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In Search of Informed Discretion: An Experimental Investigation of Fairness and Trust Reciprocity

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ABSTRACT: This paper investigates managerial discretion in compensation decisions in a team setting, in which a measure of the team's aggregate performance is readily available from the accounting system. Specifically, we examine the willingness of managers to obtain additional, costly information that would supplement this measure and allow the managers to more accurately assess individual contributions to team output. Using theory from behavioral economics that incorporates social preferences (i.e., fairness and trust reciprocity) into the managers' utility function, we predict and demonstrate experimentally that managers' willingness to obtain the costly information increases as the team's aggregate performance becomes a more noisy measure of individual performance. Further, we predict and demonstrate that managers' willingness will be greater for relatively high versus relatively low levels of aggregate performance. The study contributes to the literature on subjective performance evaluation by identifying how social preferences influence managers' use of discretion in evaluation processes.

Keywords: *subjective performance evaluation; discretionary bonus pool; incentive contracting; reciprocity; fairness; trust; third-party intervention*.

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

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I. INTRODUCTION

Incentive compensation, comprising both the measurement of employee performance and the use of performance contingent pay, has received considerable attention from accounting researchers. The focus has been on formal contracting, which requires that performance signals be anticipated, in terms of both form and importance, and that these signals be readily available from internal accounting systems. However, it has been increasingly acknowledged that contracts are incomplete. Therefore, the literature has recently considered the use of discretion in performance evaluation and compensation (e.g., Baiman and Rajan 1995; MacLeod 2003; Rajan and Reichelstein 2006). Discretion can be optimal when informative performance indicators are available but difficult to incorporate into formal contracts. Such performance indicators are often unavailable from standard performance reports. Instead, they are available only to the extent that managers are willing to undertake a costly search.[1] This costly search may require that managers access underlying accounting data (or even data that are not available in the internal accounting system) and perform additional data analyses. To illustrate, consider a team structure, which is common in both manufacturing (e.g., production cells) and service (e.g., client services) settings. The team's aggregate performance, while readily available through internal accounting systems, is likely a noisy measure of individual effort. Additional information, such as that obtained via variance investigation, discussions, examination of work documents, and other investigational processes, may be useful in filtering out the noise to distinguish individual contributions.

If managers have utility only for wealth, as is often assumed in the analytic literature, then they will be unwilling to incur a personal cost to ensure more accurate employee performance assessments.[2] It is documented in the empirical accounting literature that evaluators sometimes fail to use their discretion to mitigate the shortcomings of readily available noisy or incomplete accounting measures (Bol 2008). For example, research shows that managers exhibit a *centrality bias*, such that differences in employee performance are understated (Moers 2005). Related experimental work suggests that in allocating discretionary bonus pools managers tend to allocate the bonus pool evenly or to rely too much on readily available accounting information (Bailey et al. 2011). These results suggest that managers may fail to obtain or fully consider all available information.

We use behavioral economics theories on social preferences to investigate a team setting in which a measure of the team's aggregate performance is readily available from the accounting system. We examine the willingness of managers to obtain additional, costly information that would supplement this measure and allow the managers to more accurately assess individual contributions to team output. Using a laboratory experiment, we find that managers' willingness to do so depends, in two ways, on the outcome of the readily available accounting measure (aggregate performance). First, consistent with managerial preferences for fairness, we find that the willingness to obtain additional, costly information increases as aggregate performance becomes less extreme. Second, as predicted by theories of trust reciprocity, we find that managers are more willing to obtain additional costly information if aggregate performance is relatively high than if it is relatively low. The second result is particularly notable because it seemingly works in the opposite direction of the effect described in the recent analytic literature (Rajan and Reichelstein 2009).

[1] While we use the terms "employee" and "manager," our theory generalizes to any hierarchical setting.

[2] We examine a one-period setting, in which reputation concerns play no role. Standard reasoning suggests that the manager will never obtain costly, additional information on individual effort in this setting because any benefits (from increased future productivity) would not accrue to him/her. With multiple periods, reputation concerns play an important role, and the contracting literature often relies on reputation as a self-enforcement mechanism that substitutes for court verifiability if non-contractible performance information is incorporated via discretion (Prendergast and Topel 1993; Baker et al. 2002).

The primary contribution of this study to the accounting literature is an increased understanding of how social preferences affect the incorporation of information into performance evaluations and compensation decisions. Existing research has shown that these processes are influenced by managerial self-interest (Prendergast and Topel 1993) and cognitive biases (Lipe and Salterio 2000; Moers 2005; Bol and Smith 2011). Our findings indicate that they are also affected by managers' concerns for fairness and trust reciprocity. Specifically, our study suggests that a manager's decision whether to obtain additional information to complement readily available, but noisy, performance measures involves a trade-off among fairness, trust reciprocity and the costs of acquiring the extra information. This finding is important for accounting researchers who are interested in formally analyzing the conditions under which discretion will increase the information incorporated into performance assessments. In addition, this study helps us to understand the widespread use of discretion documented in prior accounting research (e.g., Gibbs et al. 2004).

An important implication of this study relates to the flexibility of accounting systems. For managers with social preferences, standardized performance metrics are likely to be viewed as an inadequate basis for evaluating employees. Consequently, these managers will invest costly time and effort in acquiring additional performance signals. From the firm's perspective, it may or may not be optimal for the manager to allocate his/her effort toward the search for additional information, depending on the informational value and the search cost. Thus, efforts to reduce information search costs, by designing more flexible accounting systems, could result in more accurate performance assessments while increasing overall efficiency. For example, data warehousing has emerged as a response to the need for greater flexibility in decision making. As described by Bedard et al. (2001, 54), decision makers are looking for "fast answers, simple user interfaces, a high level of flexibility supporting user-driven *ad hoc* exploration of data at different levels of aggregation and at different epochs." To the extent that accounting information systems allow for *ad hoc* exploration of performance-relevant information beyond that routinely produced in standard accounting reports, they will facilitate managers' use of that information to create more accurate evaluations.

From a more fundamental behavioral economics perspective, this study contributes to our understanding of the effects of social preferences on decision making *under uncertainty*. That is, while prior research examines the decision maker's response to unfairness, we examine the decision maker's willingness to incur a cost to prevent *potential* unfairness. While real-world decision makers commonly face such uncertainties, we know little about how they react in these situations. Our results suggest that managers are more likely to intervene as the potential for unfairness increases, but that this effect is moderated by judgments of whether their employees have (collectively) demonstrated trust that the managers will do so.

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 the results of our study. Finally, Section V provides a discussion of our results, conclusions, and directions for future research.

II. THEORY AND HYPOTHESIS DEVELOPMENT

Background

While the accounting literature focuses on complete contracting, the use of discretion in performance evaluation and compensation is common in practice (Gibbs et al. 2004). Contracts are typically incomplete, and discretion allows managers to consider the effects of additional information not reflected in formal contracts. The readily available accounting measures that form the basis of formal contracts generally provide only noisy measures of performance. For example,

macroeconomic changes can have profound effects on accounting metrics such as profitability. These macroeconomic changes are uncontrollable and often unanticipated, and managers can use discretion to untangle their effects from accounting measures.

The use of discretion is particularly valuable in joint production or team settings, in which organizational participants collaborate to produce a joint outcome. In such settings, standard performance reports provide measures of aggregate performance. However, these measures provide limited information on individual contributions to joint production. Managers must therefore look for additional information if they want to accurately assess individual performance. Sources of this additional information include, for example, the firm's internal accounting systems, discussions with co-workers, customers, and other third parties, team documentation, and additional performance indicators, from which information about individual contributions can be ascertained.

Consider, for example, manufacturing employees, who often perform their work in production cells with rotating task responsibilities. Standard accounting reports likely provide aggregate measures of performance, such as the quality or quantity of team output. However, an examination of detailed production records could reveal which individual team members were responsible for various tasks over specific time periods, allowing managers to gain insight into the contributions of these individuals. Similarly, consider a professional services team concluding a client engagement, at which time standard reports provide such aggregate measures as billable hours and budget variances. Discussions with clients and team members, as well as examination of work documents, can improve the manager's understanding of how individual team members contributed to the completion of the work. These additional information signals, which must be actively sought out, are unlikely to be included in formal contracts because they are unanticipated, cannot be jointly verified, or are difficult to value *ex ante*. Via discretion, however, managers can incorporate them into performance evaluation and compensation decisions.

