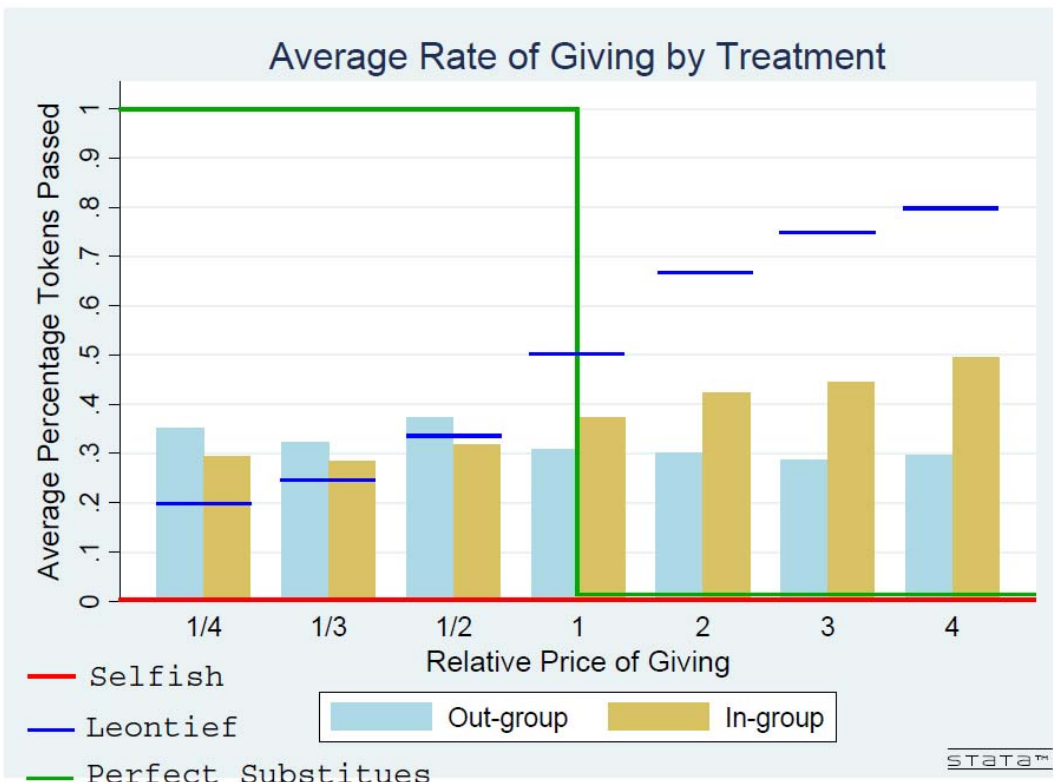
11 Figure 3.2c: Gift-Exchange Game Screen Shot - Buyer Results



