Subjective Performance Evaluation and Social Preferences: An Empirical Investigation of Fairness and Trust Reciprocity

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ABSTRACT

Using a quasi-experiment, we investigate a team production setting, examining the circumstances under which managers are willing to incur a personal cost to obtain *ex post* non-contractible information in order to evaluate and reward their subordinates more fairly. In contrast to the standard self-interest model but consistent with models that incorporate preferences for fairness and trust reciprocity, we show that managers are prepared to incur a personal cost in order to ensure that their subordinates receive rewards in proportion to their individual contributions to joint production. Moreover, our findings indicate that superiors' willingness to pay increases as the noisiness of the aggregate (team) performance measure increases and as aggregate performance increases. The study contributes to the existing literature on subjective performance evaluation by investigating the effects of social preferences of subjective performance evaluation.

Keywords: *subjective performance evaluation, discretion reciprocity, fairness, trust, third-party punishment, experimental economics.*

Data availability: *The data from this study and the set of instructions for the experimental task are available from the researchers upon request.*

I. INTRODUCTION

Accounting research on incentives and contract design has traditionally taken an agency theory approach, deriving optimal contracts based on objective performance measures (e.g., Holmstrom 1979). In more recent years, this line of research has expanded to consider subjective performance evaluation (e.g., Rajan and Reichelstein 2006). The intuition behind this newer line of research is that subjective performance evaluation can be optimal when superiors have access to non-contractible information, which supplements contractible information to provide a more complete picture of performance. For example, accounting metrics, while contractible, are often noisy measures of individual performance, because they are highly aggregated and reflect information uncontrollable by a particular individual. Additional information, such as that obtained via supervisory observation and investigation, may be useful in filtering out that noise.

The analytic research makes the rather counter-intuitive assumption that non-contractible information is fully anticipated. That is, the superior and the subordinate have *ex ante* common knowledge of the distribution of possible outcomes on all performance measures, both contractible and non-contractible. The optimal contract can place non-zero weight on any or all of these measures, but only the weights placed on contractible measures are legally enforceable. Therefore, these models rely on mechanisms of self-enforcement to allow superiors to credibly commit to weights placed on non-contractible measures. For example, the use of a discretionary bonus pool, which is funded formulaically (in total) and therefore unaffected in total by the superior's allocation decision, mitigates any temptation on the part of the superior to renege on the *ex ante* weights placed on non-contractible information.

This prior research assumes that non-contractible information, which is included in the contract *ex ante*, is readily available to the superior *ex post*. In reality, non-contractible information often must be sought, at a personal cost to the evaluator. In this paper, we examine the circumstances under which managers are willing to incur a personal cost to obtain *ex post* non-contractible information in order to evaluate and reward their subordinates more fairly.

We conduct our investigation using a quasi-experiment in a team production setting with a discretionary bonus pool. More specifically, in our setting, two individuals engage in a team effort, such that only their combined effort can be observed costlessly (Alchian and Demsetz 1972). A bonus pool is funded based on this aggregate performance measure, and the superior is given discretion to allocate the bonus pool. Using theory from behavioral economics, we predict that the superiors' utility for fairness will lead them to engage in a costly *ex post* search for non-contractible information, which will allow them to unravel the aggregate performance measure in order to more fairly allocate the bonus pool. Consistent with this prediction, we find that the majority of the participants acting as superiors are prepared to forgo wealth to prevent subordinate participants from receiving an unfair allocation. In addition, we find support for our hypothesis that superiors' willingness to conduct a costly investigation increases as the aggregate performance measure becomes a more noisy measure of individual performance (i.e., as the potential unfairness of an uninformed allocation increases). Finally, we rely on theory on trust reciprocity to predict that as aggregate performance increases, superiors will be more willing to conduct a costly investigation. We also find support for this hypothesis, consistent with the notion that the superiors' preferences for fairness are contingent on a belief that the subordinates have earned the right to be treated fairly.

Our study follows up on recent work that uses experimental economics and behavioral game theory to increase our understanding of management accounting issues (Hannan et al. 2002; Kachelmeier and Towry 2002). A primary contribution of this paper is an increased understanding of how social preferences affect the use of non-contractible information in performance evaluations (Ittner et al. 2003). While it is well established in the literature that evaluation decisions may be influenced by the evaluator's self-interest (Prendergast and Topel 1993) and or cognitive biases (Lipe and Salterio 2000; Moers 2005; Bailey *et al.* 2008), relatively little is known about how social preferences affect the decisions of evaluating managers. An important implication of our findings is that managers' subjective evaluation processes are likely to involve a trade-off between fairness, trust reciprocity, and the (opportunity) costs of acquiring extra information.

From a more fundamental behavioral economics perspective, one unique aspect of our study is that we focus on a third party's willingness to pay for information that tells them whether or not a situation of unfairness will materialize without their intervention. While situations in which such ambiguity is present are common in practice, we know little about how decision-makers react in these situations. Our study shows that managers' decisions in these situations are influenced by a concern for fairness and a desire to repay trust. We furthermore find that participants' deviations from the model of "economic man" cannot be fully explained by inequality aversion (Bolton and Ockenfels 1993; Fehr and Schmidt 1999), as the superiors in our study often use information about relative efforts to increase rather than decrease differences in payoffs. The findings instead support models of third party punishment and the notion of "strong reciprocity" (Charness and Rabin 2002; Fehr et al. 2002).

This paper proceeds as follows. In Section II we provide the theoretical background of our study and develop our hypotheses. Section III describes our research design. In section IV we present our primary results, while Section V contains some additional analyses, including an analysis of the decisions of the subordinate participants (which are not the focus of this study). Finally, Section VI provides a discussion of our results, conclusions and directions for future research.

II. THEORY AND HYPOTHESIS DEVELOPMENT

Background

While the accounting literature often focuses on complete contracting based on objective performance metrics, the use of subjectivity in performance evaluation is quite common in practice (Gibbs et al. 2004). An important reason for the use of subjectivity or discretion is that contracts are typically incomplete, and subjectivity allows superiors to factor in the effects of non-contractible information. More precisely, contractible performance metrics usually provide only noisy measures of individual employee performance. For example, macro-economic changes can have profound effects on contractible performance metrics such as profitability. These macro-economic changes are uncontrollable and often unanticipated, and superiors can use their discretion to untangle the effects of such factors from performance metrics. As another example, some aspects of performance can be observed but not written into contracts. Consider an employee's positive attitude or inclination to support and cooperate with others. These valuable attributes are non-contractible, because they cannot be jointly verified by an independent third party. However, through subjectivity, the superior may consider these attributes in the employee's evaluation and compensation.

