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ABSTRACT

The Effect of Intragroup Communication on Preference Shifts in Groups*

We use a laboratory gift-exchange game to examine decisions made by groups under three different procedures that dictate how group members interact and reach decisions in comparison to individuals acting alone. We find that group decisions do deviate from those of individuals, but the direction and magnitude of gift exchange depend critically on the procedure. This suggests that no general statements can be made concerning the propensity of groups to exhibit reciprocal or other-regarding behavior relative to individuals. The rules governing how group members can express their preferences and expectations to other group members are critical for determining group outcomes.

JEL Classification: C91, C92

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How are individual preferences for giving charitable donations or retirement planning strategies integrated by married couples? How are preferences for risk combined by members of business management teams and corporate boards? The recent growth in the economics literature on group or team decision making has been motivated by the recognition of many instances like these where individuals make a decision as part of a group and the decision-making process may not equally aggregate the preferences of the constituent individuals.

Understanding differences between group and individual behavior has been greatly illuminated by a number of recent studies in both the laboratory and field, but important questions remain. There is convincing evidence that groups outperform individuals at cognitive tasks. A majority of studies on social preferences have found that groups act with greater self-interest and are more rational, but there are exceptions. What is less clear is what mechanism causes group decisions to deviate from those of individuals, which is critical for using laboratory results to understand real world behavior. The two most commonly proposed explanations, group identity and social comparison, predict that groups will deviate from individuals in opposite directions.

Another factor that has received limited attention that we focus on is the procedure that governs how the group functions. Specifically, the extent of intragroup communication and the allocation of decision-making authority. Some groups deliberate extensively and use a fairly egalitarian framework, such as in caucuses in political elections. In other settings groups are hierarchical and may involve little interaction among constituent members. In business group procedures vary in important ways across cultures. In Japan, business traditions dictate that the team must achieve a consensus among all members to reach a decision, while a comparatively hierarchical structure is more common in the West (Gerlach,

1997). As we show later, these differences can be exploited to understand how groups reach decisions.

In this study we contribute to the literature on groups by using an experimental design that subtly varies group procedure across treatments to i) assess the robustness of previous findings by looking at whether group decisions deviate from individual decisions in a consistent direction, and ii) to test the explanatory power of competing models of group decision making to better understand *why* a difference exists. We use the gift exchange game, first described by Fehr, et. al. (1993), that is based on an experimental labor market where employers offer wages to employees who can subsequently exert costly effort that benefits the employer. Because effort is not third-party enforced, a purely self-interested employee always supplies minimal effort in a one-shot game. A particularly appealing aspect of the gift exchange game is that the intensity of social preferences can be measured by estimating a single parameter, namely, the correlation between effort and wage.[1] It also develops a richer contextual setting than more abstract designs like the trust or dictator game which better suits our focus on the role of institutions and norms on group interaction.

Our main conclusion is that rules governing how individuals can exert their preferences in the formation of group decisions is crucial for determining group outcomes. Specifically, the rules that determine the distribution of decision making authority and influence across group members can profoundly alter the degree of gift exchange exhibited by the team as a whole. In one treatment where teammates have equal power to influence the group decision, less gift exchange (relative to individuals) was observed. In a second

[1] Charness (2004) has shown that a positive correlation is indicative of the existence of general social preferences (either distributional or reciprocity based). Charness also suggests that when wages are sufficiently low so as to ensure that employees always fare poorly relative to employers, *concern withdrawal* can be triggered where the employee withdraws his willingness to sacrifice to help the employer.

treatment where one team member was assigned the role of "decision maker" and her teammate can only make suggestions, the team exhibited significantly stronger gift exchange than individuals. Finally, in a treatment where one member is an authoritarian decision maker and her teammate is completely passive, there is no significant difference in the amount of gift exchange observed between teams and individuals. These results suggests that no general conclusions can be made about the propensity of teams to exhibit more or less other-regarding behavior relative to individuals. However, it also suggests that the design of rules that govern interactions between group members can have nontrivial impacts on overall team objectives and social outcomes. For instance, in competitive situations where a team is seeking a competitive advantage over other teams, the team may want to design rules that maximize the wealth or profit of one's own team without regard to other teams. On the other hand, when groups come together for charitable causes or to cooperate on social or public goods, it may be beneficial for groups to adopt rules which would facilitate greater pro-social behavior across groups.

Previous research on group decision making can generally be categorized into two classifications. One strand focuses on the cognitive ability of groups to solve economic problems where there are universally optimal answers. The focus is on whether groups outperform individuals at tasks such as solving puzzles, processing complicated information, and avoiding mistakes as, for example, a proxy for viability under the pressures of a competitive market. Results have repeatedly found that groups do better (Cooper and Kagel, 2005; Blinder and Morgan, 2005; Sutter, 2004). Another strand of research compares group and individual preferences involving decisions such as risk or self-interest, where the optimal response is subjective. Theoretical studies have shown that group decisions deviate from

those of individuals implying that modeling groups as if they were individuals could result in biased predictions (e.g. Eliaz et al., 2006; Sobel, 2006) [2]. Empirically, Charness, Rigotti, and Rustichini (2007) use experiments to show that individuals who are members of a group and identify with the group behave differently in strategic environments than individuals who do not identify with a group. While our paper also uses experiments to examine the relevance of groups, it differs from CRR in that we focus on the group decision that emerges from teams of individuals interacting, whereas CRR focuses on how group identity and saliency affects the choices made by individuals.

With regard to teams and social preferences, previous economic studies that focus on groups and other regarding behavior include Cason and Mui (1997); Bornstein and Yaniv (1998); Cox (2002); Kocher and Sutter (2007); Luhan et al. (2007); and Kugler et al., (2006). While Cason and Mui found groups to act less in accordance with pure self-interest than individuals, the other studies mentioned found the opposite. Our study bridges this gap in research conclusions in the finding that the procedure governing group interaction can profoundly impact results. While our study adds to previous literature to further reveal *whether* groups act with greater self-interest than individuals our experimental design provides an examination of possible explanations for *why* a difference may exist. While the term group, or team, has been used generally to refer to a collection of a small number of individuals given the task of making a representative decision there is a great deal of variation in the procedures that govern how individuals within the group interact[3]. This is likely to be less important in studies on cognition where it is prudent to assume that all subjects are

[2] Eliaz et al. demonstrate that choice shifts in groups represent a failure of expected utility that is equivalent to Allais Paradox. Sobel focuses on the aggregation of information in groups when individuals receive independent signals about the state of the world.