A common use of discretion is through discretionary bonus pools. Firms often fund pools based on accounting measures of aggregate performance (e.g., business unit profit), and then endow managers with discretion to allocate the pools using self-chosen rules of distribution. Baiman and Rajan (1995) show that the use of such bonus pool arrangements, which allow managers discretion over the *allocation* of the bonus pool but not its *size*, can mitigate incentive problems on the side of the manager and enable the efficient use of information not formally included in the incentive contract. This analytic result is confirmed experimentally by Fisher et al. (2005).

Subsequent analytic papers in the accounting literature have considered the weights placed on various information signals in contracts allowing for discretion (e.g., Rajan and Reichelstein 2009; Ederhof 2010). These papers consider the effect of objective performance measure outcomes on the use of subjective measures. Rajan and Reichelstein (2009), for example, show that in a discretionary bonus pool setting, these two types of information may be optimally considered in a lexicographic manner, with subjective measures used only if the objective measures' outcomes are sufficiently low.[3] Similarly, Ederhof (2010) shows that subjective measures are optimally considered only when the objective performance measures outcome falls outside a "normal" range.

The settings examined in these analytic papers are different from our setting in two important ways. First, the analytic studies assume that all information signals are readily and freely available to the manager (i.e., the principal). Instead, we assume that the search for additional information is costly, as managers can invest resources, time, and effort in ways that are more congruent with their direct self-interest. Second, the analytic papers assume that the manager has utility for wealth only. Given this assumption, a manager could choose to forgo the search for additional information and

[3] The results of Rajan and Reichelstein (2009) vary depending on whether they consider a single- or multiple-agent setting, and depending on the solution concept used (Nash equilibrium versus dominant strategies).

TABLE 1

Bonus Pool Size as a Function of Employee Effort[a]

		Employee A Effort										
		0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Employee B Effort	0	0.00	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00	13.50	15.00
	1	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00	13.50	15.00	16.50
	2	3.00	4.50	6.00	7.50	9.00	10.50	12.00	13.50	15.00	16.50	18.00
	3	4.50	6.00	7.50	9.00	10.50	12.00	13.50	15.00	16.50	18.00	19.50
	4	6.00	7.50	9.00	10.50	12.00	13.50	15.00	16.50	18.00	19.50	21.00
	5	7.50	9.00	10.50	12.00	13.50	15.00	16.50	18.00	19.50	21.00	22.50
	6	9.00	10.50	12.00	13.50	15.00	16.50	18.00	19.50	21.00	22.50	24.00
	7	10.50	12.00	13.50	15.00	16.50	18.00	19.50	21.00	22.50	24.00	25.50
	8	12.00	13.50	15.00	16.50	18.00	19.50	21.00	22.50	24.00	25.50	27.00
	9	13.50	15.00	16.50	18.00	19.50	21.00	22.50	24.00	25.50	27.00	28.50
	10	15.00	16.50	18.00	19.50	21.00	22.50	24.00	25.50	27.00	28.50	30.00

[a] We use an abstract notion of effort as an incurred cost. For example, an employee with an effort level of 5 incurs a cost of 5 Lira (the experimental currency).

instead allocate the bonus pool based on a simple rule (e.g., in equal proportions). However, we assume that the manager has social preferences in addition to a utility for wealth. Under this alternate assumption, we predict that the manager's willingness to obtain additional, costly information will depend in two ways on the outcome of the aggregate performance measure that is readily available from the internal accounting system. We develop these predictions after introducing the basic setting.

Basic Setting

We consider a situation in which employees engage in a joint production effort, such that only their combined performance can be observed without cost. Thus, aggregate performance, which is readily available from the internal accounting system, is a noisy indicator of each employee's individual contribution. The basic setting is similar to that of Baiman and Rajan (1995) and Fisher et al. (2005), and consists of two employees and one manager. Both the employees and the manager receive a fixed endowment. The employees independently choose how much effort to devote to joint production. In our setting, effort is operationalized as a monetary cost. The employees get an endowment of 10 and can invest any part of this endowment (in integer increments) in the joint project.[4] Their combined effort determines aggregate performance. That is, aggregate performance is a noiseless measure with regard to *combined* effort. A bonus pool is funded formulaically on the basis of aggregate performance. Table 1 demonstrates the relation between employee effort and the total bonus pool amount. Note that the bonus pool equals 150 percent of the combined effort of the two employees.

The manager has full discretion over the allocation of the pool to the two employees. Unlike the prior analytic research and Fisher et al. (2005), the manager in our setting can obtain information on individual contributions to aggregate performance only via a costly search.

[4] As will be explained, all monetary amounts in our experiment were denoted in an experimental currency called "Lira."

Operationally, we give the manager the opportunity to purchase information that reveals the individual effort levels of the employees. The employees know about the manager's option to obtain and use this information. However, the setting does not allow the manager to communicate his/her intentions to obtain the information. The employees therefore must estimate the probability that the supervisor will obtain and use this information.

The monetary payoff of the manager equals a fixed endowment minus the cost of obtaining the information on individual effort levels. There are no monetary benefits to the manager of obtaining the information or of fairly allocating the bonus pool. Now, suppose an employee expects the manager to maximize his/her monetary payoff. In this situation, the employee has reason to expect an allocation equal to half of the bonus pool.[5] As long as the return on effort is between 0 and 100 percent, employees effectively find themselves in a prisoner's dilemma, where the dominant strategy is to choose zero effort. In our setting, the return on effort is 50 percent because the total bonus pool is funded at 150 percent of the aggregate effort. Table 1 indicates that if the manager simply allocates half of the bonus pool to each employee, then each employee's wealth-maximizing effort choice is zero. Therefore, the Nash equilibrium is an investment of zero effort for both employees.

Suppose, on the other hand, that the employee expects the manager to always obtain additional costly information on individual contributions to joint production, and then to allocate the bonus pool in proportion to individual effort. In this case, the employee's optimal strategy is to maximize his/her effort, as every unit of effort returns a positive reward.

Prior research in behavioral economics (e.g., Camerer 2003) leads us to expect most employee-participants to engage in a positive level of effort, given some chance of investigation. This is important because our experiment requires that we observe variation in employees' combined effort levels, which is our independent variable. Thus, we offer this prediction not as a hypothesis, but rather as an assumption that must be met in order for us to investigate our research question. The experimental setting is described in more detail in Section III.

Hypotheses

Under the assumption that the manager maximizes wealth, standard reasoning suggests that in a one-period world, the manager will never obtain costly, additional information on individual effort. That is, obtaining the information is costly, and any benefits (from increased future productivity) would not accrue to him/her. Over the past two decades, however, numerous studies have shown that the classic "Homo Economicus" model is descriptive of only a small sample of humans at best, and that most individuals are concerned not only with their own material payoffs, but also with the payoffs of others (Camerer 2003; Fehr and Schmidt 2003; Gintis et al. 2005). For example, it has been consistently shown that individuals form judgments about outcome fairness and prefer outcomes they perceive to be fair, even if these outcomes are costly in monetary terms (Fehr and Schmidt 2003). Also, it is well established that individuals derive utility from repaying trust that has been placed in them (Berg et al. 1995; Hannan 2005). The basic premise of our theory is that these two social preferences will influence managers' willingness to obtain additional, costly information.

[5] There are two reasons why, in this situation, the employee should expect to get half of the bonus pool. First, managers may distribute the pool randomly over the two employees, in which case the long-term average allocated reward will be 0.5 times the bonus pool. Further, prior research (e.g., Bailey et al. 2011) suggests that in absence of information, many managers will anchor on a 50-50 split. In both cases the expected value is half the bonus pool.