12 Figure 3.2d: Gift-Exchange Game Screen Shot - Seller Results

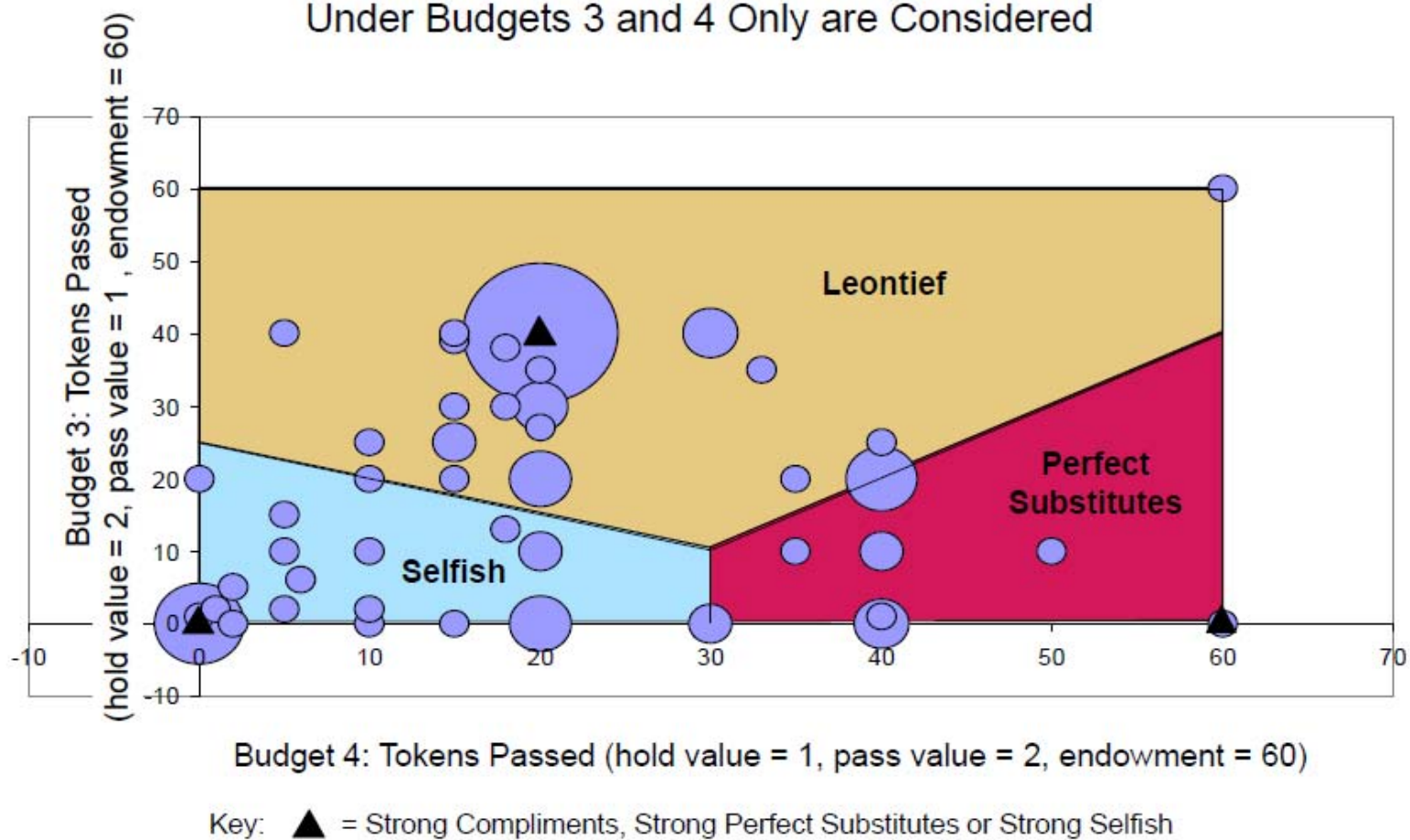


13 Figure 3.3: Cumulative Distribution of Percentage Tokens Passed in Dictator Games where the Price of Giving is One



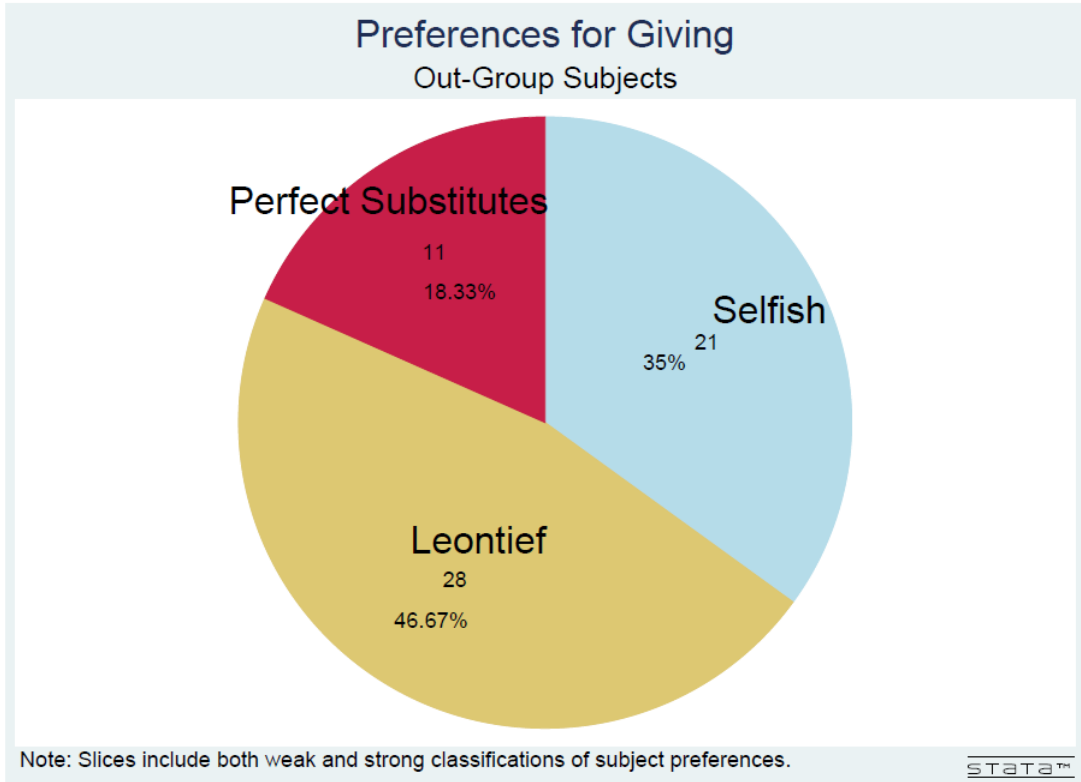
14 Figure 3.4: Average Rate of Giving by Treatment

Illustration of Preference Type Classification if Choices Under Budgets 3 and 4 Only are Considered