[3] We only consider externally dictated procedures rather than those that may arise endogenously.

working towards the same end of finding the correct solution. In preference focused contexts things are more complicated. A natural conflict exists when individuals in a group have diverse preferences and are thus driven to seek different outcomes. How they consciously and otherwise influence and are influenced by others in their group depends critically on the group procedure.

We break procedure down into two stages[4]. First is the deliberation phase that characterizes how group members are able to convey information about their preferences to others and engage in any persuasive efforts. Both of these factors have been considered as potentially important aspects of group decision-making in previous research both in social psychology and economics (Isenberg, 1986; and Luhan, 2007). Common approaches in the lab include face-to-face interaction and text over computer. Our study looks at the influence of preference revelation by gradually varying the amount of information subjects receive about their partner's preferences across the group treatments. While verbal discussion is an important part of how groups make decisions in the real world we eliminate it here to more cleanly reveal the interaction between the preferences of subjects and their pair members. This provides a foundation for interpreting decisions made in environments that allow more extensive interaction.

The second element is the decision phase which considers the importance of the rule that dictates how the group is to reach a decision. A useful way to consider the set of possible decision rules is on a hierarchy continuum from egalitarian, where the decision requires unanimous approval, to authoritarian, where a subset of the group is assigned complete control. Decision rules have been shown to influence group decisions in the social

[4] This is not meant to be an exhaustive list. For instance, important differences may exist between endogenously versus exogenously formed groups. In this case, how groups form would be an important element of procedure.

psychology and organizational behavior literature (Allison et al., 1996)[5]. While economic studies have used a variety of approaches it is difficult to ascertain its importance by comparing across studies. This element of our experimental design is important for understanding whether variation in the findings of previous studies on groups in economics is partially a result of using different decision rules. The extremes of the continuum are explored in this study where two of the group treatments are purely authoritarian while the third requires consent from both pair members.

The remainder of the paper is as follows. Section II describes the experimental design in detail demonstrating how group procedure is varied to generate testable hypotheses. Section III provides results and analysis. Section IV provides a discussion of how the design of this study and its findings fit into the larger literature on group research and considers future research.

I. Experimental Design

All parts of the experiment were programmed and conducted with the software z-Tree (Fischbacher, 2007). Students were recruited via email for a 'Paying Economics Experiment' explaining that they would interact with other students in a simulated market, and that their take home pay would depend on decisions made by themselves and others in their session. They were told that the experiment would take just over an hour, and that the average pay would be about $17. The initial response rate from the first email was approximately 10%. Interested students were sent more information and were assigned to specific sessions that

[5] Allison et al. contend that the decision rule is not only important for understanding the group decision, but also should influence the decision of the party transacting with the group if they know what decision rule is being used. Using the ultimatum game they find that individuals trading with groups unwisely ignore this factor.

took place on weekday evenings. While recruited students were from a variety of majors nearly the entire subject population had a minimum of one course in economics[6].

Subjects sat at networked laptop computers that were placed approximately three feet apart. Cardboard barriers surrounded each station to provide anonymity while making decisions. All instructions were read allowed to the subjects who followed along with a hardcopy. They were informed that their pay would be based on a combination of a show up fee, and their accumulated point total from the gift-exchange game. It is also emphasized before the start of the session that they would be paid in private at the end of the session. In the gift-exchange game the first-movers earned on average a bit less than a dollar per trade. The second movers earned about twice as much. Informed consent from each student was obtained before taking part in the session as required by the university's Institutional Review Board.

The form of the gift-exchange game used in this study most closely follows Charness and Haruvy (2004) where second-movers cannot reject their wage offer and all wage offers are private.[7] The remainder of the game structure follows the typical form of the gift-exchange game found in Fehr (1998). In a trading period, managers are given 100 points and they choose to give a wage $w \in \{0,1,....,99,100\}$ to the employee. After being informed of

[6] While there is currently a debate about whether experimental results are driven by the relative presence of students that have taken economics, see Fehr et al. (2006) and Engelmann and Strobel (2006), this is of less concern in our study since we are looking at relative changes between treatments, and subject pools across all treatments and sessions predominately consisted of students who had at a minimum taken introductory economics.

[7] In other designs of the game a continuous time market is created where firms offer wages that are accepted by a pool of workers. It was not possible to implement this design here because of the group communication structure used where groups can only communicate by proposing choices to their group member that either can accept. Also, Charness and Haruvy (2004) review gift-exchange experiments and show that public posting does not seem to affect results.

their wage, employees decide on effort or quantity of work, $q \in \{0.1, 0.2, ..., 0.9, 1\}$, which has an associated cost function, $c(q)$ [8]. This cost function is given by the schedule shown below.

Schedule of quantity of work and cost

q	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
$c(q)$	0	1	2	4	6	8	10	12	15	18

After quantity of work is determined, the managers income for the period is calculated as $MI = (100-w)q$. Income for the employees is $EI = w-c(q)$. Note that in the team treatments, the "manager" is actually a team of two subjects who jointly determine a wage. Similarly, the "employee" is a team of two subjects who jointly determine an effort level to supply to the management team after observing their wage offer. The way that teams determine wage and effort depend on the team treatment described below.

Given the sequential nature of the game, it is straightforward to show, using backward induction, that if all subjects were purely self interested, the Nash equilibrium outcome is $w = 0$ and $q = 0.1$. This equilibrium yields an income of 10 for the manager and an income of 0 for the employee. Note that the largest achievable social surplus is 100 points, which would be obtained if $q = .1$ and $w = 100$.[9] Subjects taking part in the group treatment are told that each member receives the total point amount from each transaction. In other words, it is not split between them. If their group earns 20 points they each receive this amount, not 10.

[8] Both 'quantity of work' and 'effort' are used in gift exchange experiments to describe the employees decision variable. Our instructions use the prior in the experiments, but we commonly use effort in this discussion for brevity.

[9] This result is unlikely since it requires a manager that is purely motivated by social efficiency preferences given that they know with certainty that they will accrue 0 points.

Before the start of the game all subjects perform a set of practice calculations to determine manager and employee pay under a range of possible wage and effort combinations. Each subject is also informed whether she was assigned the role of manager or employer, and that she will participate in five identical periods of the gift exchange game, where in each period, she will trade with a different subject on the other side of the market. For example, if she is an employee, she will be randomly rematched with another manager at the beginning of each period. This random rematching rules out repeated game effects. For the two team treatments where one team member is assigned decision making authority (AN and AC) subjects are informed of which role they have been assigned to.