Considerable effort is currently being directed toward the development of analytical models that relax the assumptions of "Homo Economicus" and incorporate social preferences into utility functions. Originally, most models were centered on the notion of inequality aversion, proposing that individuals experience disutility if their payoffs are either higher or lower than those of others.[6] However, more recently, it has been proposed that preferences over outcomes are inherently linked to *intentions* (e.g., Falk and Fischbacher 2006a; Falk et al. 2008), and a number of empirical studies suggest that reciprocity is a driving concern in human behavior (e.g., Mohtashemi and Mui 2003; Carpenter et al. 2004; Fehr and Fischbacher 2004b). In fact, the prevailing view is that humans have a basic tendency toward "strong reciprocity," meaning the willingness of an independent observer to forgo wealth in order to reward or punish others.[7]

Several studies have examined the willingness of such independent observers to incur costs in order to influence the distribution of payoffs among others. First, Kahneman et al. (1986) report that 75 percent of their experimental participants were willing to incur a cost to reward cooperative and punish uncooperative behavior. Turillo et al. (2002) replicated this experiment and report a similar 73 percent of their participants choosing a self-sacrificing split with a cooperator. In a series of follow-up experiments, they disentangled the effects of rewarding cooperation and punishing selfishness, finding that individuals were prepared to pay for both. Finally, Fehr and Fischbacher (2004b) let their participants observe two other individuals playing prisoner's dilemma games and dictator games. In both games, they found that significant numbers of the participants were willing to incur a cost to punish a player who had behaved uncooperatively.[8]

This prior literature thus demonstrates a basic human tendency to sacrifice wealth in order to reward (punish) others who *are known to* have behaved cooperatively (uncooperatively) (Fehr and Fischbacher 2004a, 2004b). We extend this literature by addressing a setting in which the third party does not know with certainty if a reward (penalty) is merited. Specifically, the manager in our study is akin to an independent, third-party observer. S/he does not know how the individual employees have behaved, but s/he is tasked with distributing the bonus pool among them. By obtaining and acting on information on individual contributions, the manager can ensure that each employee receives a fair allocation. We conceptualize fairness as a preference for "just deserts," meaning that the amount allocated to individuals reflects their contribution. Obtaining the additional information allows the manager to ensure that those who have contributed more also receive a larger portion of the bonus pool. Thus, s/he rewards employees who act cooperatively, punishes those who try to "free ride" by not investing while hoping for a share of the bonus pool, and enforces a norm of cooperation (Fehr et al. 2002; Fehr and Fischbacher 2004b). Based on this reasoning, we begin with a baseline hypothesis, suggesting that managers charged with allocating a bonus pool are generally willing to obtain additional, costly information on individual contributions to group production.

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[6] Fehr and Schmidt (1999) is a prime example; Rabin (1993) and Levine (1998) are notable exceptions.

[7] Strong reciprocity means that individuals' utility is affected not only by the outcome of others with whom they have interacted, but also by the outcomes of anonymous strangers with whom they have no economic relationship. More specifically, the notion of strong reciprocity suggests that individuals exhibit a general willingness to pay for rewarding (punishing) individuals who have been kind (unkind) toward someone else (e.g., Levine 1998; Gintis 2000; Charness and Rabin 2002; Falk and Fischbacher 2006b).

[8] These studies on third-party punishment and reward relate to the literature on norm enforcement, which suggests that individuals derive utility from enforcing social norms (Bendor and Swistak 2001; Fehr and Fischbacher 2004a; Hannan et al. 2010) and that cooperation is an important social norm in human societies (Fiske 1991; Gintis 2000). Deviation from this norm is perceived to be unfair and is associated with negative emotions (Van Winden 2007; Reuben and Van Winden 2008). Recent research in neuroeconomics has also found that such perceived unfairness has neural correlates in pain-related brain areas (Sanfey et al. 2003; Singer et al. 2006) and that the opportunity to punish a norm-violator activates reward-related areas of the brain (De Quervain et al. 2004).

H1: Managers are willing to incur a cost in order to obtain information on the individual contributions to joint production.

We furthermore expect that the willingness to obtain this information will depend in two ways on aggregate performance, i.e., the performance signal that is readily available from the internal accounting system. First, we predict that the managers' willingness to obtain the additional, costly information will increase as aggregate performance becomes less extreme, because extreme measures are more informative about individual contributions. Second, we predict that, given a specific level of extremeness, managers will be more willing to obtain additional, costly information if aggregate performance is relatively high than if it is relatively low. We describe the theory underlying these predictions below.

We begin with the effect of extremeness, which is based on a managerial preference for fairness. It would be difficult for a manager to achieve a fair allocation based solely on the aggregate performance measure, but less so as aggregate performance becomes more extreme. As aggregate performance becomes more extreme (either high or low), it becomes more informative about individual performance. That is, exceptionally good aggregate performance can only be the result of substantial effort of all responsible employees and exceptionally bad aggregate performance can only mean that all employees have failed to excel. In our setting, the noisiness of aggregate performance as a measure of individual performance is reflected in the number of possible combinations of effort choices by the two employees that could have led to the observed outcome. This number increases as the aggregate measure of team performance moves away from the extreme (high or low) outcomes.[9]

The point is illustrated in Table 1. Suppose first that aggregate performance equals zero. This can only mean that both employees have chosen effort levels of zero, and so in this case, the aggregate measure is also a perfect measure of individual performance. Similarly, if the aggregate measure is 20 (resulting in a total bonus pool at the maximum of 30), this can only mean that both employees have put forth their maximum effort. At all other levels, more than one combination of effort choices by the two employees is possible. The number of possible combinations is maximized for a combined effort level of 10, with a corresponding 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.

If managers prefer fair allocations (based on "just deserts"), then they will be more willing to obtain additional, costly information as aggregate performance becomes a less informative indicator of individual performance. Based on this reasoning, we make the following formal prediction.

H2: *Ceteris paribus*, the cost that managers are willing to incur in order to obtain information on individual contributions to joint production increases as the aggregate performance measure moves away from either of the extremes (i.e., as the aggregate performance measure becomes a less informative measure of individual performance).

We now turn to the second way in which we expect the willingness to obtain additional costly information to depend on aggregate performance. We expect that managers will be more willing to obtain the information on individual effort levels when the employees have performed relatively well in the aggregate than when they have performed relatively poorly in the aggregate. We base this prediction on the notion of trust reciprocity.

[9] One may think of extremeness as operationalizing the broader notion of informativeness. That is, in our team setting extreme aggregate outcomes are most informative about individual contributions. This is likely representative of most situations in practice. However, we expect our theory to generalize to settings in which informativeness and extremeness are not related. In such settings, we would expect a higher willingness to obtain additional costly information when readily available accounting measures are less informative about effort.

A preference for trust reciprocity means that managers derive positive utility from reciprocating trust that has been placed in them or, equivalently, derive negative utility from failing to reciprocate a costly trusting act. Berg et al. (1995) first showed that a general preference for trust reciprocity existed, and this has been confirmed by many later studies (e.g., Dufwenberg and Gneezy 2000; Fehr and Schmidt 2003; Hannan 2005). In our setting, employees who choose to invest effort convey trust that managers will provide them with a fair return. Employees who do not trust the manager to provide them with a fair return should prefer to make no investment to maximize their payoff. The higher the total investment by the employees, therefore, the more trust the employees have demonstrated in the manager. To the extent that managers prefer to reciprocate that trust, they will willingly incur some cost to obtain information that would facilitate a fair allocation.[10] This reasoning suggests that if aggregate performance is high, managers will be more willing to pay for the additional information than if aggregate performance were low.

To illustrate, again refer to Table 1. Suppose that the aggregate performance measure equals 18 (resulting in a bonus pool of 27). Table 1 shows that a bonus pool of 27 (aggregate performance of 18) is associated with three possible effort combinations. It is certain, however, that both employees have invested substantial effort, as each employee must have chosen an effort level of at least 8 to achieve this outcome. Now compare this situation to one with aggregate performance of 2 (resulting in a bonus pool of 3). Again, this aggregate performance can only have come about by three different effort combinations. Yet, in this case both employees have clearly acted uncooperatively, as neither employee could have chosen an effort level greater than 2. Due to preferences for trust reciprocity, we hypothesize that managers will be more willing to obtain costly, non-contractible information on individual contributions to joint production in the former case than in the latter.