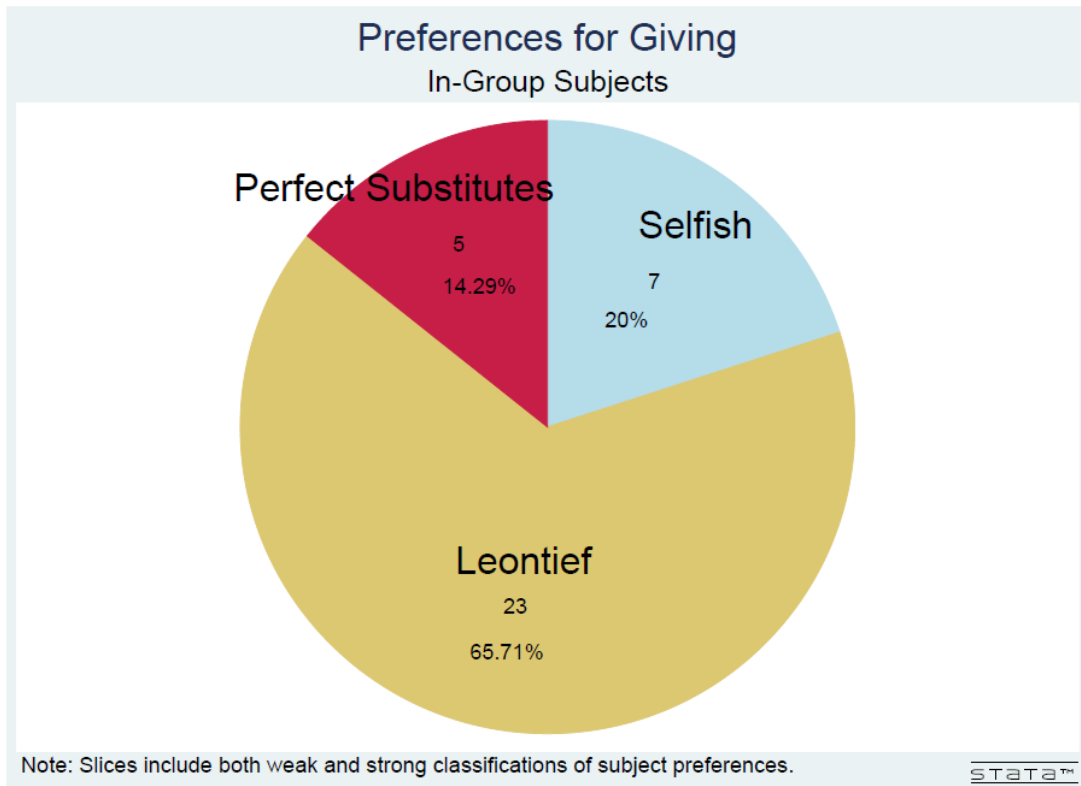


Note: Bubble sizes represent frequencies of actual couplets of choices by subjects in the experiment.