We now provide the details of our treatments, which includes an individual treatment, which serves as a baseline for comparison, along with three team treatments. A detailed description of the individual and three group treatments is provided below.

Treatment 1: Individual Treatment (IN)

The individual treatment serves as the baseline treatment where individual managers trade with individual employees. In this regard, it is very similar to most gift-change experiments found in the literature.

Treatment 2: Asymmetric No Communication Team Treatment (AN)

The AN treatment is our first team treatment. A team is comprised of two subjects that are on the same side of the market. For example, a manager team is a team of two subjects that were assigned to the role of manager. An employee team is a team of two subjects assigned the role of employee. In each team, one member is assigned the role of "Decider" and the other

subject is simply a silent partner who observes passively. All subjects are told what role (manager or employee) they are assigned to before reading the instructions and that they will keep the same role throughout all five periods. They are also told that their pair member changes after every period. Deciders are told that they are paired with another person and will be making a decision on behalf of their team. They also know that manager teams and employee teams have the same procedure for arriving at a decision. The silent partners in both the manager and employee teams are informed of all relevant wage and effort decisions made by their Decider partners. Thus, the Deciders know that their partners will be informed of their decision. Also, there are no time limits on any decisions.

For both treatment AN and AC (described below) there is limited within and between group rematching. Looking first at within group pairings, recall that 6 subjects are assigned to be managers and 6 are employees. Subjects keep the same role over the five periods, so the three dictators are paired with all three non-dictators once, and two out of three twice. The same holds for between group pairings. The three management dictators are paired with each of the three employee dictators once, and two out of three twice. While this does introduce the possibility of strategic action resulting from repeated interaction the potential for this is limited by not identifying with whom one is paired or trading with.

The AN treatment was designed to determine whether group choices can deviate from individual choices purely as a function of group identity, as was looked at in CRR. Confounding factors created by the communication of expectations are minimized by eliminating interaction between partners and assigning complete authority to one person. Thus, of our three treatments, AN involves the least amount of interaction between teammates. To use terminology from CRR, compared to the other two team treatments the

groupings in AN are the least *salient*[10]. The strongest potential influence of group membership results from the authoritarian group member knowing that their partner is informed of their decision. Note that given that teammates are randomly assigned and determined purely by an act of chance, team identity can be construed as an illusion and we would anticipate that team identity should have minimal influence. Nonetheless, minimal group ties assumptions are often motivated by the psychological theory of *social identity theory*, which assumes that people's self identity is partly tied to perceived membership or ties to a group.[11] Previous research in social psychology has shown that even when people are randomly assigned to groups, they tend to discriminate in favor of group members (Billig and Tajfel, 1973).

Treatment 3: Asymmetric Communication Team Treatment (AC)

The AC treatment only varies the deliberation phase relative to AN. The difference is that the non-Decider is able to communicate his preferred decision to the Decider before the Decider chooses the team decision. The Decider, after observing the preferred decision of her teammate, then decides the actual wage or effort depending whether it is a manager team or employee team. For example, in the case of an employee team, both team members are informed of the wage the team received from the manager team and then the non-Decider suggests an effort. The Decider then decides the actual effort provided by her team. This treatment permits a limited degree of communication between teammates. That is, before the Decider chooses, she learns about her teammates preferences. For information on within and

[10] One way that CRR vary saliency is by altering whether the non-decision making team member is present to observe their teammates decision.
[11] See Haslam (2001) for a discussion of this theory.

between rematching in AC refer to the second paragraph in the above section on treatment AN.

Treatment 4: Bilateral/Unrestricted Communication Team Treatment (BG)

The BG treatment varies both the deliberation and decision phases relative to AN and AC. Each team member in the manager and employee teams have equal decision-making authority, and communication of desired decisions is much less restricted than in AC. The two team members in a pairing are given three minutes to negotiate an agreement on a decision. In negotiating a decision, each member is limited to offering a wage proposal (managers) or an effort proposal (employees) to her teammate by typing in the number they want. Both group members can offer as many proposals as desired and either team member can make the first offer during the negotiation period. The negotiation stage ends either when one of the offers is accepted or after 180 seconds. Each person sees all the previous offers they have made in the same negotiation stage, and all the offers their partner made in the same negotiation stage. If there is no agreement after 180 seconds both subjects on the team receive a payout of zero for that period. If this happens for the managers a wage of 0 is assigned to the employee team while minimum effort is supplied for employees if no decision is reached. During the actual experiments the average time to reach a decision for employees was 37 seconds, and only one pair went down to the final 5 seconds. Managers took more time on average to reach agreements, and one pair failed to do so within the time limit.

This form of group interaction has a number of attractive qualities. First, it eliminates a number of confounds that are created by text based discussion or face-to-face interaction which allow subjects to provide arguments. Factors including gender, race, physical stature,

speaking volume, and fluency with English could all affect written, spoken, or face-to-face negotiations. While each may play a key role in real world scenarios these factors are not the focus of this research. While restricting communication, subjects can transmit to their partner some level of preference intensity by repeatedly making the offer or by refusing to accept a partner's offer.

A second advantage of the communication format is that it allows for a detailed analysis of the group negotiation process. Analyses can thus be made about who made an offer, who accepted an offer, how many offers where made, and when they were made. It also reveals whether subjects with certain types of preferences tend to be more active in negotiations. An example of an actual employee group negotiation is shown in Figure 1. Again, this approach sacrifices written or spoken communication in order to gain detailed information about the negotiation process while minimizing subjective interpretation.

Group theories and Hypotheses

While economists have just recently begun to study group preferences and decision making, social psychologists have generated a significant amount of research on group decision-making in the last forty years. Their primary finding though that group decisions tend toward extremes relative to individual decisions, a phenomenon referred to as group polarization first discovered by Stoner (1961), was clearly of potential interest to economists[12]. The first economic study of group preferences was Cason and Mui (1997), which focused on integrating concepts from social psychology into economics, and to test two competing theories of group decision-making, Social Comparison Theory (SCT) and Persuasive

[12] Isenberg (1986) provides a summary and meta-analysis of the social psychology literature on group polarization.

Argumentation Theory (PAT), using the dictator game. They find that other-regarding behavior is accentuated in groups as individuals seek to represent their preferences as being less self-regarding[13]. According to Social Comparison Theory (SCT) people seek to display their preferences as being more extreme than average in the direction deemed preferable according to social norms. For example, among business students risk taking is considered to be an attractive trait, so a contest develops to present oneself as more of a risk taker than others. The result is that the group decision is less risk averse than would have resulted from each individual anonymously making decisions alone.