H3: *Ceteris paribus*, the cost that managers are willing to incur in order to obtain information on individual contributions to joint production will be greater for relatively high than for relatively low levels of aggregate performance.

On the surface, this prediction may seem to conflict with recent work that suggests a strong tendency for third parties to punish others who are perceived to violate a social norm (De Quervain et al. 2004; Fehr and Fischbacher 2004b; Hannan et al. 2010). That is, one may interpret H3 as predicting a stronger preference for rewarding than for punishing employees. Recall, however, that the funding of the bonus pool is based on the team's aggregate performance. Thus, the team *as a whole* will be automatically punished for poor performance and rewarded for good performance. The role of the manager's discretionary allocation is to distinguish individual performance. Thus, even when the team's aggregate performance is relatively high (low), the manager's motivation for obtaining and using additional costly information could include punishing (rewarding) the lower (higher) performing employee.

We next discuss the pattern of results that is predicted by the combination of H2 and H3. H2 suggests that managers will be more willing to obtain additional costly information as the aggregate measure moves away from either of the extremes. H3 suggests that managers will be more willing to obtain such information as the aggregate measure increases. When combined, the two hypotheses suggest a non-monotonic and asymmetric relation between the aggregate performance measure and the manager's willingness to obtain costly information. The aggregate measure of combined effort ranges from 0 to 20 in our study. As the aggregate measure increases from low levels of

[10] Note that trust reciprocity does not necessarily imply that employees consciously make trusting decisions. However, by making larger investments, employees make themselves more vulnerable to the allocation decision of the manager, and the willingness to make oneself vulnerable is the essence of trust (Berg et al. 1995). What matters for our theory is that managers perceive investments as an act of trust. They can reciprocate this perceived trust, even if trust is not actually the underlying factor motivating the employee's behavior.

performance to moderate levels, such as 10, both the fairness (H2) and the trust reciprocity (H3) arguments suggest that the manager's willingness to obtain this information will increase. However, as the aggregate measure increases from moderate to higher levels, the two arguments predict opposing effects, with the fairness argument (H2) predicting a decrease in the willingness to obtain information and the trust reciprocity argument (H3) predicting an increase. Depending on the relative sizes of these effects (which we do not predict), the relation between aggregate performance and the willingness to obtain additional information may remain positive or become negative. Importantly, if the relation becomes negative (indicating a stronger effect for fairness than for trust reciprocity), then we would expect a negative slope to the right of 10 that is less steep than the positive slope to the left of 10. That is, in absolute values, the slope to the right of 10 will be lower than the slope to the left of 10. In sum, while fairness will lead to an inverse-U-shaped pattern, trust reciprocity will positively affect the willingness to incur a cost both to the left and right of 10, creating horizontal asymmetry.

III. RESEARCH DESIGN

Experimental Design

We conducted a three-person laboratory study that combines elements of a quasi-experiment with those of a controlled experiment. Specifically, like a quasi-experiment, our study involves no experimental manipulation. Rather, the independent variable (aggregate performance) is measured (Shadish et al. 2002). However, we also capture the benefits of a controlled experiment through random assignment. That is, the independent variable, aggregate performance, is determined by participants acting as employees, and the dependent variable, the willingness to obtain additional costly information, is determined by participants acting as managers. Because managers and employees are randomly matched, we can reliably attribute differences in the dependent measure to differences in the independent measure and, therefore, reliably assess causality. That is, the random matching of employees and managers accomplishes the same purpose that the random assignment of participants to experimental conditions accomplishes in a traditional controlled experiment.

The experimental task combines elements of a one-shot prisoner's dilemma and the trust game of Berg et al. (1995). Participants interacted anonymously with each other through a computer network in the laboratory. The game was programmed using the software package z-Tree (Fischbacher 2007). All monetary amounts were denoted in an experimental currency (Lira) that has a value of 0.5 Euro.[11] The employee endowment was 10 Lira and the manager endowment was 15 Lira. We operationalize employee effort as a monetary cost. That is, each employee must choose an effort level in the range of 0 to 10, which corresponds to a payment of 0 to 10 Lira from the employee's initial endowment.[12]

Notably, the managers' pay is not a function of aggregate performance. We make this design choice to isolate the effects of social preferences. Specifically, in our setting, if managers have utility only for wealth, then we would expect them to be unwilling to obtain additional costly information. Therefore, if we observe manager-participants obtaining the information, we can conclude that their decisions are driven by social preferences. If the manager's payoff had depended on aggregate performance, then the effects of fairness and reciprocity would have been confounded

[11] At the time the experiment was run the exchange rate was U.S.$1.55 for €1 Euro.

[12] The operationalization of effort as a monetary cost in experiments is common in the experimental gift exchange literature (e.g., Fehr et al. 1993) and is often used in, for example, experimental labor markets studies in accounting (Hannan 2005; Kuang and Moser 2009). It is consistent with the notion of effort as a construct that is controllable by the employee, creates negative utility, and results in an increase in expected output (Baiman 1982).

by the fact that the cost of the additional information had been relatively lower for higher levels of aggregate performance. Importantly, our design choice thus biases against finding the hypothesized effects.

We use a Becker-DeGroot-Marschak (BDM) mechanism (Becker et al. 1964; Bohm et al. 1997) to assess the managers' willingness to obtain the additional costly information about individual contributions to joint production. Specifically, participants were informed that such information was available for a price, which was unknown and would be determined randomly by the computer. After the employees had decided on their effort levels and all three players had learned the value of the available bonus pool, the managers made a price offer for the information. This price offer is the main dependent variable in our study, as it represents the manager's willingness to pay for this information. After the managers made their offers, the actual price was randomly determined. Managers 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, then the manager did not receive the information and paid nothing (Becker et al. 1964).

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 manager 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 manager had a 60 percent chance of getting the information). Independent of whether a manager had obtained the information, s/he was required to divide the bonus pool between the two employees. After the allocation decision was final, all participants were informed of their own and each others' decisions and payoffs. To prevent a potential curiosity effect, participants were told at the beginning of the session that they would receive this information after each round.

In total, we conducted 12 sessions with eight rounds each. Accordingly, each participant engaged in eight separate games. New groups of three participants were created at the start of each round, using a stranger-design-matching pattern. While participants could be re-matched with another participant up to two times, they were never in a particular triad more than once, and because they interacted anonymously they did not know when, or with whom they were re-matched. After round four, all participants who played the role of manager in the first four rounds changed roles to act as employees in the second four rounds. Also, half of the participants acting as employees in the first half of the session changed roles and acted as managers 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 12 sessions were run with either 12 or nine participants.[13] In total there were 84 different managers and 336 unique triads/games.

The students self-registered as participants in response to an invitation on the university's laboratory website. Course credits were used as a show-up fee. The actual payout in Euros for the participants was determined by randomly selecting (at the end of each session) one of the eight rounds as the pay round and converting the Lira payoff from that round to Euros. The average amount earned was €6.58 with a minimum of €0.83 and a maximum of €11.93.

[13] The laboratory had 12 computers available and we ran sessions with nine participants only if fewer than 12 of the registered participants showed up. In total there were six sessions with nine and six sessions with 12 participants.

TABLE 2

Primary Descriptive Statistics

	n	Min	Max	Median	Mean	SD
Employee effort	672	0	10	6	5.43	3.26
Manager price offer	336	0	5	2	2.08	1.67
Employee payoff	672	0	28	12.99	12.71	3.14
Manager payoff	336	10.84	15	15	14.31	1.10

The laboratory consisted of a central area surrounded by 12 cubicles, each with a computer, and a control room. Upon arrival the students entered a waiting room. An instructor explained the basic procedures and told the participants that they would find detailed sets of instructions in their cubicles. Next, the participants were randomly assigned to a cubicle and started reading the instructions. The instructions explained the task and provided an example. They also explained the procedures for determination of the participants' pay-off and emphasized that they would be interacting with each other and that there was no deception of any kind. To prevent negative connotations, the instructions described the roles of the players as a division manager (supervisor) and two business-unit managers instead of a manager and employees.