15 Figure 3.5: Illustration of Preference Type Classification if Choices under Budgets 3 and 4 Only are Considered

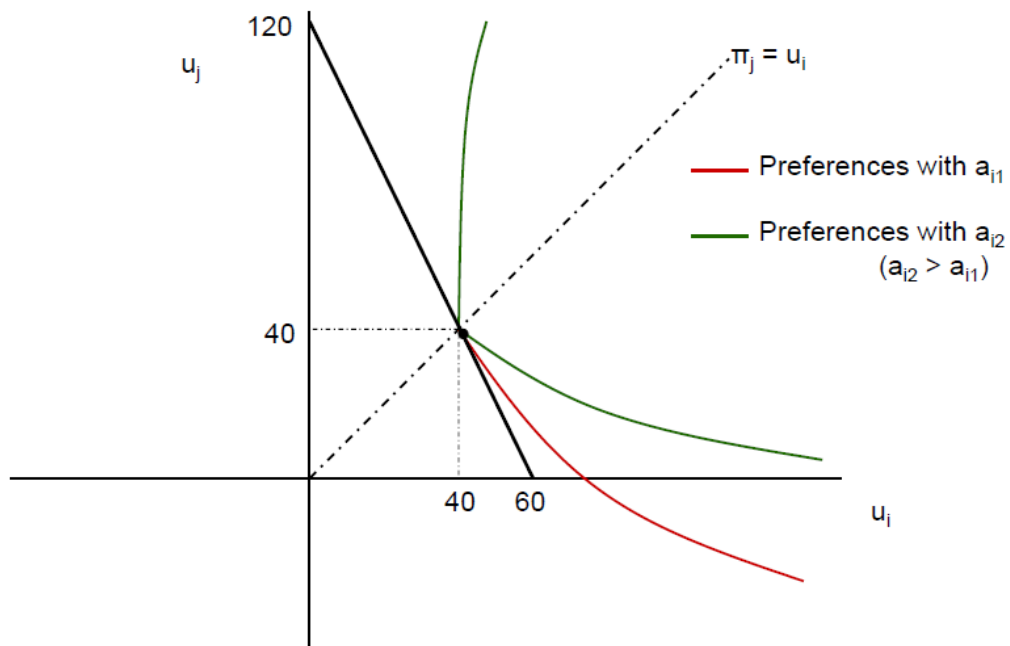


16 **Figure 3.6a: Preference Type Classification by Treatment - In-Group**



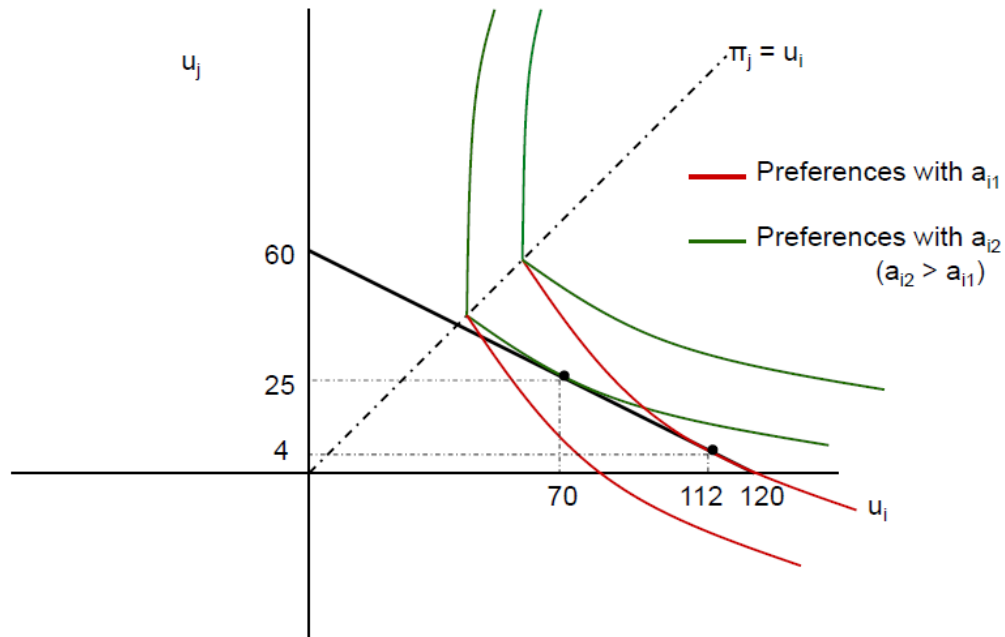
17 **Figure 3.6b: Preference Type Classification by Treatment - Out-Group**

Budget 4: Hold Value = 1, Pass Value = 2, Endowment = 60
 Inequity Aversion Preferences



18 Figure 3.7a: Utility Maximization Problem for a Worker with Inequity Aversion Preferences Facing Budget 4

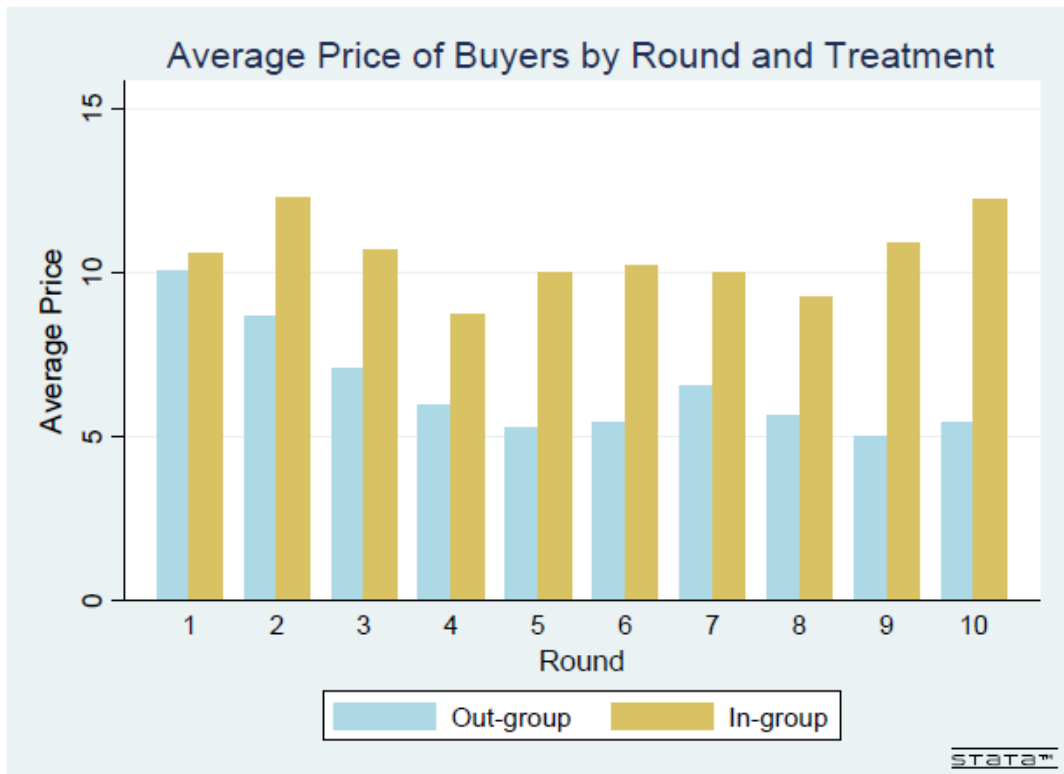
Budget 3: Hold Value = 2, Pass Value = 1, Endowment = 60
 Inequity Aversion Preferences