The results in Cason and Mui (1997) have been contradicted by more recent studies that have found that groups seem to act more strategically with less concern for the payoff of others; in other words, groups act in a manner more consistent with narrow self-interest. In ultimatum games groups play closer to game theoretic predictions by offering and accepting less equal splits (Bornstein and Yaniv, 1998). Cox (2002) found groups returning less money in trust games (another continuous form of response game) than individuals. In the study most related to this one, Kocher and Sutter (2007) also compare individual and group play in the gift exchange game.[14] While they do find groups acting in greater accordance with narrow self-interest in a treatment where individuals in three person groups vote, this finding is less strong in a face-to-face treatment. No significant difference between individuals and groups is found in terms of gift exchange. It has also been shown that groups differ from individuals in their level of trust in experiments with non-enforceable exchange. Kugler et al.

[13] Cason and Mui (1997) base their argument that other-regarding preferences are more socially acceptable on the standard finding that a large percentage of the population sacrifices to improve the pay of others in experimental designs such as the dictator and ultimatum games.

[14] While they also have one treatment that employs computerized interaction to track group decision-making dynamics, it is based on a discrete proposal and voting scheme that differs from the continuous time dynamic format used in this study.

(2006) find that groups transfer less money in the first stage of a trust game and expect less in return, although they return just as much money as individuals in the responding role.

One explanation for group behavior that has come out of field experiments is the importance of group identity. These studies look at how imagining oneself as part of a defined group may impact behavior as a result of focusing more on those within one's group relative to those outside. The logic is that a person that is willing to sacrifice their own pay to improve that of another person is unwilling to do so when this sacrifice also applies to someone inside their group to the betterment of an outsider. Goette et al. (2006) examined other-regarding behavior among soldiers for those in their temporarily formed platoon relative to soldiers outside their platoon. Even though the groups were temporary with no future, soldiers quickly formed a group identity and showed strong preferences for those inside their group relative to those outside. Solow and Kirkwood (2002) found that in some cases being part of a pre-existing group could increase contributions to public goods, results varied depending on a number of factors. In particular, in most settings group formation is endogenous meaning that certain types of groups are likely to attract particular types of individuals. The impact of this type of selection is likely just as critical to group decisions as general group processes are, and it has received limited study to date. The strength of group identity in contexts including sports teams, military units, corporate identity, or branding is likely to be the subject of many future studies.

It appears that most existing theories on group and team behavior predict that group decisions will deviate from individual choices. Thus, our main hypothesis is that *the level of gift-exchange observed in treatment IN will differ from the level of gift exchange observed in the team treatments AN, AC, or BG.*

However, there is significantly less consensus concerning the direction and magnitude of the deviation. Group polarization combined with social comparison theory suggest that groups may cause other regarding behavior to be accentuated in a direction deemed acceptable to social norms and expectations. The importance of social expectations seems to be confirmed by a paper by Dana et al. (2006) examining people's willingness to contribute in dictator games where social expectations can be manipulated. The authors suggest that much of what appears to be altruistic or other-regarding behavior can be confounded with attempts to satisfy social expectations of pro-social behavior. If this strand of theory is correct, *then we would anticipate that there could be more gift exchange in AN, AC, or BG than in IN.* Moreover, we would also expect differences in the level of gift exchange observed across the three team treatments as they differ in the degree to which teammates can communicate their expectations to each other. On the other hand, group identity theory would predict that people will be more loyal to team members than outsiders. Thus, if our subjects have social preferences, we would anticipate that they would have a stronger propensity to express these preferences toward teammates rather than the other team. Thus, *we would expect "team" decisions to exhibit less gift exchange than individual decisions.* While existing theories do not provide us with a clear prediction about the direction of gift exchange in teams relative to individuals, these theories may aid us with the interpretation of our results later.

II. Results

The experiment was performed with students enrolled on the main campus of Ohio State University in Columbus, OH from October, 2006 to July, 2007. Subjects were randomly assigned to specific roles within the experiment, and kept the same role throughout. Twelve

subjects took part in each session, and a total of 13 sessions were run. There were three sessions of IN, AN, and AC, along with four of BG. Since there are five rounds, a total of 30 wage and effort choices are made in each session for IN, while there are 15 for all the group treatments. For the total sample, there are 237 unique wage/effort contracts.[15]

Trends in average wage and effort across treatments and periods are shown in Table 1. Wages were higher in BG (41) and AC (42) than in AN (33) and IN (38). IN, BG, and AN were all similar in distribution around the mean with a standard deviation of about 23, as opposed to the more tightly grouped wages in AC where the standard deviation was 15. Mean effort for IN was 0.23 compared to 0.26 for AN, 0.36 for AC, and 0.23 for BG. Minimum effort was more than twice as frequent in BG (60%) than in AC (26%). IN was a slightly lower than BG at 56%, and lower yet in AN at 31%.

Figure 2 breaks down effort at different points in the wage schedule to provide some insight into mean effort across the treatments conditional on wage. AC stands out with higher effort choices in each wage range greater than 10 while effort was lower at high wages in BG. A notable exception in AC compared to the other treatments is that no managers ever assigned a wage of less than 10. The significance of w=10 is that when wages are lower than this cutoff point, it ensures that employees always fare poorly relative to employers. If employees consider these excessively low wages as unfair, it could trigger *concern withdrawal* (Charness and Rabin 2002) where the employee withdraws his willingness to sacrifice to help the employer.

Looking at the frequency of low wages, 23% percent of wages in the IN treatment were 10 or below. In the BG treatment 19% were in this range. This percentage drops to 4%

[15] Three observations were lost in BG due to a minor computer failure in the final period of one session.

(2 out of 45) in the AC treatment (it was equal to 10 in both cases). There is also significant variation in the frequency of high wages across treatments. In IN 32% of wage offers were above 50, while just under half were in BG (47%). AC was in between IN and BG at 36%, while AN was the lowest at 25%. Managers in the BG treatment appeared much more likely to offer high wages than those in the other treatments. It also seems that AC and AN differ from IN and BG in the lack of variance in wage offers. Very few observations are in the extreme low or high ends of the range in the group treatments with asymmetric power.

The average total surplus per contract per round was highest in the AC treatment at 56 points. It is followed by BG at 52, AN at 49.4, and IN at 46.3. If all subjects employed the Nash equilibrium strategy where wage is 0 and work is 0.1, income would be 10 for managers and 0 for employees. It appears that managers maintained higher levels of gift exchange by avoiding the very low wages that were common in IN and BG. Employees in AC also contributed to this by not deviating to minimum effort in round 1 and 2. Employees did earn fewer points on average in AC as a result of this, although the increase in managers points more than made up for it from a social surplus standpoint.