The computer task started automatically, about ten minutes after the participants entered the cubicles. The participants first had to answer a set of questions about the experimental task to ensure that they understood the task. Participants could not continue without having given the correct answer to all questions. After all participants had successfully completed this 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. 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 completing the questionnaire, the randomly selected pay round was reported, and participants collected their money and left.

IV. RESULTS

Descriptive Statistics

In the exit questionnaire, we asked participants three questions regarding their involvement in the session. The answers indicate that most participants participated seriously in the session, made their choices after some deliberation, and cared about the outcomes of their decisions.

In our analyses we use the pooled data from all 336 unique triads of one manager and two subordinates. Tables 2, 3, and 4 contain descriptive statistics. First, Table 2 shows that on average employees chose effort levels equal to more than half of their endowment (5.43 Lira out of 10), signaling at least some degree of trust in managers' intentions to provide them with a fair return.[14] Table 3 shows the observed frequencies of team effort levels, indicating that team effort levels are observed over the whole range from 0 to 20, with higher frequencies around the midpoint of 10 and fewer observations at the extremes. In addition, Table 4 shows how the mean effort evolved during

[14] While our primary research questions relate to the behavior of managers, we also asked post-experimental questions regarding the participants' decisions when in the role of employee. One question asked participants to indicate the degree to which they trusted managers to allocate the bonus pool in a fair manner. Untabulated analysis shows that responses to this question are positively correlated with the chosen effort level ($p < 0.01$).

TABLE 3

Observed Frequencies of Combined Effort

Combined 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	

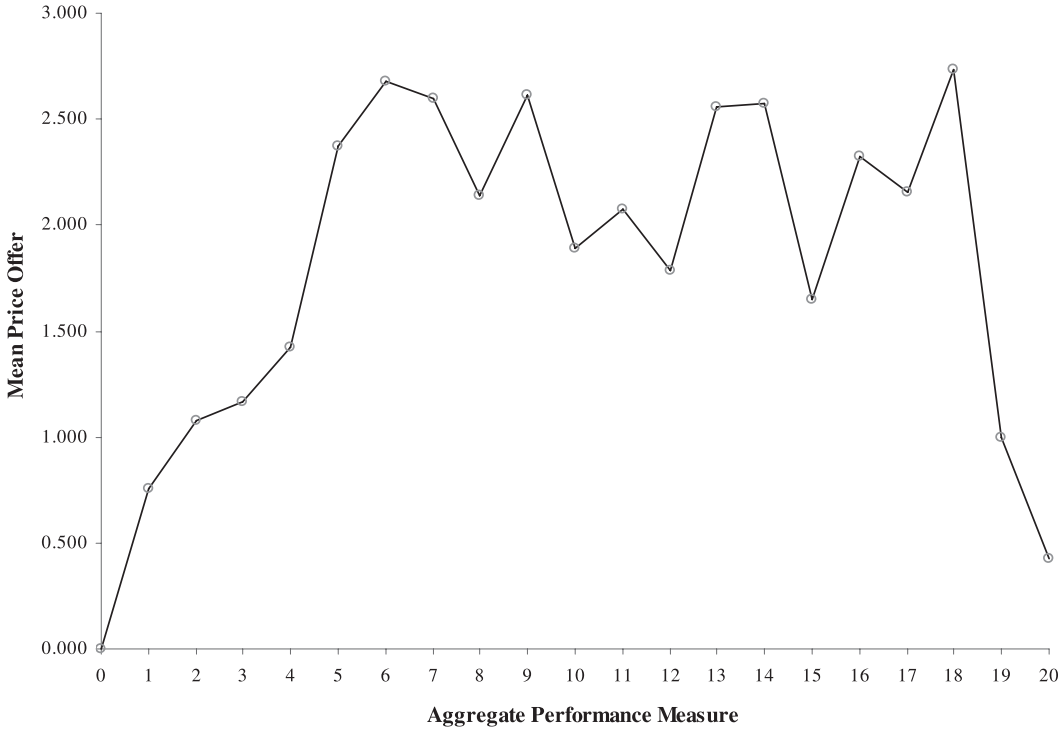
TABLE 4

Mean Employee Effort Levels and Manager Price Offers across Rounds

	Round								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Overall**
Employee Effort									
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
Manager Price Offers									
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

the eight rounds of the experiment. Tables 2 and 3 also provide descriptives regarding the price offers of the managers. The mean offer is 2.08 Lira (SD = 1.67). As is clear from Table 4, the mean offer is somewhat higher in the first four rounds of the session than in the last four rounds. Figure 1 displays the mean offer for different values of total effort.

FIGURE 1
Descriptive Results
Mean Price Offer as a Function of the Aggregate Performance Measure



Hypothesis Tests

H1 predicts that managers will generally be willing to obtain additional, costly information on individual contributions to joint production. H2 predicts that managers will be more willing to obtain this information as aggregate performance becomes less extreme, and H3 predicts that they will be more willing to do so as aggregate performance increases. As described earlier, together, H2 and H3 suggest a non-monotonic, asymmetric relation between the aggregate performance measure and the price offers made by managers. Specifically, the price offers will increase as aggregate performance increases, up to the point where aggregate performance (total effort) is 10. After this point, the price offers either will increase at a lower rate or decrease as aggregate performance increases from 10 to 20. Thus, we are able to test all three hypotheses by examining the pattern of data. We do so using the following regression:

$$PRICE = \alpha + \beta_1 \cdot EXTREME + \beta_2 \cdot HIGHPERF + \beta_3 \cdot HIGHPERF{\cdot}EXTREME + \beta_4 \cdot EMPEXP, \quad (1)$$

where:

PRICE = the price offer made by the manager;
EXTREME = the absolute value of (aggregate performance minus 10);
HIGHPERF = a dummy variable that has the value 1 if aggregate performance $\geq$ 10, and 0 otherwise;

HIGHPERF · *EXTREME* = the interaction between *HIGHPERF* and *EXTREME*; and
EMPEXP = a dummy variable that has the value of 1 if the manager has previous experience as an employee, and 0 otherwise.

We take several steps to ensure that the statistical tests provided by this regression are appropriate for the experimental design used. First, we exclude observations for which aggregate performance is 0 or 20 (*EXTREME* = 10), allowing for a discontinuity at these extreme observations.[15] Next, because we collect four different observations of the price offer from each participant acting as a manager, our 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).[16] Finally, because the participants changed roles after four rounds, we include a dummy variable (*EMPEXP*) to control for the fact that some managers had prior experience as an employee, while others had not.

Table 5, Panel A and Figure 2 present the regression results. Importantly, the x-axis on the graph in Figure 2 is aggregate performance, whereas the regression itself does not include a term for aggregate performance. Therefore, it is useful to translate the regression output to its graphical representation. When aggregate performance equals 10, the most moderate level of aggregate performance, the variable *EXTREME* equals 0. Therefore, the intercept α equals the price expected as aggregate performance approaches 10 from the left. This intercept plus β_2, the coefficient on the dummy variable *HIGHPERF*, equals the price expected as aggregate performance approaches 10 from the right. While these two points are separated in the figure, it should be noted that the difference (i.e., β_2) is not significant at conventional levels ($p = 0.118$).[17] The negative of β_1, the coefficient on *EXTREME*, equals the slope of the regression line to the left of 10, whereas the sum of β_1 and β_3, the coefficient on the interaction term, equals the slope of the regression line to the right of 10.

The pattern of data presented in Figure 2 is consistent with our hypotheses. Specifically, price offers are positive and increase as aggregate performance increases, up to the point where aggregate performance (total effort) is 10. At this point, there is a kink in the line, after which there is an asymmetry, such that the slope of the line to the left of 10 is much steeper than that to the right of 10.