Subjectivity provides superiors with the opportunity to reduce the noise inherent in purely objective performance metrics, potentially reducing risk to the employee and, consequently, reducing the cost of incentive contracting (Baker et al. 1994). Further, it can lead to perceptions of procedural fairness in performance evaluation (Landy et al. 1978; Giraud et al. 2008). Many studies show perceived fairness of evaluation procedures has significant effects on employees attitudes and behavior (Taylor et al. 1998; Erdogan 2002; Taylor et al. 1995). For example, Taylor et al. (1998) show that employees who perceive their evaluation process to be more fair are more satisfied with their job, show higher levels of work motivation and are less likely to act in counterproductive ways.

The use of subjectivity will not guarantee a reduction in the risk that employees face. Rather, this risk reduction depends on the superior's willingness to seek out relevant non-contractible information and to use it in evaluating employee performance. Such an information search is likely to be costly. First, it may rely on information systems (formal or informal) that capture relevant non-contractible information. Second, investigations have opportunity costs attached to them, as evaluating managers can invest their time and (cognitive) effort in ways that are more congruent with their direct self-interest. In line with this, existing research has found that in the absence of explicit incentives to use subjectivity to reduce the noise in performance measures, evaluators' judgments may be influenced by their monetary self-interest (Ittner et al. 2003; Prendergast and Topel 1993) and by cognitive biases (Moers 2005; Ghosh and Lusch 2000; Lipe and Salterio 2000). Not much is known, however, how about how social preferences affect subjective performance evaluations. These effects may be substantial, as existing research indicates that preferences for honesty, fairness and reciprocity impact a wide range of individuals' economic decisions (Fehr and Fischbacher 2002; see Camerer 2003 for a review), including decisions within the domain of management accounting (Matsumura and Shin 2006; Hannan 2005; Evans et al. 2001). In this paper we use a quasi-experiment to examine the conditions under which superior managers preferences for fairness and trust reciprocity influence their willingness to incur a cost in order to obtain the opportunity to evaluate and reward their subordinates more fairly.

Basic setting

In our study we focus on noise in performance metrics caused by interdependence between subordinates (e.g. Abernethy et al. 2004). More precisely, we consider a situation in which subordinates engage in team production, such that only the only contractible measure is their joint production. This joint production metric is a noisy measure of each subordinate's individual contributions. We focus on interdependence because it is a common source of noise in organizations and particularly likely to produce situations of perceived unfairness, as the gain of one subordinate tends to be the loss of another one (Gibbs et al. 2004). The basic setting involves two subordinates and one superior. Both the subordinates and the superior receive a fixed salary. The subordinates independently choose how much effort (operationalized as a monetary cost) to direct toward a common project, and their combined effort determines the aggregate performance. As is common in practice, a bonus pool is funded formulaically on the basis of aggregate performance, but the superior has full discretion over the allocation of the pool between the two subordinates. Importantly, the superior can gain information on individual contributions to aggregate performance only via a costly search. Operationally, we give the superior the opportunity to purchase *ex post* information about the individual effort levels of the subordinates. The subordinates know about the superior's option to obtain and use the information *ex post*. However, the setting does not allow communication, and so the superior cannot commit *ex ante* to obtaining the information. The experimental setting is described in more detail in section III.

Subordinate behavior

While the main focus of our study is on the behavior of superiors, we begin by considering subordinate behavior. In choosing an effort level, each subordinate must predict both the effort of the other subordinate and the probability that the superior will obtain and use information on individual contributions to joint production. Suppose a subordinate expects the superior to maximize his/her monetary pay off, which means that s/he will not be willing to incur a cost to obtain this information. In this situation, the subordinate can reasonably expect to receive an allocation equal to half of the bonus pool.[1] As long as the return to effort is between zero and 100% (i.e. the size of the total bonus pool is somewhere between the total cost of effort and twice the total cost of effort), then subordinates effectively find themselves in a prisoner's dilemma, where the dominant strategy is to choose zero effort. Table 1 demonstrates the relation between the cost of effort and the total bonus pool using the parameters used in this study. Note that the return to effort is 50% in this setting, in that the total bonus pool is funded as 150% of the total of the two subordinates' effort levels. From this table it is clear that a subordinate will always be better off by choosing less than the other subordinate, so that the Nash equilibrium is an investment of zero for both subordinates.

[1] There are two reasons why in this situation the subordinate should expect to get half of the bonus pool. First, superiors may distribute the pool randomly over the two subordinates, in which case the long term average allocated reward will be 0.5 times the bonus pool. Alternatively, research (e.g. Bailey et al. 2006) suggests that in absence of information most superiors will anchor on a 50-50 split. In both cases the expected value is half the bonus pool.

Suppose, on the other hand, that the subordinate expects the superior to willingly incur a cost to obtain information on individual contributions to joint production and then to allocate the bonus pool based on individual effort. In this case, the subordinate's optimal strategy is to maximize his/her effort, as every unit of effort returns a positive reward. If the assumptions of the standard agency model hold, the result in a one period world would be the Nash equilibrium of zero effort and no productive output. However, if subordinates believe superiors' social preferences may lead them to seek additional information, in order to reduce the noise associated with the aggregate performance metric, the subordinates can gain by engaging in effort.

Superior behavior

Under the assumption that the superior maximizes wealth, standard economics-based reasoning suggests that in a one-period world superiors will never choose to engage in a costly ex post investigation, because doing so would reduce their monetary pay off. Psychological theories of organizational justice (Cropanzano et al. 2001) and recent insights from experimental economics and behavioral game theory (Camerer 2003; Fehr and Schmidt 2003), however, suggest that individuals care about fairness and trust reciprocity. We extend this line of research to consider how superiors' social preferences for fairness and trust reciprocity will influence their willingness to incur a cost in order to obtain information on individual contributions to joint production. More specifically, we investigate the conditions under which superiors will be willing to incur such a cost.