Pooling all the treatments, there is a downward trend in effort from period 1 to 5. The mean effort levels of the pooled sample by period were 0.35, 0.25, 0.26, 0.22, and 0.20. The mean wage for the entire sample for periods 1 through 5 was 45, 42, 41, 32, and 30. Figures 3 and 4 show the trend in mean wage and effort broken down by treatment and period. Also shown in Table 1, there is a clear downward trend in the pooled sample.

Regression Analysis

In order to assess the level of gift exchange observed in our experiments, we follow many previous studies of gift exchange by using a two-sided censored regression of the form:

(1) $q = \alpha + \beta w$

where the coefficient β represents the level of gift exchanges. Gift exchange exists if β is strictly positive as it implies that increases in wages will induce employees to supply more effort even though employees are not obligated to do so. Moreover, given that there is a downward trend in effort and wage, we include period and period-squared time trends in the regression. Moreover, because there are repeated observations for each subject, we also use random effects to estimate β.[16] In the IN, AN, and AC treatments this simply requires accounting for unobserved individual specific effects through a panel data model. In BG there are two individuals actively making one choice. Since the pairs change every round it is not possible to have group specific effects. Using individual specific effects requires including the wage and effort decision for each team member. Finally, we include an interaction term between the wage variable and a team treatment dummy. We specify a separate team treatment dummy for AN, AC and BG. We point out that we do not pool all team data together; instead, we conduct the same analysis for each of the three team treatments. Thus, we run three separate regressions of the form,

(2) $q = \alpha + \beta_1 w + \beta_2 TD + \theta wTD + \rho_1 P + \rho_2 P^2$

where *TD* is a dummy variable for either AN, AC, or BG; and *P* is a period trend variable. Note that θ represents the difference in the level of gift exchange between teams and individuals and is the key parameter of interest.

[16] This was implemented using the xtintreg command in STATA.

Table 2 provides a comparison of gift-exchange in all the group treatments compared to the individuals. These results provide a test of our main hypothesis which is that team gift exchange will differ from individual gift exchange. Before comparing the various team treatments to the individual (IN) results, note that gift exchange was observed by individuals. The estimate of β_1 is 0.01 and significant at the 1% level of significance. Moreover, the magnitude of gift exchange is in the same neighborhood as what was found in previous studies (e.g. Charness 2004).

We first compare the level of gift exchange observed in the AN team treatment to the level of gift exchange observed by individuals. Recall that AN involves an authoritarian decision maker with a completely passive teammate. Note here that, from a decision making perspective, the decision maker (henceforth, Decider) is essentially acting alone as if he were an individual. However, because the Decider was assigned a teammate, this raises the possibility that the group identity effect might still affect behavior. If this effect is behaviorally irrelevant, then we ought to observe an estimate of θ that is not significantly different from zero. The estimated coefficient is in fact -0.0015 and not significantly different from zero. Thus, it appears that association with a team did not lead to any significant differences in gift exchange in our experiments[17].

We now examine team results from AC. Recall that in this team treatment, a Decider still makes the decision but now her partner (henceforth Proposer) can communicate his preferred choice to the Decider before the Decider chooses effort. It turns out that allowing for one way communication has a large, positive, and significant impact on the level of gift

[17] A possible treatment that lies between IN and AN would have been one where the silent partner is only informed of their point total but not of the specific wage and effort choices. This would have controlled for whether the Decider was sensitive to beliefs about the expectations of their partner. The fact that there was no difference between IN and AN makes this treatment less interesting.

exchange observed. The estimate of θ is 0.005 and significant at the 1% level. Thus, the level of gift exchange exhibited by AC teams is dramatically higher than the level exhibited by individuals. Moreover, the sum of the coefficients for wage and the wage/TD interaction term gives us the estimated size of gift exchange by AC employee teams. This estimated sum turned out to be 0.015 and significantly different from zero at the 1% level of significance. To put this into perspective, gift exchange of 0.015 is 50% higher than what we estimated for individuals at 0.01.

Given the powerful effect that one way communication of effort appears to have, it would be interesting to closely examine the data on effort proposals by the Proposers in our AC sessions. We conducted a regression replacing q in (2) with preferred q by Proposers. Moreover, the TD dummy for AC and the interaction term were dropped because data on proposed effort is relevant only for the AC sessions. This regression yielded an estimate of gift exchange to be 0.0013 and not significantly different from zero (p=0.38). Hence, it appears that proposed effort is much less responsive to wages than the actual effort chosen by Deciders. The fact that Deciders exhibited a comparatively high amount of gift exchange whereas Proposers exhibited no gift exchange is somewhat of a puzzle. Examining the raw data might offer some explanations. First, average proposed effort is 0.38 which is very close to the actual effort chosen by Deciders (0.36). Note from Table 1 that the average effort of 0.36 is significantly higher than average effort from any other treatment. Thus, it is not out of the realm of possibility that the generosity exhibited by Deciders in AC is partially influenced by the generous effort proposals of the Proposers. Second, shown in the last row of Table 1, the percentage of trades for which employees chose the minimal effort of 0.1 is by far the lowest in AC. Only 31% of AC employee teams exerted minimal effort, whereas no less than

50% of employees in other treatments exerted minimal effort. Deciders also may have been influenced by the generosity of Proposers as only 27% of proposed effort were minimal. In sum, while proposed effort in AC appears to be non-responsive to wages so that there is very little apparent gift exchange, the proposals are nonetheless very generous. This generosity perhaps gave Deciders "permission" to also behave generously toward their managers. The main difference is that Proposers appeared to be unconditionally generous whereas Deciders were conditionally generous by rewarding generous wages with generous effort. We conjecture that perhaps being in the Decider role and being given the responsibility of making the final decision is more likely to arouse reciprocal preferences. Charness (2004) points out that the gift-exchange model can embody both distributional and reciprocal preferences, although it has the drawback of not making it possible to disentangle the two due to the multiplicative nature of the managerial pay function. That said, the behavior of Proposers more closely reflects distributional social preferences given the consistent trend of not supplying minimum effort. Deciders, on the other hand, were more likely to punish managers for giving low wages and also reward them when they are high. A plot of the difference between effort and proposed effort, shown in Figure 5, demonstrates that a wage of about 40 is where reciprocal preferences appear to switch from eliciting negative to positive reactions. The question remains though as to exactly how Deciders are being influenced by Proposers. One possibility for future research is to investigate how expectations of pro-social behavior by others influences a person's propensity to be generous.