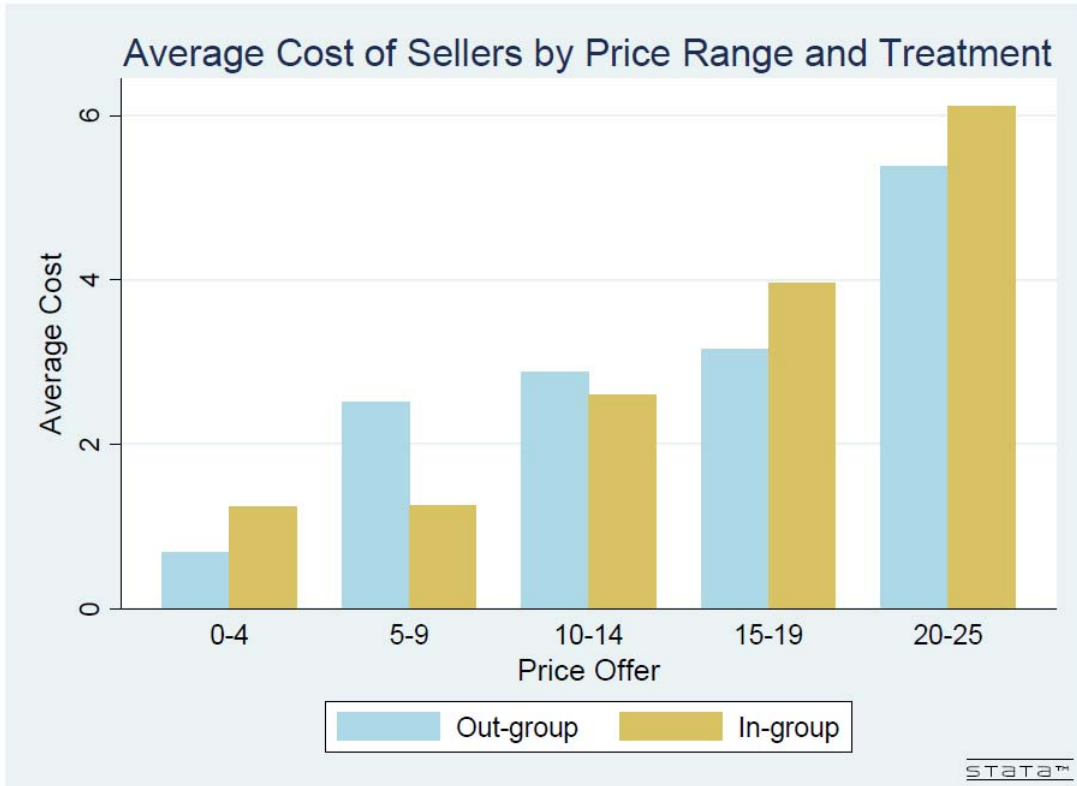
19 Figure 3.7b: Utility Maximization Problem for a Worker with Inequity Aversion Preferences Facing Budget 3



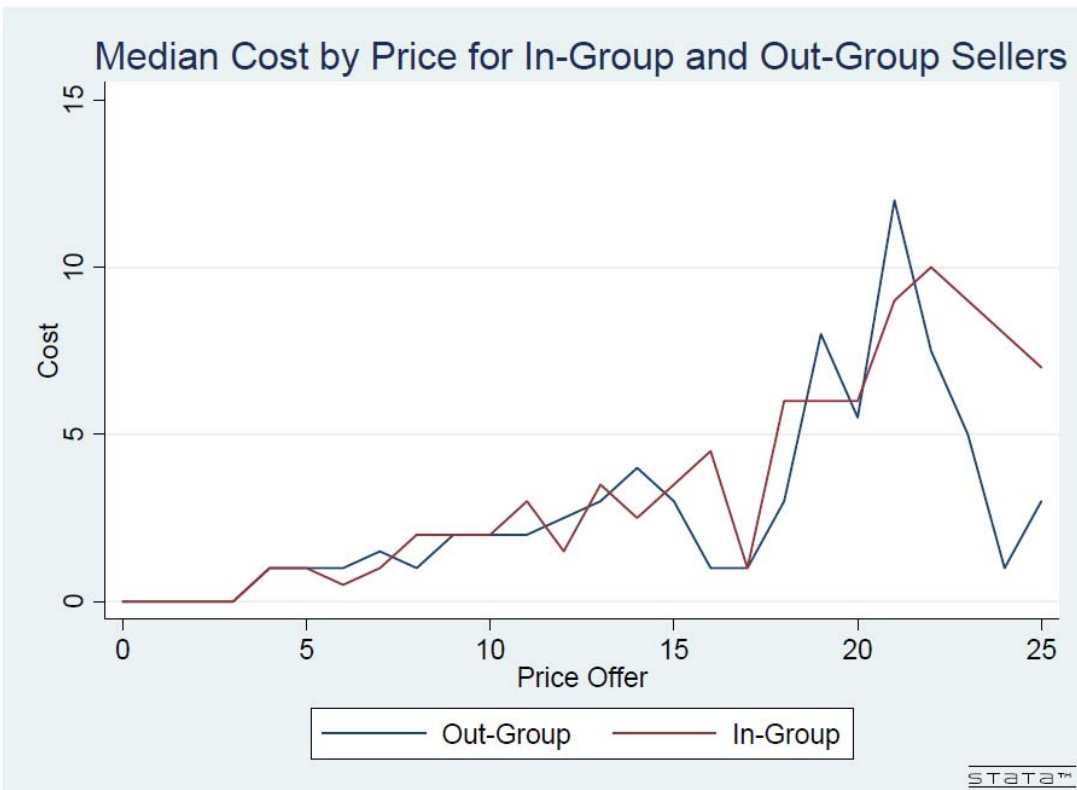
20 Figure 3.8: Cumulative Distribution of Buyer Price Offers by Treatment