Because of their preferences for fairness, we predict that superiors will often be willing to incur a cost to obtain this information By engaging in a search and by acting on the resulting information, the superior can ensure that each subordinate earns a fair allocation, thus rewarding subordinates who act cooperatively, punishing subordinates who try to free-ride, and enforcing a social norm of cooperation (Fehr and Fischbacher 2004b; Fehr et al. 2002; Hannan et al. 2008). Studies suggests that people derive utility from enforcing social norms (Bendor and Swistak 2001; Fehr and Fischbacher 2004a) and that one important social norm in human societies is acting cooperatively and refraining from free-riding behavior (Gintis 2000; Fiske 1991). Accordingly, there is some evidence of a basic human tendency of being prepared to pay for rewarding cooperative behavior and punishing uncooperative behavior of others, even if this behavior was directed towards some third party (Fehr and Fischbacher 2004a, 2004b). Three studies in particular show that observers are prepared to pay for a fairer distribution of valuable resources between two other individuals (Turillo et al. 2002; Fehr and Fischbacher 2004b; Kahneman et al. 1986).

First, Kahneman, *et al*. (1986) report that 75 percent of their experimental participants were prepared to incur a small cost to reward cooperative and punish uncooperative behavior. In their experiment, participants were given the choice between an equal split of $12 between them and someone who had acted uncooperatively in an earlier experiment and an equal split of $10 between themselves and someone who had acted cooperatively in the earlier experiment.[2] Turillo, *et al* (2002) replicate this experiment and find a similar 73 percent of their participants choosing the self-sacrificing split with the cooperator. In a series of follow-up experiments they disentangle the effects of rewarding cooperation and punishing uncooperative selfishness and find that individuals were prepared to pay for both. They also find that knowledge about individuals' uncooperative or unfair behavior in the past makes it even more likely that participants will be willing to pay some money in order to punish the unfair individual. Finally, Fehr & Fischbacher (2004b) let their

[2] The cooperative person had chosen a $10/$10 split between themselves and someone else instead of an $18/$2 split, while the uncooperative person had chosen to take the $18 and leave the other participant with $2.

participants observe two other individuals who play prisoner's dilemma games and dictator games. Regarding the prisoner's dilemma they find that almost half of their participants were willing to incur a cost to punish a player who had defected in a prisoner's dilemma game where the other player had acted cooperative. In the dictator game more than 60 percent of the third party players accepted a lower pay-off to punish a selfish dictator.

Based on this prior literature, we begin with a baseline hypothesis, suggesting that superiors will generally be willing to conduct a costly search for information on individual contributions to group production. We then move on to two variables we expect to moderate this willingness.

> **H1**: Superiors are willing to incur a cost in order to obtain *ex post* information on the individual contributions to joint production.

We furthermore expect the degree of this of unselfish behavior to increase with the noisiness of the aggregate performance measure as an indicator of individual contributions. In other words, superiors will be more willing to engage in a costly information search when they have greater uncertainty about whether allocating the bonus pool without such an investigation will result in an unfair allocation.

In our setting, the noisiness of the aggregate measure is operationalized as the number of possible combinations of effort choices by the two subordinates that could have led to the observed outcome. More specifically, the aggregate measure of team performance becomes a noisier measure of individual effort as it moves away from the extreme (high or low) outcomes. This point is illustrated in Table 1. In our setting, the aggregate performance measure is simply the sum of the two subordinates' effort levels (Recall that the total bonus pool equals 150% of this aggregate measure of team performance.) While this measure contains no noise with respect to the *team's* performance, it is a noisy measure of *individual* performance, and the degree of noise depends on the outcome. Suppose first that the aggregate measure equals zero. This can only mean that both agents have chosen to use no effort at all, and so in this case, the aggregate measure is also a perfect measure of individual performance. Similarly, if the aggregate measure is twenty (resulting in a total bonus pool at the maximum of 30), this can only mean that both agents have put forth their maximum effort. At all other levels, more than one combination of effort choices by the two subordinates is possible.

In our setting, the number of possible combinations is maximized at 11, for a combined effort level of 10 and a total bonus pool of 15. Note in Table 1 that there are 11 different combinations of effort that lead to a total bonus pool of 15. Importantly, an aggregate performance measure equal to 10 might indicate that both subordinates have invested a medium amount of effort (5) or alternatively, that one subordinate has invested the maximum of 10 and the other nothing. Therefore, if the aggregate measure of performance equals 10, it is a very noisy measure of individual performance. This is in contrast to the extreme aggregate measures of 0 and 20, which are noiseless measures of individual effort.

Thus, as the aggregate performance measure moves away from the extreme outcomes, it becomes a noisier measure of individual performance, and it becomes more likely that there is a substantial difference between the efforts provided by the two subordinates. Accordingly, it becomes more likely that an equal split of the bonus pool will punish a subordinate who has invested a substantial amount of effort and reward the uncooperative behavior of another subordinate. As the literature suggests individuals want to ensure just desserts (Mohtashemi and Mui 2003; Carpenter et al. 2004; Fehr and Fischbacher 2004b), superiors will be prepared to incur a greater cost for information on individual contributions to joint production as the aggregate measure becomes lessinformative about individual efforts. This is reflected in the next hypothesis:

> **H2:** The cost that superiors are willing to incur in order to obtain information on individual contributions to joint production increases as the outcome of the aggregate performance metric becomes a more noisy measure of individual performance.

Finally, we consider the effect of the aggregate performance measure outcome itself on the willingness of superiors to incur a cost to obtain information on individual contributions to joint outcome. We expect that superiors will willing to incur a greater cost if doing enables them to differentiate between two subordinates who have performed relatively well in the aggregate than if it enables them to differentiate between two subordinates who havce performed relatively poorly in the aggregate. We base this prediction on the notion of trust reciprocity. Specifically, when a subordinate chooses to invest effort, knowing that his/her return depends on the superiors' subjective assessment, s/he signals trust in the superior. Superiors will derive utility from repaying this trust by ensuring that the subordinate earns a fair return on his/her effort (Berg et al. 1995; Hannan 2005; Hannan et al. 2002). This prediction is consistent with the considerable literature suggesting that individuals are prepared to repay other individuals who have made a trusting decision (Berg et al. 1995; Dufwenberg and Gneezy 2000; Fehr and Schmidt 2003)[3]. In contrast, if the aggregate performance measure indicates that both subordinates have invested limited amounts of effort, the superior will feel less inclined to incur a cost to ensure that the bonus pool allocation fairly reflects individual contributions, because both subordinates have placed little trust in him/her. In this case, the superior is likely to allocate half of the bonus pool to each subordinate.

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[3] For details of these games and extensive reviews of this literature see (Camerer 2003) and (Fehr and Schmidt 2003).