We now turn to the team treatment BG where both team members have equal decision making authority. Recall that in this treatment, both team members are free to make offers whenever and as often as they want within the 3 minute time limit. A subject can accept a

proposal by her teammate at anytime and can make a counter-proposal at any time during this stage. Note from Table 2 that the estimate of θ in this treatment is -0.004 and significantly different from zero at the 10% level of significance (p= 0.08). Thus, there is tentative evidence that gift exchange decreased under this treatment. The estimated level of gift exchange exhibited by BG employee teams is 0.0065 and significantly different from zero at the 1% level of significance. This level of gift exchange is 35% lower than that exhibited by individuals in treatment IN and is in stark contrast to the level of gift exchange observed in AC, which was 50% higher than for individuals.

As mentioned earlier, the computerized communication mechanism used in this treatment makes it possible to track negotiations making it possible to potentially understand how decisions are reached. There does not appear to be a tendency for negotiations to move effort decisions up or down. The average first effort offer was 0.23, which is nearly identical to that for final effort (0.22). Within team analysis also does not reveal a directional drift. An interesting trend appears though when considering how much back and forth was required between team members to reach a decision that helps in revealing a connection between the nature of team interactions and group preferences. In 20% of the teams the first offer was accepted. The mode for number of offers was 2, which occurred 44% of the time. The remaining 36% were spread between 3 and 14 offers. A positive relationship exists between the number of offers and effort. The mean effort for 1, 2, and ≥ 3 offers was 0.12, 0.2, and 0.27, respectively[18]. One possible driver of this result is that teams that were given low wages agreed without controversy to reciprocate with low effort. For one offer teams the mean wage

[18] There is a clear delineation in the sample at wages around 38. Only one team assigned a wage below this took more than two offers. On the other hand, about half of the teams assigned a wage in the high 30's and above required 3 or more offers. There is no strong theoretical justification for the breaking point to occur at this wage point. It could simply be that many subjects perceive wages in the high 30's and above to be 'fair'.

and effort were 28 and 0.12, respectively. The average wage for two offer teams was 38, while it was 50 for teams requiring 3 or more offers. This trend is interesting relative to Luhan et al. (2007) who found that selfish types were more active and forceful in attempting to get the group to maximize their own pay. If this were true here it would seem likely that groups with more contentious negotiations would eventually agree to a lower effort level. The opposite appears to be true. This raises some potentially interesting questions about heterogeneity among other-regarding types. It could be that while one group are willing to undergo a cost in terms of negotiations to avoid a selfish action, a different portion of this subset is not willing to go through a difficult negotiation once they see that their teammate prefers not to sacrifice.

III. Discussion and Summary

We use a gift exchange game to compare other-regarding behavior exhibited by teams versus individuals. Our results are consistent with the hypothesis that the level of gift exchange exhibited by teams can differ from individuals, but the magnitude and direction of the deviation depends on the procedures that govern interactions among teammates in the team treatments. In our AN team treatment, where there is no interaction among teammates and one member of the team is chosen to be the decision maker while her teammate observes passively, there appears to be very little behavioral difference between groups and individuals. Thus, our first observation is that the random assignment of subjects to teams does not appear to form group ties that are strong enough to influence gift exchange.

However, in our other team treatments, we observed substantial deviation from individual behavior. In our AC treatment, one team member is assigned the role of "Decider"

while the other is the "Proposer". The Decider makes the ultimate decision for the team but before choosing effort, receives a recommended effort level from the Proposer. In this treatment, we observed significantly more gift exchange for teams than individuals. In contrast, in our BG team treatment where both team members have equal decision making authority and come to a team decision through multiple effort proposals to each other until a consensus is reached, we observed significantly less gift exchange for teams relative to individuals.

It is interesting to note that one of the fundamental differences between the AC and BG team treatments is that, in AC, there is only one way communication of a teammate's expectations via the Proposer's preferred effort. In contrast, in BG, both teammates communicate their preferred effort and as often as they wish. Thus, in AC, the Decider receives one signal from a teammate and then must act on the basis of that signal. In BG, there is much richer sharing of information as the parties can propose and veto multiple counter-proposals. These differences in communication structures raise some puzzles that might be interesting topics of investigation for future research. First, might a procedure that allows for richer sharing of information permit the team to ultimately make more rational decisions that benefit the team at the expense of outsiders? Might this drive the lower level of gift exchange in BG? Second, it is not clear how procedures for communication might affect perceptions of social expectations among teammates. Dana, Cain and Dawes (2006) have shown that other-regarding behavior in dictator games is non-trivially influenced by social expectations and pro-social norms. Some of what appears to be other regarding behavior by DCD's dictators may simply be attempts to conform to social expectations. In our AC experiments, our Proposers were quite generous in their effort proposals much like many

dictators in dictator games. The generous effort proposals may generate social expectations that wield a powerful influence on the Deciders. Our data indicates that Deciders did choose effort levels that are fairly close to the effort proposals of Proposers. Thus, there appears to be some evidence of pro-social conformity. In BG, social expectations are endogenous and can evolve through the negotiation process before the team acts. It is not clear to us at this point whether this difference in social expectation formation might explain the differences in observed gift exchange. It would be interesting to explore the formation of social expectations further and to examine how these expectations interact with social preferences. Answers to these questions might aid in the design of optimal team and organizational structures that facilitate the achievement of team objectives.

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V. Tables and Figures

	Pooled		IN		BG		AC		AN		Period Mean	
Period	Effort	Wage	Effort	Wage	Effort	Wage	Effort	Wage	Effort	Wage	Effort	Wage
1	0.35	45	0.27	41.7	0.38	53.2	0.47	44.7	0.37	39.4	0.35	45
2	0.25	42	0.26	38.9	0.23	49.1	0.32	37.2	0.2	39.4	0.24	42
3	0.26	41	0.24	43.1	0.18	38.7	0.43	42.2	0.2	36.8	0.26	40
4	0.22	32	0.17	25.1	0.17	33.2	0.36	44.9	0.24	31.1	0.23	34
5	0.21	30	0.21	27.4	0.17	30.6	0.23	42.2	0.19	20.7	0.22	30
Treatment Mean	0.25	38	0.23	35	0.22	41	0.36	42	0.24	33		
% Effort = 0.1 (min)			56		58		31		58			

Table 1. Average Wage and Effort by Period and Treatment.