H1 predicts that, on average, managers' willingness to pay for the information will be higher than zero. As shown in Table 2 the mean price offer is 2.08, which is significantly greater than zero ($p < 0.001$).[18] Of course, given that the price is truncated at zero, this statistical test is not

[15] Note that if total effort is either 0 or 20, there is no uncertainty about the individual effort levels and consequently we would not expect the manager to make a positive price offer for the information (i.e., our theory only applies for values of *EXTREME* < 10). Thus, including observations with *EXTREME* = 10 in our analysis might obscure an existing linear relationship between *EXTREME* and *PRICE*. In fact, our results are inferentially identical if we do include these observations, albeit the coefficient on the interaction term drops to marginal significance ($p = 0.054$). If we use an independent correlation structure instead of an auto-regressive correlation structure, then the interaction term is significant at the 0.05 level even if we include cases in which *EXTREME* = 10.

[16] We run GEE with a fixed scale value of 1 and with an auto-regressive correlation structure. The auto-regressive correlation structure allows us to take into account that observations that are closer together in time (e.g., a manager's first and second price offer) are likely to have a stronger correlation than observations that are further away from each other (e.g., a manager's first and fourth price offer) (e.g., Zorn 2001). Our findings are qualitatively similar if we use an independent correlation structure (assume no correlation between the different observations for a specific participant). In that case the interaction coefficient also remains significant if we include the observations for which *EXTREME* = 10.

[17] If the regression is run without the *HIGHPERF* dummy (but leaving in the interaction term), thus forcing the two lines to overlap at the point *EXTREME* = 0, the results are inferentially identical.

[18] A closer look at the offers reveals that 11 managers (13.1 percent) exhibit pure wealth-maximizing behavior and offer 0 Lira for the information in all four rounds in which they act as managers. Three other managers also kept their offers constant despite varying levels of total effort. Two of these made the maximum offer of 5 Lira in all four rounds and the other always offered 3 Lira.

TABLE 5
Results of GEE Analyses[a]

Panel A: Hypothesis Test

$$PRICE = \alpha + \beta_1 \cdot EXTREME + \beta_2 \cdot HIGHPERF + \beta_3 \cdot HIGHPERF \cdot EXTREME + \beta_4 \cdot EMPEXP$$

	B	Std. Error	Wald Chi-Square	df	p-value (two-tailed)
Intercept	2.897	0.252	132.556	1	< 0.001
EXTREME	−0.177	0.053	10.954	1	0.001
HIGHPERF	−0.386	0.247	2.444	1	0.118
HIGHPERF · EXTREME	0.151	0.064	5.622	1	0.018
EMPEXP	−0.526	0.289	3.317	1	0.069

Planned Contrast: $\beta_1 + \beta_3 < -\beta_1$.
Wald Chi-Square = 6.10, p = 0.014.

Panel B: Results of GEE Analysis for *HIGHPERF* = 1 Subsample, Including Only *HIGHTRUST* and *HIGHFAIR* Managers

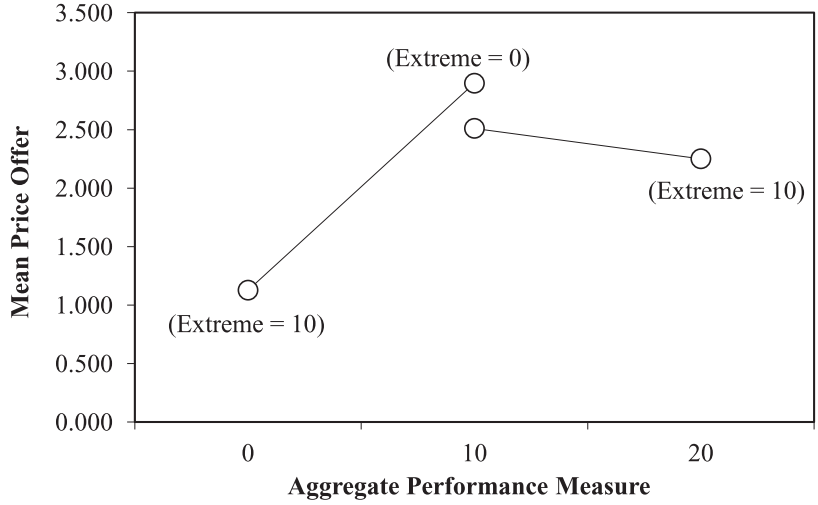
$$PRICE = \alpha + \beta_1 \cdot EXTREME + \beta_2 \cdot TRUSTvsFAIR + \beta_3 \cdot EXTREME \cdot TRUSTvsFAIR + \beta_4 \cdot EMPEXP$$

	B	Std. Error	Wald Chi-Square	df	p-value (two-tailed)
Intercept	2.403	0.459	27.364	1	< 0.001
EXTREME	−0.126	0.090	1.977	1	0.160
TRUSTvsFAIR	−0.757	0.554	1.868	1	0.172
EXTREME · TRUSTvsFAIR	0.299	0.121	6.080	1	0.014
EMPEXP	−0.229	0.427	0.289	1	0.591

[a] To correct for cluster-correlated data (due to manager-participants each providing four observations), we calculate robust estimators (also known as Huber-White or sandwich estimators), using the Generalized Estimating Equations (GEE) module of SPSS. We run GEE with a fixed scale value of 1 with an auto-regressive correlation structure. The auto-regressive correlation structure allows us to take into account that observations that are closer together in time (e.g., a manager's first and fourth price offer) are likely to have a stronger correlation than observations that are further apart from each other.

Variable Definitions:
PRICE = the price offer made by the manager;
EXTREME = the absolute value of (aggregate performance minus 10);
HIGHPERF = a dummy variable that has the value 1 if aggregate performance $\geq$ 10, and 0 otherwise;
TRUSTvsFAIR = a dummy variable that has the value of 1 if the manager is a *HIGHTRUST* manager, and 0 if the manager is a *HIGHFAIR* manager; and
EMPEXP = a dummy variable that has the value of 1 if the manager has previous experience as an employee, and 0 otherwise.

FIGURE 2
GEE Results
Willingness to Incur Cost as a Function of Aggregate Performance Measure[a]



[a] This graph presents the results of the regression presented in Table 5, Panel A. When aggregate performance equals 10, the variable *EXTREME* equals 0. Therefore, the regression intercept equals the price expected as aggregate performance approaches 10 from the left. This intercept plus the regression coefficient on the dummy variable *HIGHPERF* equals the price expected as aggregate performance approaches 10 from the right. While these two points are separated in the figure, it should be noted that the difference (i.e., the coefficient on *HIGHPERF*) is not significant at conventional levels ($p = 0.118$). The negative of the coefficient on *EXTREME* equals the slope of the regression line to the left of 10, whereas the sum of the coefficient on *EXTREME* and the interaction coefficient equals the slope of the regression line to the right of 10.

particularly insightful into the average behavior of manager-participants. However, the regression results provide additional support for H1. If managers were driven by pure wealth-maximization and never bought the information, then none of the coefficients in the regression model would be significant. In contrast, and in support of H1, we find that the intercept, β_1, and β_3 are significantly different from zero.

The regression results also indicate that the predicted pattern in the data is statistically significant. Recall that the slope to the left of 10 equals $-\beta_1$. Thus, the significantly negative β_1 ($p = 0.001$) suggests that as aggregate performance approaches 10 from the left, price offers increase. We provide statistical evidence of the fairness effect (H2), by demonstrating that there is a kink in the line at the point where aggregate performance = 10. Because the slope to the right of 10 equals $\beta_1 + \beta_3$, we test for this slope change using a planned comparison that $-\beta > \beta_1 + \beta_3$. This test provides evidence of a statistically significant ($p = 0.014$) reduction in the slope at the point where aggregate performance equals 10. Finally, the significantly positive β_3 ($p = 0.018$) indicates an asymmetry in the relation between the aggregate performance measure and the price offer, which, as described earlier, provides evidence of the trust reciprocity effect predicted in H3.