To illustrate, again refer to Table 1. Suppose that the aggregate performance measure equals 19 (resulting in a bonus pool amount of 28.5). This observation is associated with two possible combinations of effort by the two subordinates, as it is certain that one subordinate has invested 9 and the other 10. Both subordinates have invested substantial effort however. Now compare this situation with an output signal of 1. Again, this output can only have come about by two different effort distributions (0 and 1 or 1 and 0). Yet, in this case both subordinates have clearly acted uncooperatively. We hypothesize that superiors' willingness to investigate who has provided the higher level of effort is stronger in the former case than in the latter:

> **H3:** Holding the noisiness of the aggregate performance measure constant, the cost that superiors are willing to incur in order to obtain information on individual contributions to joint production increases as the aggregate performance measure increases.

Figure 1 provides a graphical representation of our three hypotheses.

III. RESEARCH DESIGN

Quasi-Experimental Design

We conducted a three-person game that combines elements of a one- shot prisoner's dilemma and the trust game of Berg et al. (1995). Participants interacted with each other through a computer network in the laboratory. The game was programmed using the software package Z-tree (Fischbacher 2007). Table 2 lists all design parameters and variables, and Table 3 provides a time line of the ten stages in each round of each session. All monetary amounts were denoted in an experimental currency (Lira) which has a value of 0.5 Euro.[4] As shown in Table 2, the endowment of the subordinates was 10 Lira and the endowment of the superiors was 15 Lira.

[4] At the time the experiment was run the exchange rate was 1.55 US Dollar for 1 Euro.

Notably, the superiors' pay is not a function of the subordinates' effort choices. We make this design choice to enable ourselves to disentangle the effects of the social preferences of interest from the effects of reputation formation. (As described below, our rematching protocol enhances our ability to do so.) Notably, this design choice biases against finding the hypothesized effects.

We used the strategy method to assess the variable of interest in this study: superiors' willingness to pay for information about individual effort levels. Participants were informed that there was an actual price for the information, which was unknown and would be determined randomly by the computer. After the subordinates had decided about their effort levels in stage 3 and all three players had learned the value of the available bonus pool in stage 4, the superiors made a price offer for the information in stage 5. The actual price was determined using a random draw in stage 6. Superiors only obtained the information, at the *actual* price, if the offer was at least as high as the actual price. If the offer was below the actual price, the superior did not receive the information and paid nothing. All participants knew the (uniform) probability distribution of the actual price of the information. They were informed at the start of the session that the price of the information varied between 0 and 5 Lira, such that for an offer of 0 a superior was certain not to receive the information, while for an offer of 5 Lira s/he was 100 percent certain to receive the information. The chance of obtaining the information increased linearly with the offer between 0 and 5 lira (e.g. for an offer of 3 Lira a superior hasd a chance of 60 percent of getting the information). Independent of whether a superior had obtained the information, s/he was required to divide the bonus pool over the two subordinates in stage 8.

In total, we conducted twelve sessions with eight rounds each. Accordingly, each participant engaged in eight separate games. Participants interacted with each other anonymously through a computer network and new groups of three participants were created at the start of every round using a stranger design matching pattern. While participants could be re-matched with another participant up to two times, they were never in the same triad more than once. Halfway through the session, after round four, all participants who played the role of superior in the first four rounds changed roles to act as subordinate in the second four rounds. Also, half of the participants acting as subordinate in the first half of the session changed roles and acted as superior in the second half.

Participants and experimental procedures

The participants are undergraduate students from a business school in The Netherlands. In total 126 students participated in the study. The mean age of the participants was 20.4 years, with the youngest participant being 18 and the oldest 29. There were 42 (33 percent) female participants and 84 (67 percent) males. All twelve sessions were run with either twelve or nine participants.[5] In total there were 84 different superiors and 336 unique triads / games.

The students self-registered as participants in response to an invitation on the university's laboratory web site. Course credits were used as a show up fee. The actual payout in Euros for the participants was determined by randomly selecting one of the eight rounds as pay round at the end of the experiment and converting the Lira payoff from this round to Euros. The average amount paid-out was 6.58 Euro with a minimum of 0.83 Euro and a maximum of 11.93 Euro.

[5] The laboratory had twelve computers available and we ran sessions with nine participants only if less then twelve of the registered participants showed up. In total there were six sessions with nine and six sessions with twelve participants.

The laboratory consisted of a central area surrounded by 12 cubicles, each with a PC, and a control room. The cubicles had doors that could be closed, so the participants could not see or hear each other during the experiment. Upon arrival the students entered a waiting room. As it was time, one of the researchers collected them from this room and escorted them to the laboratory. Another researcher explained the basic rules of the study (e.g. no talking, mobile phones switched off, procedures regarding payout after the last round) and told the participants that they would find a set of instructions on their keyboard. Next, the participants drew an envelope from a stack. This envelope contained a card with a number that corresponded to the number of a cubicle. They entered their cubicle and started reading the instructions. The number of the cubicle determined the roles a participant would play in the first and second half of the experiment (superior - subordinate, subordinate - superior or subordinate - subordinate).

The computer task started automatically, about 10 minutes after the participants entered their cubicle. This gave them ample time to read through the set of instructions. This set consisted of 4 pages and explained the basic setting and the task as well as an example. It also explained the procedures for determination of the participants' pay-off and emphasized that they would be actually interacting with each other and that the researchers promised to refrain from deception of any kind. To prevent negative connotations, the instructions described the roles of the players as a division manager and two business unit managers instead of a superior and subordinates.

The computer task started with an instrument used to assess the participants' risk aversion. The instrument was taken from Holt and Laury (2002) and asked participants about their preferences for a series of lotteries. The risk aversion instrument was followed by a set of questions about the experimental task, which served as an understanding check of the instructions. Participants could not continue without having given the correct answer to all questions. After all participants had successfully completed the understanding check, the first round began. On average, the eight rounds of the experiment took the participants 25 minutes. During the experiment the participants had the opportunity to refer to hardcopies of Table 1, which were placed on their desks. After the last round the participants completed an exit questionnaire. This questionnaire was used to gain a better understanding of the motives behind participants' decisions. Finally, after filling in the questionnaire, the pay round was determined and participants collected their money and left.