	AN vs. IN	AC vs. IN	BG vs. IN
Constant	-0.203	-0.192	-0.06
	(0.122)	(0.115)	(0.13)
Wage	0.01***	0.01***	0.01***
	(0.002)	(0.0014)	(0.002)
TD	-0.093	-0.03	0.094
	(0.148)	(0.157)	(0.124)
Wage*TD	-0.0015	0.005**	-0.004*
	(0.003)	(0.002)	(0.002)
Period	-0.173**	-0.023	-0.25***
	(0.086)	(0.065)	(0.072)
PeriodSq	0.028**	0	0.041**
	(0.014)	(0.011)	(0.012)
Sum of Wage and Wage*TD	0.009***	0.015***	0.0065***
	(0.002)	(0.002)	(0.002)

Notes: *, **, and *** denote significance at the 90%, 95%, and 99% confidence levels. Standard errors are in parentheses. Treatment abbreviations are IN=Individual, BG=Bilateral Groups, AC=Asymmetric Communication, and AN=Asymmetric No Communication. TD represents the treatment dummy.

Table 2. Random Effects Censored Regression Comparing Gift-Exchange in Each Group Treatment to the Individual Treatment.

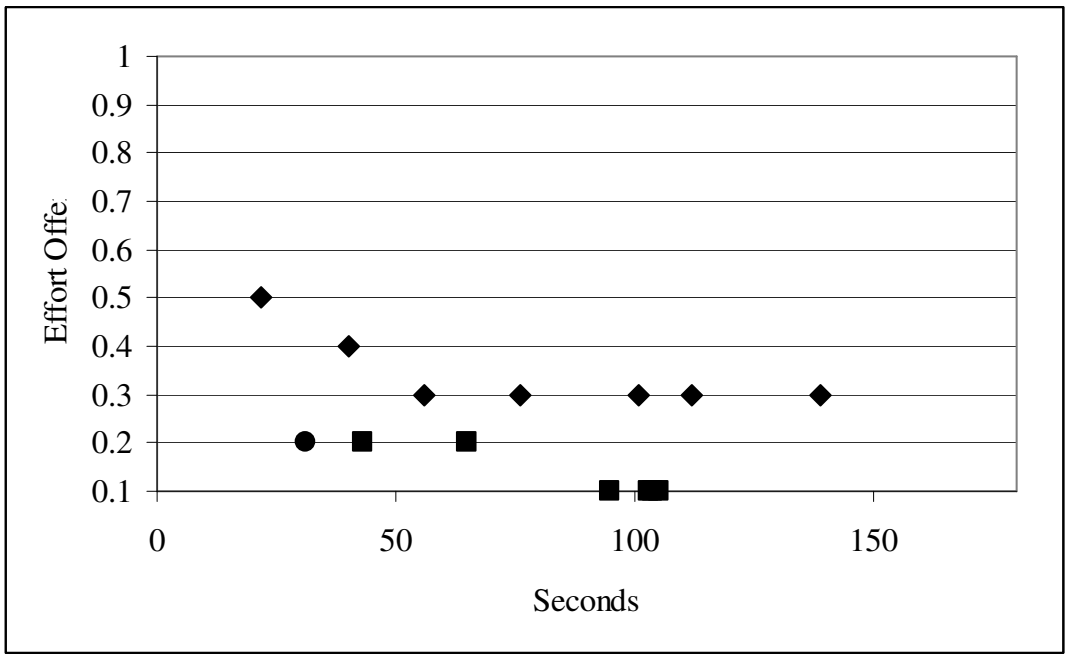

Figure 1. Actual Employee Team Negotiation in Treatment BG.

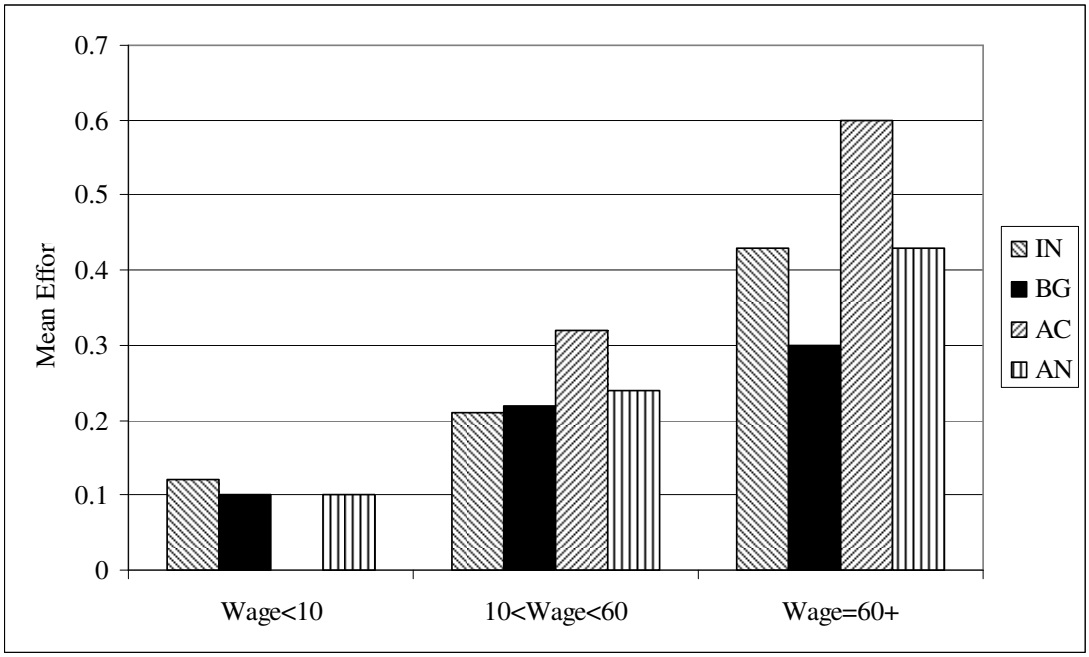

Figure 2. Mean Effort by Treatment at Low, Medium, and High Wages.