21 Figure 3.9: Average Buyer Price Offers by Round and Treatment



22 Figure 3.10: Average Seller Cost by Price Range and Treatment



23 Figure 3.11: Median Seller Cost by Price and Treatment

Appendix 3.3 – Instructions

The instructions below were read to subjects while the subjects followed along on their individual computer screens, with one exception. The practice questions for the “second experiment” were not read aloud. Subjects read and answered the questions on their own. Subjects navigated through the instructions by clicking on a ‘continue’ button. A dashed line indicates that the next lines of instructions were on a new screen. Brackets indicate a line or lines of instructions that were available only in session 1, where there were an odd number of subjects.

INSTRUCTIONS

WELCOME! Please read along on your computer screen while I read aloud. This session will consist of TWO experiments followed by a questionnaire. In total, this session should last approximately 90 minutes.

The first experiment is used to analyze decision making. The instructions are simple. If you read them carefully and make appropriate decisions, you can earn a considerable amount of money.

Your profits from this experiment and the following experiment will be added to your show-up fee, which will be revealed later. The total will be paid to you in private in cash.

Throughout the session you will move between pages by clicking the button on the bottom right corner of the screen. Once you click the button, you will not be able to move back to a previous screen. Therefore, you should be sure about the selections you have made before you proceed.

CONFIDENTIALITY: In the questionnaire portion of the session, you will be asked to enter your name. Your name will be maintained separately from both your questionnaire answers and your experiment decisions. It will be linked by a subject number.

Your participation, decisions and answers in this session will remain confidential.

ANONYMITY: All decisions made in this session will be made anonymously. To help maintain anonymity, please refrain from sharing information about your choices and earnings, both during and after the session.

EXPERIMENT 1: This experiment will consist of 16 rounds. In each round you will make one decision that will affect your own earnings and the earnings of one other

subject. At no point will you know the identity of the other subject, nor will the other subject know your identity.

In this experiment your earnings, or profits, will be counted in points. Every point that a subject earns will be worth \$0.06 or 6 cents. For example, if you earn 58 points, you will make $58 * \$0.06 = \3.48 in the experiment.

TAKE-HOME PROFITS: Each of you will make a decision in 16 rounds. AT THE END of the 16 rounds, ONE round will be randomly selected by the computer. We will call this round the “payment round.” The computer will then randomly select half of the participants in the room [ODD: minus one, because there is an odd number of participants]. We will call these participants “decision makers.” The choices of the decision makers in the payment round will be carried out.

A participant who is not selected to be a decision maker is called a “non-decision maker.” Each non-decision maker will be paired with a decision maker. The decision maker will receive the number of points corresponding to the "Your Profit" line on the decision maker's computer during the payment round. The non-decision maker will receive the number of points corresponding to the "Recipient Profit" line on the DECISION MAKER'S computer during the payment round. The profit lines referred to above will be explained shortly.

To be clear, if you are selected to be a non-decision maker, your choices will have no effect on your earnings or the earnings of any other subject. Therefore, you should make your decision in each round as though you are the decision maker.

[ODD: Because there is an odd number of participants in this session, a single, randomly chosen participant will neither be a decision maker nor non-decision maker. That participant will receive a pre-determined payment for participation in this experiment.]

ROUNDS 1 – 11: In each of the first 11 rounds, you will face choices similar to the box below.

In this example, you must divide 50 tokens. You can keep all of the tokens, keep some and pass some, or pass all of the tokens. In this example, you will receive 1 point for every token you hold, and the other subject will receive 2 points for every token you pass.

If, for example, you hold 50 and pass 0 tokens, you will receive 50 points, or $50 * \$0.06 = \3.00 , and the other subject will receive no points and \$0. If you hold 0 tokens and pass 50, you will receive 0 points and \$0 and the other subject will receive $50 * 2 = 100$ points, or $100 * \$0.06 = \6.00 .

You may choose any number between 0 and 50 to hold. For instance, you could choose to hold 29 tokens and pass 21. In this case, you would earn 29 points, or $29 \times \$0.06 = \1.74 . The other subject would receive $21 \times 2 = 42$ points, or $42 \times \$0.06 = \2.52 .

Please feel free to use a calculator to calculate points or to assure that all of the tokens have been allocated. The total must equal 50. You may also use the computer's calculator by clicking on the calculator button on the left side of the screen.