As part of the exit questionnaire we measured two personality traits: *trust propensity* and *morality*. Trust propensity refers to individuals' general tendency to be trustworthy of others. Individuals scoring low on this construct tend to be more suspicious and attend more to their environment when forming trust judgments (Colquitt et al. 2006; Mayer et al. 1995). Morality refers to a personality trait associated with relatively high sensitivity to justice concerns and a tendency to ascribe responsibility to individuals (Zuckerman and Reis 1978; Colquitt et al. 2006). Trust propensity, trait morality and risk aversion have all been shown to affect individuals' behavioral responses to situations of (in)justice. Following Colquitt et al (2006) we measured both trust propensity and morality with five items from the International Personality Item Pool (2001). Cronbach alpha for trust propensity was 0.75 and for morality it was 0.71.

IV. RESULTS

Descriptives

In analyzing our data we first look at the pooled data from all 336 triad observations. Table 4 contains descriptive statistics. In the exit questionnaire, we asked participants three questions regarding their involvement in the session. The items and descriptive statistics are provided in Panel C of Table 4. These indicate that most participants participated seriously in the session, made their choices after some deliberation, and cared about the outcomes of their decisions. Table 5 (discussed under hypothesis tests) provides the primary statistical analysis. In addition, Tables 6 through 10 provide various other supplemental data.

Hypothesis tests

Our first hypothesis (H1) predicts that on average, superiors will be willing to incur a cost in order to obtain information about individual contributions to joint production. The mean price offer is 2.08, which is significantly higher than zero ($p < 0.01$), providing support for H1. A closer look at the offers reveals that a select group of eleven superiors (13.1 percent) exhibited the typical behavior of the "homo economicus," offering 0 Lira for the information in all four rounds in which they act as superiors. Three other superiors also kept their offers constant, though above zero. Two of these made the maximum offer of 5 Lira in all four rounds and the other always offered 3 Lira. This leaves 70 superiors who varied their offers across rounds of the session. This provides initially supportive evidence that superiors' willingness to incur a cost to obtain information on individual contributions to joint production depends on the observed aggregate performance measure.

H2 predicts that superiors will be willing to incur a greater cost as the noisiness of the aggregate performance measure increases (i.e., as the aggregate performance measure becomes less extreme), and H3 predicts that, holding the noisiness constant, they will be willing to incur a greater cost as the aggregate measure increases. Figure 2 displays the patterns in the data. However, this figure is difficult to interpret, because, as shown in Table 6, some of the averages in this figure represent very few observations, particularly at the more extreme levels of total effort. Therefore, in order to increase interpretability, we recast the data. More specifically, we split the data into three categories of the aggregate performance measure, coding an observation as low (medium, high) if the aggregate performance measure (total effort) is 0 to 6 (7 to 13, 14 to 20). Together, H2 and H3 suggest that the price offers made by superiors will be highest when the aggregate performance measure is medium, followed by high and then low. As shown in Figure 3, the price offers follow just this pattern.

To jointly test H2 and H3, we estimate the following model:

$$\text{PRICE} = \alpha + \beta_1 \cdot \text{COMBINATIONS} + \beta_2 \cdot \text{AGGMEAS} + \beta_3 \cdot \text{COMBINATIONS} \cdot \text{AGGMEAS},$$

where PRICE = the price offer made by the superior, COMBINATIONS = the number of possible effort allocations associated with the output signal, AGGMEAS = a dummy variable which has the value 1 if total output is greater than or equal to 10 Lira (i.e. where COMBINATIONS decreases with total output) and zero otherwise, and COMBINATIONS·AGGMEAS = the interaction term. H2 implies that β_1 is positive and significant. H3 implies that the coefficient of the interaction term (β_3) is significantly negative, as we expect the absolute value of the slope shown in Figure 10 to be greater to the left of 10 than to the right.

Importantly, we collect four different observations of the PRICE from each participant acting as a superior. Therefore, these data violate the assumption of independence. To correct for this violation, we calculate robust estimators (also known as Huber-White or sandwich estimators), using the Generalized Estimating Equations (GEE) module of SPSS. This method provides estimates that are corrected for cluster-correlated data such as ours (Wooldridge 2003, 2006).[6]

The results of the model estimation are in Table 5, and they provide support for H2 and H3. First, column (a) of Table 5 shows that in a model without the interaction term, COMBINATIONS has a significantly positive effect on PRICE *($p < 0.001$)*. Superiors' price offers increase 0.114 Lira for every extra possible combination of efforts. Next, in column (b), which provides the full model including the interaction term, COMBINATIONS is again significant *($p = 0.015$)*. Additionally, the interaction term is negative and significant *($p = 0.028$)*. This implies that the marginal effect of COMBINATIONS on PRICE is significantly more positive when the aggregate performance measure (total effort) is low (i.e., below 10) than when it is high (i.e., 10 or more). Apparently, superiors are more willing to incur a cost to obtain information when the aggregate performance measure is high, indicating the both subordinates have put forth some reasonable degree of effort. It seems that superiors feel that those subordinates have earned the right to be treated fairly.

V. SUPPLEMENTAL ANALYSES

This section contains some additional analysis of our results. First, we examine the allocation decisions for superiors who did and did not obtain information on individual contributions to joint production. Next, we use data from the exit

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[6] The Jonckheere-Terpstra test is a non-parametric test for differences in *k* conditions *($k > 2$)* when there is an *a-priori* prediction of the ordering of magnitudes across the k conditions. We conduct this test using the trichotomized aggregate performance measure category (low, medium, or high) as the independent variable and the superior's price offer as the dependent variable. This test provides statistically significant evidence that the price offers follow the predicted pattern *(J-T = 1.784, $p = 0.03$ one-tailed)*.

questionnaire to gain a better understanding of the decisions made by the superior participants.

Table 8 provides details regarding the allocations made by superiors with and without knowing the relative effort levels of the subordinates. The offers of the superiors were high enough to obtain the information in 131 (39 percent) of the cases and not high enough in 205 (61 percent) of the triads. The data in Table 8 show that in most cases (132, 64.4 percent) the superiors who allocated the bonus pool without the information chose a 50-50 split. In the remaining 73 cases the allocations range from 0-100 splits to 49-51 splits. Closer analysis of the data shows an interesting pattern. In the 89 cases where superiors offered zero Lira for the information, and accordingly did not obtain it, the bonus is split in two equal halves in 73 (82.0 percent) of the cases. In the 116 cases where the offer was positive but not high enough to obtain the information on the other hand, the bonus is split equally in only 57 (49.1 percent) of the situations. Our theory does not enable us do draw conclusions about the causal mechanisms responsible for this pattern. However, it is tempting to speculate that superiors whose maximum offer is zero, compensate this selfish choice by at least acting as a “predictable” superior. Managers’ whose price offer is positive but too low on the other hand, may feel frustrated that their unselfish behavior does not pay off and dividing the bonus pool in unequal random portions may be a way to relieve this frustration.