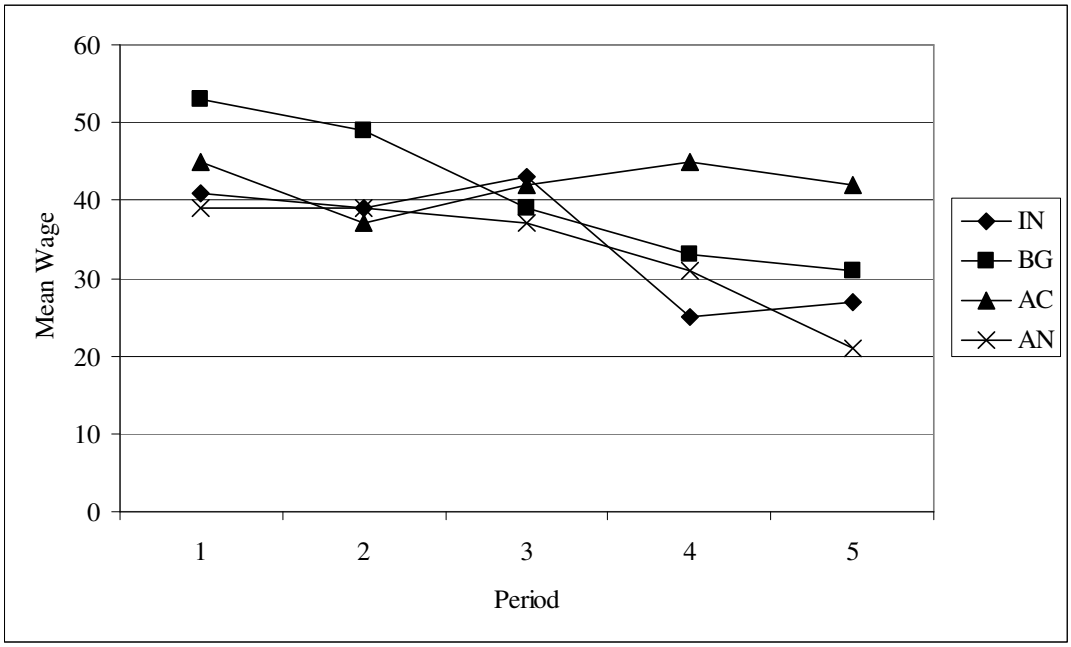

Figure 3. Mean Wage by Period and Treatment.

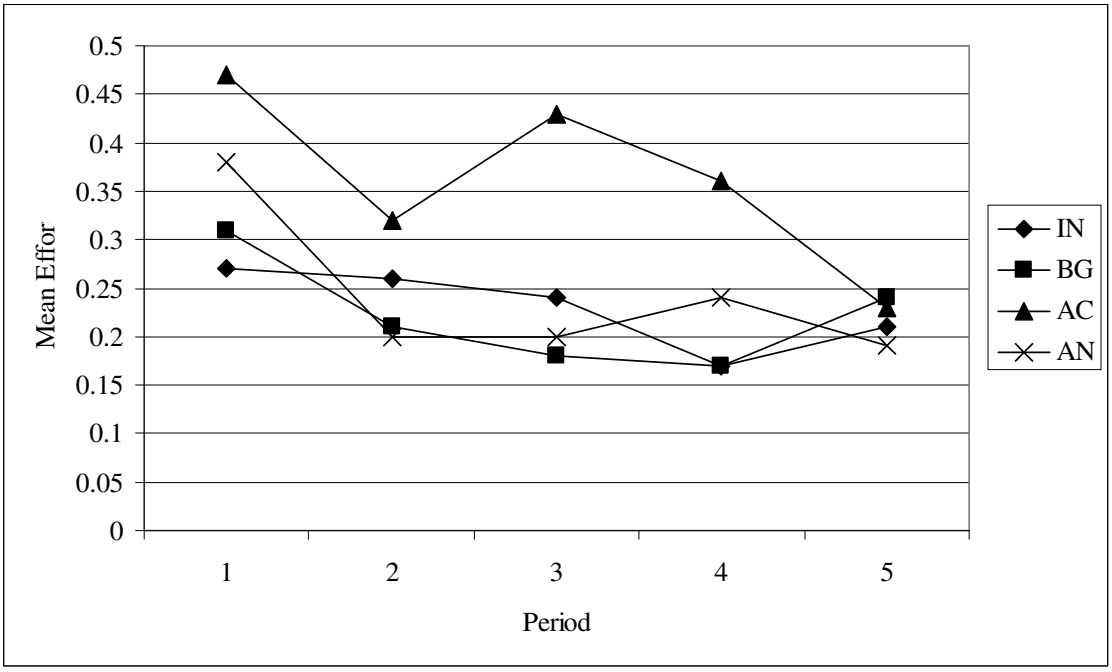

Figure 4. Mean Effort by Period and Treatment.

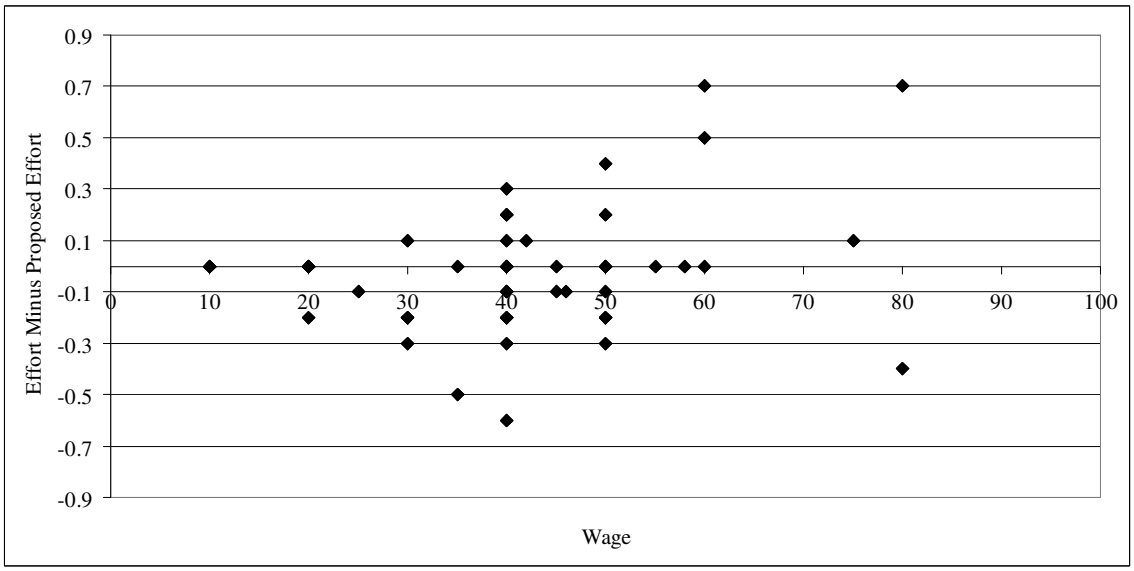

Figure 5. Plot of the Difference Between Effort and Proposed Effort for the Treatment AC Sample.