The H3 result is notable, because it seemingly works in the opposite direction of the effect described in the recent literature. Rajan and Reichelstein (2009) develop an analytical model demonstrating that under certain assumptions, subjective measures will be *less* valuable for the

allocation of a discretionary bonus pool when objective measure outcomes are higher. In many ways, their objective measures are analogous to our readily available information, while their subjective measures are analogous to the additional information we model. Ederhof (2010) builds on Rajan and Reichelstein's (2009) model and shows that subjective measures are optimally considered only when the objective performance measures outcome falls outside a "normal" range. Ederhof's empirical evidence supports the notion that discretionary bonuses are paid more often when the contractible measure shows very low or high performance. We do not interpret our results as conflicting with those of Ederhof (2010) and Rajan and Reichelstein (2009), but rather as complementing them. Those results are based on theories of optimal contracting under traditionally modeled utility functions. Further, they do not model the joint production setting, which is central to our investigation. Our results would seem to create a boundary condition for their results, suggesting that in the team setting, managers' social preferences could mitigate these effects, such that managers would place *greater* value on subjective measures when the objective measure outcomes are more extreme.

In summary, we find that managers' willingness to obtain additional costly information that reveals the individual efforts of their employees follows the predicted pattern. Over the whole range of observed total effort levels, managers are prepared to pay for such information. However, their willingness to do so depends on the level of aggregate performance. Specifically, the willingness to obtain additional, costly information decreases as aggregate performance becomes more extreme, which is consistent with the predicted fairness effect. Further, the willingness to obtain this information increases with aggregate performance, providing support for the predicted trust reciprocity effect.

Supplemental Analyses

This section contains several additional analyses. First, we use data from the exit questionnaire to gain a better understanding of the managers' underlying motivations. This allows us to establish with more certainty that considerations of fairness and trust reciprocity drive managers' decisions about obtaining the information. Next, we examine and discuss the allocation decisions for managers who did and did not obtain information on individual contributions to joint production. This analysis is important because it shows that managers who obtain the information indeed use it to allocate the bonus pool in proportion to the employees' relative effort. Finally, we discuss the results of additional analyses, including an additional study, used to examine the validity of our assumption that our participants equate fairness with "just deserts."

Process-Based Analysis

To provide additional evidence on the underlying motivations responsible for the effects we observe, we extract a subset of manager-participants who report that they placed greater importance on a desire to provide a fair allocation than on a desire to reciprocate trust, and then compare the pattern of their responses to what our theory would predict for managers driven solely by fairness concerns, with trust reciprocity playing no role. Similarly, we extract a subset of managers who report that they placed greater importance on a desire to reciprocate employees' trust than on a desire to ensure a fair distribution of the bonus pool, and then compare the pattern of their responses to what our theory would predict for managers driven solely by trust reciprocity, with fairness concerns playing no role.

We extract our subsets of managers using the results of the exit questionnaire. This questionnaire contained a set of items that supplement the behavioral data and allow us to evaluate the motivations behind managers' price offers and allocation decisions. Table 6 provides descriptive statistics on these questionnaire items. Note that items 3 through 7 relate to the manager's motivation to provide a fair allocation, whereas items 8 through 11 relate to manager's desire to reciprocate the trust that investing employees placed in them. Principal components analysis confirms that items 3 through 7 (the fairness

TABLE 6

Descriptive Statistics
Exit Questionnaire Items[a]

Item		Mean	SD	t	p
(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 manager.	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 manager.	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

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

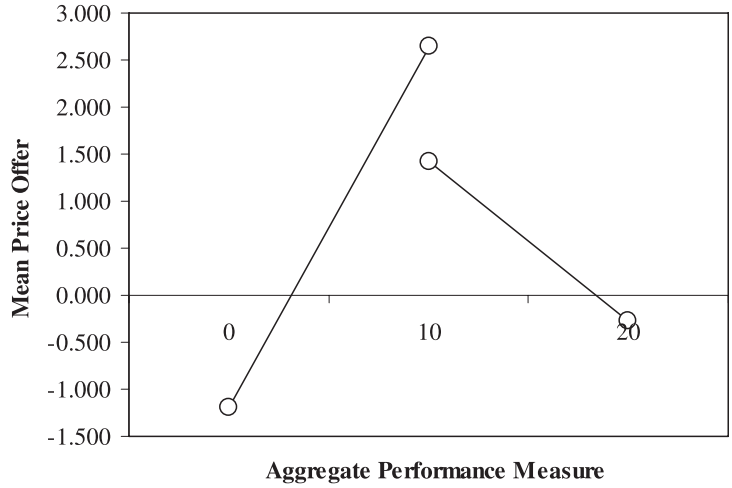
items) all load on one factor and items 8 through 11 (the trust reciprocity items) all load on another factor. The reliability of the scales is satisfactory, as Cronbach alpha is 0.89 for the fairness scale and 0.82 for the trust reciprocity scale. None of the mean item scores differs significantly (all $p > 0.10$) between participants who played the manager role in the first four rounds and participants who played the manager role in the second half of the experiment.

We subtract the sum of items 3 to 7 from the sum of items 8 to 11, resulting in a difference score, representing the relative importance of trust reciprocity versus fairness to the manager. Those managers who scored in the bottom 25 percent are labeled *HIGHFAIR* managers and those who scored in the top 25 percent are labeled *HIGHTRUST* managers.

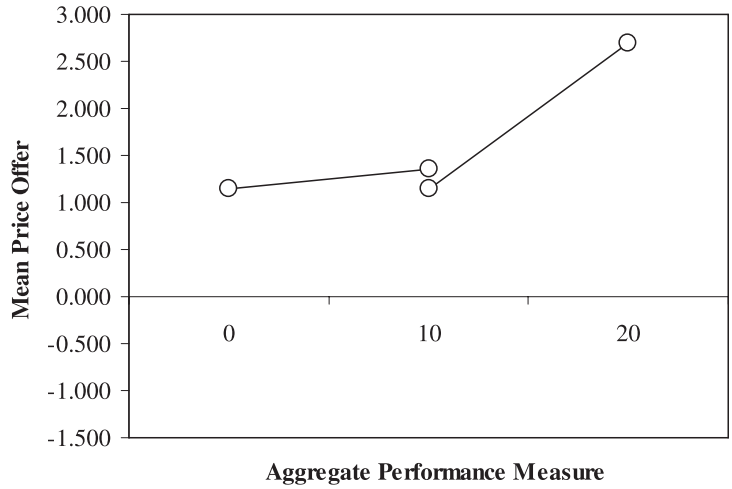
Recall that if managers' decisions were driven solely by fairness concerns and that trust reciprocity played no role, then we would expect to see a perfectly symmetric relation between the aggregate performance measure and the managers' price offers, with the offers increasing up to an aggregate performance measure of 10 and then decreasing at the same rate beyond that point. We re-run our primary regression analysis (Equation (1)), using only the data for *HIGHFAIR* managers, and graph the results in Figure 3, Panel A, similar to the presentation of the main results in Figure 2. The results of this analysis must be interpreted with some caution, because they are based on only 25 percent of our manager-participants and thus represent a small sample size. Further, we are comparing them to a benchmark based on managers who place zero weight on trust reciprocity, whereas these managers simply place less weight on trust reciprocity than on fairness concerns.

FIGURE 3
GEE Results
Willingness to Incur Cost as a Function of Aggregate Performance Measure

Panel A: *HIGHFAIR* Managers[a]



Panel B: *HIGHTRUST* Managers[b]



[a] This graph presents the results of the primary regression, including only those managers designated as *HIGHFAIR*. We subtract the sum of exit questionnaire items related to fairness (items 3 to 7) from the sum of those related to trust reciprocity (items 8 to 11). Those managers who score in the bottom 25 percent of this difference score are labeled *HIGHFAIR* managers, and those who score in the top 25 percent are labeled *HIGHTRUST* managers.

[b] This graph presents the results of the primary regression, including only those managers designated as *HIGHTRUST*. We subtract the sum of exit questionnaire items related to fairness (items 3 to 7) from the sum of those related to trust reciprocity (items 8 to 11). Those managers who score in the bottom 25 percent of this difference score are labeled *HIGHFAIR* managers, and those who score in the top 25 percent are labeled *HIGHTRUST* managers.

Nonetheless, the visual pattern of results is quite similar to the pattern we would expect for managers for whom fairness, but not trust reciprocity, is a primary concern.