Please choose a number of tokens to hold and a number of tokens to pass in the example box below and then press OK.

DISPLAY: The box you see below is similar to the screen you will see after you enter your selections in each round. The number of tokens you chose to hold, and the number you chose to pass are listed.

The hold value and pass value of the current round are listed along with your profits and the profits of the recipient, in terms of points.

ROUNDS 12-16: Thank you for completing the first practice round.

In rounds 12 through 16, the number of tokens held and the number of tokens passed will be set. You will be asked to select the value, in points, of each token. In these last five rounds, tokens always have the same value for you as they do for the other subject. The token value may be any number between and including 0 and 10.

PRACTICE EXAMPLE 2: In this example, you will hold 8 tokens and pass 4 tokens. You must choose a token value. If you choose a token value of 10, you will receive $8 \times 10 = 80$ points, or $80 \times \$0.06 = \4.80 . The other subject will receive $4 \times 10 = 40$ points or $40 \times \$0.06 = \2.40 .

If you choose a token value of 0, you will receive 0 points and \$0. The other subject will receive 0 points and \$0 as well.

If, for example, you choose a token value of 6, you will receive $8 \times 6 = 48$ points, or $48 \times \$0.06 = \2.88 . The other subject will receive $4 \times 6 = 24$ points, or $24 \times \$0.06 = \1.44 .

Please choose a token value in the example box below and press OK.

DISPLAY: The box you see below is similar to the screen you will see after you make a selection in rounds 12 through 16.

The number of tokens held and passed are listed. The token value that you selected is listed as both the hold value and the pass value. Your profits and the profits of the recipient are displayed in terms of points.

Thank you for completing the second practice round.

We are now ready to begin the first experiment. You may proceed through the rounds at your own pace. You will not need to wait for instruction from me until the end of this experiment.

The first experiment has concluded. Your earnings from the first experiment will be displayed to you at the conclusion of the session.

EXPERIMENT 2: We are now ready to begin the second experiment. Once again, the instructions are simple. If you read them carefully and make appropriate decisions, you can earn a considerable amount of money.

Again, you will not be able to move back to a previous screen after you have pressed the button on the bottom right corner of the screen. You should be sure about the selections you have made before you proceed.

All decisions will be made anonymously.

In this experiment, each point earned will be worth \$0.30 or 30 cents.

STAGES: This experiment will consist of 10 [8] rounds. Each round will consist of three stages. Over the course of the three stages, a seller will sell a fictitious good to a buyer.

Stage 1: The buyer will be asked to select the price of the good, in points. The price may be any integer between and including 0 and 25.

Stage 2: The price, which was selected by the buyer, will be presented to the seller. The seller will then be asked to select the cost of the good, in points. The cost may be any integer between and including 0 and 20.

Stage 3: The cost, price and quality of the good will be presented to both the buyer and the seller. The buyer's and seller's profits will also be presented to both subjects.

PROFITS: The buyer's profits, in points, will be equal to the quality of the good minus the price that the buyer pays for the good.

$$\text{Buyer's Profits} = \text{Quality} - \text{Price}$$

The seller's profits, in points, will be equal to the price of the good minus the cost of producing the good.

$$\text{Seller's Profits} = \text{Price} - \text{Cost}$$

QUALITY: Quality and cost are both measured in points. Quality depends on the cost that is chosen by the seller. The table below gives the quality of the good for different levels of cost. The same cost and quality table will be used in every round.

There is no need to copy the cost-quality table. It will be provided for you throughout the experiment.

ASSIGNMENT OF ROLE: The computer has randomly assigned each of you to be either a buyer or a seller as indicated below.

The random assignment of role in this experiment is completely independent of your earnings in the previous experiment.

If you are a buyer, you will remain a buyer for all rounds. Likewise, if you are a seller, you will remain a seller for all rounds.

Each buyer will be paired with a DIFFERENT seller in every round. A buyer will never be paired with the same seller more than once. A seller will never be paired with the same buyer more than once.

[ODD: Because there is an odd number of subjects in this session, there will be one more seller than there are buyers. In each round, one seller will not participate.]

TAKE-HOME PROFITS: At the end of the stated number of rounds, the computer will randomly select one round to be carried out. We will call this round the "payment round." Each point earned in the payment round will be worth \$0.30 or 30 cents. [ODD:

The seller that is not participating in the payment round will receive a pre-determined payment for participating in this experiment.]

Each of you will receive a show-up fee of \$18 for participating in this session.

If your profits from this experiment are positive, they will be added to your earnings from the previous experiment and your show-up fee. The sum will be paid to you in private in cash.

NEGATIVE PROFITS: In this experiment it is possible to make negative profits.

If your profits are negative, your earnings from the previous experiment will be added to your show-up fee. The negative profits from this experiment will be subtracted from the total.

PRACTICE QUESTIONS: Please answer the following three practice questions to check your understanding of the instructions. Proceed through the questions at your own pace.