Next, we examine the results from the exit questionnaire. This questionnaire contained a set of items that allow us to evaluate the motivations behind superiors’ price offers and allocation decisions. Table 10 provides descriptive statistics about these questionnaire items. The figures in Table 10 indicate that superior participants in general were interested in the separate investments of the two subordinates. They furthermore suggest that superior participants were motivated by both a need to establish a social norm of cooperation (ensure that cooperators were rewarded and slackers were punished (items 3 to 7) and a need to reciprocate the trust that investing subordinates placed in them (items 8 to 11). The mean score on all items except two (item 5, indicating the importance of norm enforcement and item 10, indicating the importance of trust reciprocity) is significantly higher than the theoretical mean of 3 that indicates that participants are neutral about the statement. The two items that participants do not significantly agree with are both items that refer to importance of punishing subordinates. This provides some evidence that our superior participants experienced stronger social incentives to reward "good behavior" than to punish "bad behavior" (c.f. Andreoni et al. 2003).

VI. DISCUSSION AND CONCLUSIONS

This study has used a laboratory experiment to examine the effect of social preferences on superiors' subjective performance evaluations. We find that very few superiors behave in accordance with the traditional model of "economic man." Most superiors are prepared to incur a cost to be able to *ex-post* filter out noise from performance measures and reward their subordinates' relative efforts. The price they are prepared to pay for the noise-eliminating information increases as combined effort becomes a noisier indicator of individual effort. In addition, holding the noisiness of combined effort as a performance measure constant, superiors' willingness to pay for the information increases in the aggregate performance measure. These results are consistent with models that incorporate social preferences, in particular preferences for fairness and trust reciprocity. Our findings have implications for both the accounting literature and research on human altruism and third-party intervention.

The study contributes to accounting research as it is one of the first to systematically investigate how non-selfish motivations influence subjective performance evaluations. The existing literature suggests that evaluation processes require (cognitive) effort from superiors. In many situations superiors, do not have the monetary incentives to provide this costly effort. Our study shows that even in absence of monetary incentives, social preferences may motivate superiors to incur a cost to fairly evaluate and reward their subordinates. Our findings also show that superiors' willingness to pay for fairness is limited, however. A small minority of superiors never offers a positive amount for the information about the individual efforts. In addition, our results indicate that from the viewpoint of many superiors subordinates need to "earn" a fair treatment by investing relatively high levels of effort, which is in line with the literature on reciprocity (e.g. Hannan 2005).

Our results are of interest to researchers in economics and related fields as this study is one of the first to focus on third party's decisions regarding the allocation of resources between two other parties and the first to deal with third parties' intervention in situations of *potential* unfairness. Our research suggests third parties do have preferences regarding such allocations and are prepared to incur a cost to ensure that resources are allocated according to these preferences. Superiors willingness to pay does not seem to be solely driven by inequity aversion (c.f. Bolton and Ockenfels 1993; Fehr and Schmidt 1999). To illustrate, in 26.0 percent of the cases in which the superior obtains the information about the individual effort levels, the bonus pool is allocated in such a way that the difference between the payoffs of the two subordinates is larger than the difference that would have resulted had the pool been split equally. Also, in 37.4 percent of the cases, superiors use the information to provide at least one subordinate with a payoff that is higher than their own payoff. Instead, superiors' willingness to pay seems to originate in an experienced need to enforce a social norm of cooperation and to repay trust (Berg et al. 1995; Fehr and Fischbacher 2004b). Consequently, our paper is strongly supportive of the notion of strong reciprocity (Fehr and Fischbacher 2004b; Fehr et al. 2002).

In conclusion, the findings in this paper highlight the need for researchers to continue to develop, refine and test models of apparently unselfish human behavior in economic situations. In particular, research on third party observation of – and intervention in – economic transactions between other individuals is likely to be fruitful, as this important issue is currently understudied. For example, future studies should help us understand why in our study superiors who are prepared to pay for fairness are more likely to provide completely random, and therefore potentially unfair, rewards and punishments if their price offer falls short and their initial investment in fairness does not pay off.

The findings of this study also point towards different directions for future research in accounting. First, more research is needed on how superiors use performance measures in evaluation decisions. Most studies in this area have focused on understanding the effects of unintentional cognitive biases. Our study shows that managers' social preferences may also influence evaluation and reward processes. Future research should extend and refine our conclusions, for example by studing the effects of individual differences and superiors' incentive structures on evaluation processes. Accounting researchers should also continue to examine how social preferences influence other accounting-related issues. Examples are the design of performance measurement systems and incentive structures and transfer pricing issues. Our research shows how theories and research methods originating in behavioral and experimental economics can inform accounting research in this respect.

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TABLE 1
Bonus pool size as a function of subordinate effort

Individual investments and bonus pool size

Subordinate B Effort

Subordinate A Effort	0									9	10
0	0.0	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0
1	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5
2	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0
3	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5
4	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0
5	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5
6	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0
7	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5
8	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0
9	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5
10	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5	30.0

Note: We use an abstract operationalization of effort. That is, if a participant chooses an effort level of e, then the participant bears a monetary cost of e lira (the experimental currency).

TABLE 2
Study Variables

Variable name	*Code*	*Value*
Subordinate A endowment	N_a	10 Lira
Subordinate B endowment	N_b	10 Lira
Superior endowment	N_s	15 Lira
Subordinate A investment	E_a	$0 < E_a < N_a$
Subordinate B investment	E_b	$0 < E_b < N_b$
Total production	T	$E_a + E_b$
Bonus pool	B	1.5 * T
Price offer of superior	P_{offer}	0 Lira < P_{offer} < 5 Lira
Actual price of information	P_{act}	0 Lira < P_{act} < 5 Lira (determined at random)
Bonus allocated to subordinate A	B_a	$B - B_b$
Bonus allocated to subordinate A	B_b	$B - B_a$
Subordinate A final pay off	F_a	$N_a – E_a + B_a$
Subordinate B final pay off	F_b	$N_b – E_b + B_b$
Superior final pay off	F_s	$N_s – P_{act}$ for $P_{offer} \geq P_{act}$ and N_s for $P_{offer} < P_{act}$

TABLE 3:
Session time line per round

Stage	
1	New groups are formed (one superior and two subordinates)
2	The superior and the subordinates receive their endowments N_a, N_b and N_s
3	The subordinates decide how much of their endowment N_a and N_b to invest. Their investments are E_a and E_b.
4	All participants observe total production $T = (E_a + E_b)$ and the available bonus pool B.
5	The superior indicates the maximum price P she is prepared to pay to learn E_a and E_b.
6	The computer randomly determines the actual price P_{act}.
7	If $P_{offer} \geq P_{act}$, the superior learns about E_a and E_b and her endowment is reduced with P_{act}.
8	The superior decides how to allocate the bonus pool B over the two subordinates (i.e. decides about B_a and B_b).
9	The subordinates receive their part of the bonus pool.
10	All participants learn about the round's pay offs, F_a, F_b and F_s, as well as the offer of the superior P_{offer} and the actual price P_{act}.

TABLE 4:
Descriptive statistics

Panel A: Primary variables

	N	*Min*	*Max*	*Median*	*Mean*	*SD*
Subordinate effort	672	0	10	6	5.43	3.26
Offer	336	0	5	2	2.08	1.67
Subordinate payoff	672	0	28	12.99	12.71	3.14
Superior payoff	336	10.84	15	15	14.31	1.10

Panel B: Subordinates' mean effort over four or eight rounds acting as subordinate

Player type	*N*	*Mean*	*SD*
Subordinate in first half	42	5.11	2.79
Subordinate in second half	42	5.17	2.57
Subordinate in both halves	42	5.72	2.22
Total	126	5.33	2.53

Panel C: Items measuring participants' involvement in experiment

Item	*Mean*	*SD*	*Theoretical range*	*Actual range*
I participated seriously in this study	4.68	0.57	1 – 5	2 – 5
I thought about my choices before making any decisions	4.43	0.71	1 – 5	2 – 5
I really cared about the outcomes of my decisions	4.52	0.76	1 – 5	1 – 5

Panel D: Personality traits

	Mean	*SD*	*Theoretical range*	*Actual range*
Risk aversion	3.06	1.63	0 – 10	0 – 10
Morality	3.86	0.71	1 – 5	1.40 – 5.00
Trust propensity	3.19	0.66	1 – 5	1.60 – 4.40

TABLE 5
Model Estimation Results (p values between brackets)

	(a)	(b)
Intercept	1.227 (<0.001)	1.507 (<0.001)
COMBINATIONS	0.114 (<0.001)	0.078 (0.015)
AGGMEAS	0.021 (0.898)	-0.813 (0.051)
COMBINATIONS*AGGMEAS		-0.110 (0.028)

Dependent variable	=	superior's price offer
COMBINATIONS	=	number of possible effort distributions that could have led to output level
AGGMEAS	=	dummy that indicates if total output was higher than its theoretical mean of 10 Lira or not

All tests are two-tailed.

TABLE 6
Observed frequencies individual and total effort

Individual effort

Effort	*Frequency*	*Percentage*	*Cumulative percentage*
0	87	12.9	12.9
1	24	3.6	16.5
2	36	5.4	21.9
3	39	5.8	27.7
4	65	9.7	37.4
5	78	11.6	49.0
6	74	11.0	60.0
7	57	8.5	68.5
8	75	11.2	79.6
9	28	4.2	83.8
10	109	16.2	100.0
Total	672	100.0	

Total effort

Effort	*Frequency*	*Percentage*	*Cumulative percentage*
0	3	0.9	0.9
1	5	1.5	2.4
2	9	2.7	5.1
3	3	0.9	6.0
4	8	2.4	8.3
5	11	3.3	11.6
6	11	3.3	14.9
7	18	5.4	20.2
8	34	10.1	30.4
9	25	7.4	37.8
10	32	9.5	47.3
11	35	10.4	57.7
12	19	5.7	63.4
13	22	6.5	69.9
14	21	6.3	76.2
15	24	7.1	83.3
16	24	7.1	90.5
17	12	3.6	94.0
18	9	2.7	96.7
19	3	0.9	97.6
20	8	2.4	100.0
Total	336	100.0	

TABLE 7
Mean subordinate effort choices and superior price offers across rounds

Effort investments

	Round 1	2	3	4	5	6	7	8	Overall
Mean	5.52	5.52	5.68	5.35	5.14	5.62	5.57	5.02	5.43
SD	2.75	3.17	3.28	3.20	3.16	3.28	3.49	3.73	3.26
N	84	84	84	84	84	84	84	84	672

Price offers

	Round 1	2	3	4	5	6	7	8	Overall
Mean	2.35	2.46	2.27	2.39	1.66	1.81	1.95	1.74	2.08
SD	1.43	1.57	1.75	1.62	1.54	1.64	1.89	1.79	1.67
N	42	42	42	42	42	42	42	42	336

TABLE 8
Allocation decisions of superiors

Offer		Gets information?		50/50 in no get situations?		In accordance with relative effort in get situation?*	
Zero	89	No	89	No	16		
				Yes	73		
				Total	89		
Positive	247	No	116	No	59		
				Yes	57		
				Total	116		
		Total No	205				
		Yes	131			No	20
						Yes	111
Total	336		336		205		131

* Considered in accordance with relative effort if fractions of bonus pool allocated to subordinates is within 10 percentage points of relative efforts. We chose this measure because some superiors round their allocation on multiples of 10 percent. E.g. if the information shows that A has provided 33 percent of total effort and B has provided 67 percent, the superior chooses a 30-70 split.

TABLE 9
Pearson correlations between personality variables and primary variables

		(1)	(2)	(3)	(4)
Risk aversion (1)					
Morality (2)	Correlation	-0.004			
	Sig. (2-tailed)	0.961			
	N	126			
Trust propensity (3)	Correlation	0.070	0.472(**)		
	Sig. (2-tailed)	0.433	0.000		
	N	126	126		
Mean investment (4)	Correlation	0.135	-0.024	-0.010	
	Sig. (2-tailed)	0.131	0.793	0.911	
	N	126	126	126	
Mean offer (5)	Correlation	-0.010	0.047	0.021	0.159
	Sig. (2-tailed)	0.930	0.672	0.850	0.148
	N	84	84	84	84