If you do not see a message after you answer a question, then you have selected the correct answer. If you are unsure of an answer, it is okay to take a guess. If you submit a wrong answer, you will have the opportunity to change your selection.

Question 1: Can the seller see the price of the good before he/she selects the cost of the good? yes no

Question 2: In how many rounds will a buyer be paired with a particular seller?
 zero one two ten

Question 3: Please refer to the profit functions and cost-quality chart above.

A calculator is available by clicking the calculator button on the left side of the screen.

If the buyer selects a price of 16 and the seller selects a cost of 7...

What are the profits of the buyer? _____

What are the profits of the seller? _____

READY TO BEGIN: We are now ready to begin the experiment. When prompted, please enter a decision and press the OK button. Please press the 'Start' button to begin.

Thank you for completing the second experiment. We are now ready to begin the questionnaire. Your name will be maintained separately from your questionnaire responses and your experiment decisions.

Please take your time on the questionnaire. Payments will be made and participants will be dismissed after ALL participants have completed the questionnaire.

QUESTIONNAIRE

First Name _____
Last Name _____

Thank you for completing the decision making portion of this session. Please take a moment to complete this questionnaire while the experimenter calculates the payments to be made to each subject. Your information and answers in this questionnaire will NOT affect your earnings and will remain strictly confidential.

The questionnaire is made up of two parts and should take approximately 10 minutes to complete.

Please enter the following information:

Gender:

- Male
- Female

Age: _____

Year in School:

- Freshman
- Sophomore
- Junior
- Senior
- Other

If other, please explain: _____

Please enter your major: _____

Grade Point Average (GPA):

- 3.5-4.0

- 3.0-3.5
- 2.5-3.0
- 2.0-2.5
- Below 2.0

Do you live in on-campus housing?

- Yes
- No

If yes, please enter your dormitory: _____

Please list any student groups to which you belong:

Race:

- White
- African/African-American
- Hispanic
- Asian/Pacific Islander
- Native American
- Other

If other, please explain: _____

What is your household income, including all earners in your household? (This question refers to your permanent residence.)

- Less than \$40,000
- \$40,000-\$80,000
- \$80,000-\$120,000
- More than \$120,000

What is your religious affiliation?

- Protestant Christian
- Roman Catholic
- Evangelical Christian
- Jewish
- Muslim
- Hindu
- Buddhist
- None
- Other

If other, please explain: _____

What is the highest level of education your mother has completed?

- Less than High School
- High School/GED
- Some College
- 2-Year College Degree (Associates)

- 4-Year College Degree (BA, BS)
 - Master's Degree
 - Doctoral Degree
 - Professional Degree (MD, JD)
 - Other
- If other, please explain: _____

What is the highest level of education your father has completed?

- Less than High School
 - High School/GED
 - Some College
 - 2-Year College Degree (Associates)
 - 4-Year College Degree (BA, BS)
 - Master's Degree
 - Doctoral Degree
 - Professional Degree (MD, JD)
 - Other
- If other, please explain: _____

You will be asked to assess your familiarity and friendliness with, and your attitude toward your fellow participants in today's session. Please answer the following questions:

Question 1:

For each fellow subject in today's session, please choose the category that best describes your FAMILIARITY with that person. Feel free to use the scratch paper provided to keep track of your tally as you look around the room. For each category, enter the number of fellow subjects with whom your familiarity fits the description. The number of fellow subjects entered in the six categories MUST TOTAL 19 [14].

- Completely foreign, have never seen the person before: _____
- Vaguely familiar, have seen the person once or twice: _____
- Familiar looking, see the person around somewhat regularly: _____
- Familiar, spend time around the person on occasion: _____
- Very familiar, regularly spend time around the person: _____
- Highly familiar, spend significant time around the person daily: _____
- Do the entries in the six boxes above total 19 [14]? ○ Yes

Question 2:

For each fellow subject in today's session, please choose the category that best describes the FRIENDLINESS of your interactions with that person. Feel free to use the scratch paper provided to keep track of your tally as you look around the room. For each category, enter the number of fellow subjects with whom your friendliness fits the description. The number of fellow subjects entered in the six categories 19 [14].

Not applicable, have rarely or never interacted with the person: _____
Unfriendly, interactions have been negative in nature: _____
Neutral, interactions have neither been positive nor negative in nature: _____
Somewhat friendly, interactions have been somewhat positive: _____
Friendly, interactions have been positive and rewarding: _____
Very friendly, interactions have been extremely positive and rewarding: _____
Do the entries in the six boxes above total 19 [14]? Yes

Question 3:

For each fellow subject in today's session, please choose the category that best describes YOUR ATTITUDE toward that person. Feel free to use the scratch paper provided to keep track of your tally as you look around the room. For each category, enter the number of fellow subjects toward whom your attitude fits the description. The number of fellow subjects entered in the five categories MUST TOTAL 19 [14].

Negative, dislike the person: _____
No opinion/Neutral, neither like nor dislike the person: _____
Somewhat positive, like the person somewhat: _____
Positive, like the person: _____
Highly positive, like the person to a substantial degree: _____
Do the entries in the five boxes above total 19 [14]? Yes

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