** Correlation significant at $p < 0.00$ (2-tailed)

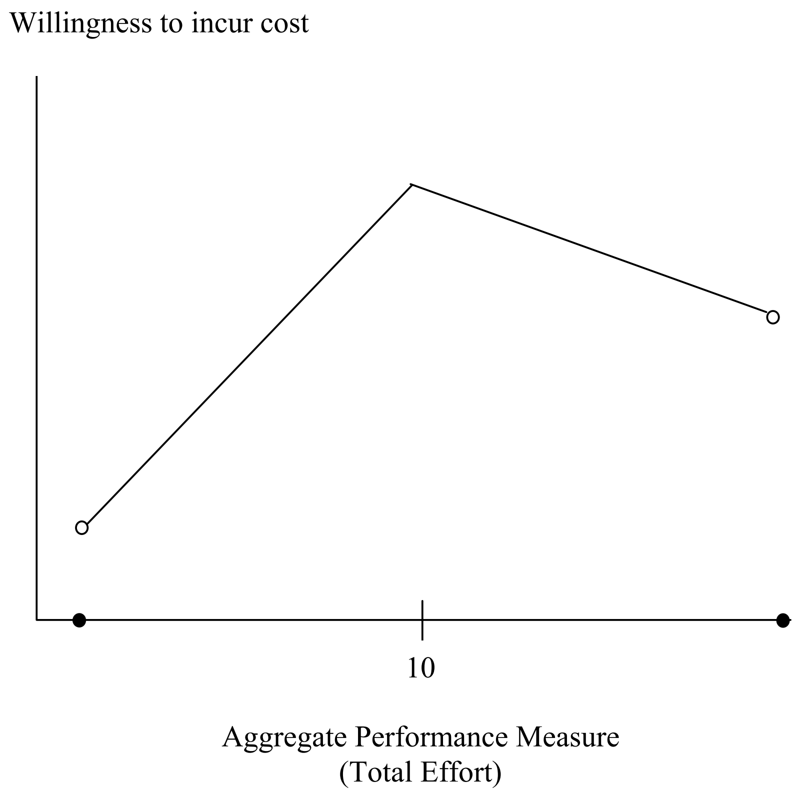
TABLE 10
Descriptive statistics exit questionairre items

Item		Mean	SD	t	p (2-tailed)
(1)	In general I was curious about the separate investments of the two BU managers	3.86	1.28	6.13	0.000
(2)	In general I wanted to know whether one BU manager had invested more than the other	3.89	1.28	6.39	0.000
(3)	I wanted to reward BU managers who acted cooperatively	3.87	1.30	6.14	0.000
(4)	I wanted to punish BU managers who did not act cooperatively	3.61	1.38	4.03	0.000
(5)	I thought it was important that BU managers who tried to get more than their fair share got punished	3.23	1.27	1.63	0.107
(6)	I thought it was important that BU managers who acted in the common interest got rewarded	3.70	1.08	5.94	0.000
(7)	I thought it was important that BU managers who acted in the common interest got at least a fair return	3.99	1.05	8.65	0.000
(8)	I wanted to repay the trust that BU managers placed in me by investing part of their base amount	3.58	1.12	4.77	0.000
(9)	I wanted to reward those BU managers who expected me to be a fair superior	3.71	1.14	5.76	0.000
(10)	I wanted to punish those BU managers who did not expect me to be a fair superior	2.92	1.08	-0.71	0.481
(11)	I did not want to disappoint BU managers who trusted me to reward high investments	3.43	1.26	3.11	0.003

The last two columns give the t-statistic and associated two-sided p value for a t-test if the mean score differs from the theoretical mean of 3.

All items scored on a five point Likert scale (fully disagree – fully agree). Answers on all items cover the whole theoretical range (1 to 5).

FIGURE 1
Graphical representation of expected results



Note that at the extreme observations (i.e., 0 and 20), the aggregate performance measure becomes a perfect measure of individual contributions to joint production. Therefore, we model a discontinuity at these extreme observations, because the superior does not need to incur a cost to have perfect information on individual effort choices.

FIGURE 2
Results: Mean price offer as a function of the Aggregate Performance Measure

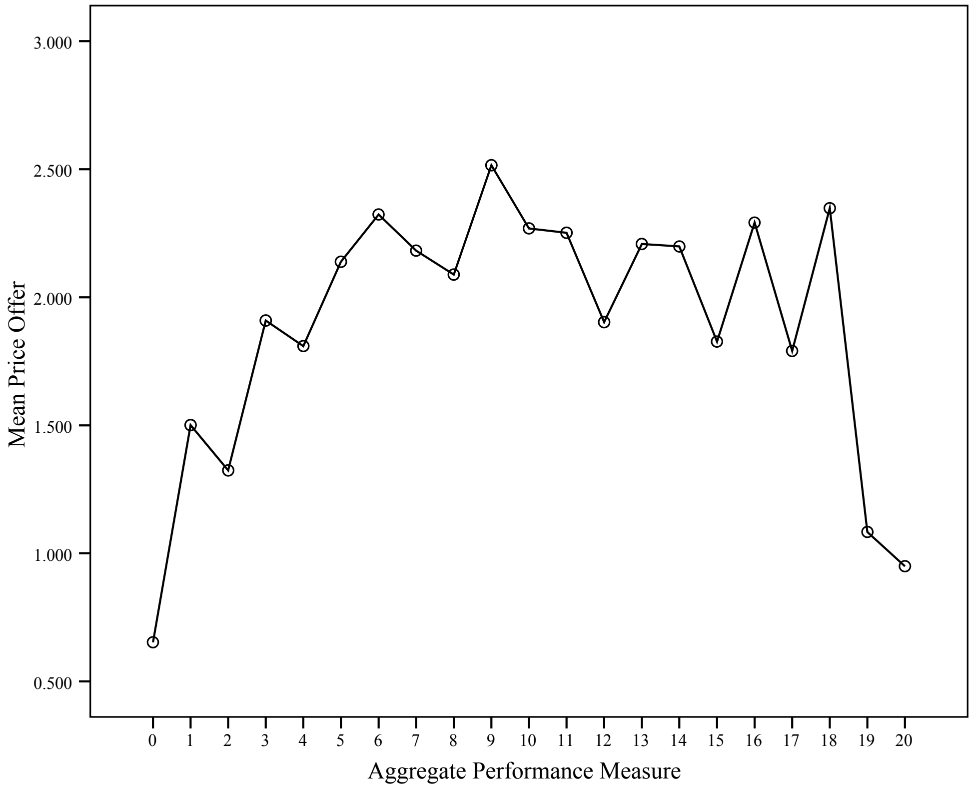


FIGURE 3
Results: Mean price offer as a function of the Aggregate Performance Measure
Trichotomized Results