Recall further that if managers' decisions were driven solely by trust reciprocity and that fairness played no role, then we would expect no change in the slope at 10. Rather, we would expect a consistent and monotonic increase in price offers as the aggregate performance measure increased from 0 to 20. We re-run our primary regression analysis (Equation (1)), using only the data for *HIGHTRUST* managers, and graph the results in Figure 3, Panel B, similar to the presentation of the main results in Figure 2. Using similar reasoning to that above, the results of this analysis must be interpreted with some caution, because they represent a small sample size and because, we are comparing them to a benchmark based on managers who place zero weight on fairness, whereas these managers simply place less weight on fairness concerns than on trust reciprocity. Nonetheless, the visual pattern of results is quite similar to the pattern we would expect for managers for whom trust reciprocity, but not fairness, is a major concern.

We compare these results statistically by running a regression analysis using both the *HIGHFAIR* and the *HIGHTRUST* managers for the cases in which the aggregate measure was moderate to high (i.e., $HIGHPERF = 1$), since only in this region does the fairness and trust argument lead to different predictions. We test the following regression model:

$$PRICE = \alpha + \beta_1 \cdot EXTREME + \beta_2 \cdot TRUSTvsFAIR + \beta_3 \cdot EXTREME{\cdot}TRUSTvsFAIR + \beta_4 \cdot EMPEXP, \quad (2)$$

where:

PRICE = the price offer made by the manager;
EXTREME = the absolute value of (aggregate performance minus 10);
TRUSTvsFAIR = a dummy variable that has the value 1 if the participant is a *HIGHTRUST* manager, and the value 0 if the participant is a *HIGHFAIR* manager;
EXTREME · TRUSTvsFAIR = the interaction between *EXTREME* and *TRUSTvsFAIR*; and
EMPEXP = a dummy variable that has the value of 1 if the manager has previous experience as an employee, and 0 otherwise.

A significantly positive coefficient on the interaction would suggest that the slope to the right of 10 is more positive for the *HIGHTRUST* than *HIGHFAIR* managers. As presented in Table 5, Panel B, the interaction is significant ($p = 0.014$). Thus, we conclude that the patterns represented in Figure 3, Panels A and B are significantly different. More importantly, they are different in precisely the way that our theory would predict. That is, managers who report to care more about trust reciprocity than fairness increase their price offers as the aggregate performance measure increases from 10 to 20, whereas those who report to care more about fairness than trust reciprocity decrease their price offers over this same range. Thus, this analysis provides corroborating evidence that our main results are driven by the social preferences addressed by our theory.[19]

The Effect of Additional, Costly Information on Allocations

We next consider how the additional, costly information, when obtained, affected the subsequent allocation decisions. Table 7 compares the allocation decisions made by managers who obtained the additional, costly information on individual contributions to joint production to the decisions of those who did not. The price offers of the managers were high enough to obtain the information in 131 (39

[19] We acknowledge that the size of the bonus pool is larger when aggregate performance is relatively high than when it is relatively low. This analysis helps to rule out the alternate explanation that it is the size of the bonus pool and not trust *per se* that motivates managers' willingness to purchase information.

TABLE 7

Allocation Decisions of Managers

Informed Allocations	Allocation in proportion to relative effort[a]	112
	Other allocation[b]	19
	Total	131
Uninformed Allocations		
After zero offer	50/50 allocation	73
	Other allocation	16
	Total	89
After positive but too low offer	50/50 allocation	57
	Other allocation	59
	Total	116
Total Allocations		336

[a] Considered in proportion to relative effort if proportions of bonus pool allocations are within 10 percentage points of relative efforts. We chose this measure because some managers round their allocation to the nearest 10 percent (e.g., if the information shows that A has provided 33 percent of total effort and B has provided 67 percent, the manager chooses a 30-70 split).

[b] Of these 19 cases, nine represent allocations that are closer to a 50-50 split than the relative contributions are and the difference in allocations is therefore smaller than just deserts would justify. The other ten cases represent allocations where the difference in allocations is larger than justified by the just deserts notion of fairness.

percent) of the triads and not high enough in 205 (61 percent) of the triads. The data in Table 7 show that in most cases (130, 63 percent) managers who allocated the bonus pool without the information chose a 50-50 split. In the remaining 75 "uninformed" cases, the allocations range from 0-100 splits to 49-51 splits. Managers who did obtain the information used it to allocate the bonus pool in proportion to individual efforts in the vast majority of cases (112 cases, 85.5 percent).[20] This confirms that most managers used the information to ensure just deserts, as we expected.

Fairness as Just Deserts

Finally, we provide evidence regarding our conceptualization of fairness as "just deserts." Recall that by just deserts, we refer to the expectation that outcomes should be proportional to inputs. For managers who care about fairness, and who equate fairness with just deserts, obtaining the additional, costly information is a way to ensure that fairness is achieved. Therefore, when a manager chooses to not obtain the information, we conclude that s/he does not care enough about fairness. However, some managers might hold ideas of fairness other than just deserts. These managers might decline to obtain the additional information not because they do not care about fairness, but because they believe an uninformed allocation can actually be a fair allocation. In particular, some managers might believe that an equal split of the bonus pool, irrespective of the

[20] Of the remaining 19 cases of "informed discretion," nine represent allocations that are closer to a 50-50 split than the relative effort contributions are. In these cases the difference in allocations is therefore smaller than would be justifiable based on the just deserts notion of fairness. The other ten cases represent allocations where the difference in allocations is larger than justified by the just deserts notion of fairness. For example, three of these latter ten cases represent a situation in which both employees made a positive contribution, but the whole bonus pool was allocated to the employee who made the highest investment.

individual contributions, is the fairest allocation. Thus, we present two additional analyses to check whether our participants indeed equate fairness to just deserts, as we assume.

First, we examine the self-reported preferences (through the post-experimental questionnaire) of the 11 manager-participants who made no positive price offers for the additional information. If the decision to not obtain the additional information stems from a lack of concern for fairness, then we would expect these 11 managers to report less concern for fairness than that reported by the other managers. Recall that four of the questions on the manager's post-experimental questionnaire were aimed at assessing manager's concern for fairness. For the 11 managers who made no positive price offers, the mean of these four questions is 2.11 (SD = 1.22). In the subsample of managers who made at least one positive price offer, the mean is 3.92 (SD = 0.74). The difference between these means is significant ($t = 4.77$, $p < 0.001$). Also, the mean in the sample of managers who never make a positive price offer is significantly lower than the theoretical midpoint of 3 ($t = -2.42$, $p < 0.05$) indicating that, on average, these managers somewhat disagree with the items measuring their concern for fairness. We conclude from this that the primary reason for a failure to obtain the additional information is a lack of concern for fairness.

Second, we ran an additional study to examine the proportion of individuals in our study's population who hold notions of fairness different from just deserts. In this study we provided a sample of 167 participants (62.9 percent male, mean age 20.6, from the same target population used in the main study) with six hypothetical scenarios (none of these participants participated in the main study). The scenarios described situations that actually occurred in our main experiment (i.e., two individuals, A and B, have independently chosen how much of an endowment of 10 to invest in a common project that returns a bonus pool equal to 150 percent of the combined investment). However, the participants in this extra study not only saw the combined investment, but also learned the individual contributions (i.e., they got the additional information at no cost). We then asked the participants to indicate which allocation they felt was *the most fair*.

The six situations are listed in Table 8. The results (not tabulated here) show that a large majority of the participants equate fairness with just deserts. The percentage of participants allocating the pool proportional to contribution sizes ranges from 80.8 percent (situation 4) to 90.4 percent (situation 1). The percentage of participants allocating it equally, on the other hand, ranges from 1.8 percent (situations 3 and 6) to 11.4 percent (situation 4).[21] Many participants (44.3 percent) chose an exact (i.e., up to 1 decimal) just deserts allocation in all six cases. Those who did not tended to round one or two allocations (for example, many participants rounded the allocations in situations 2 and 4 to whole percentages). Moreover, only one participant consistently chose the 50-50 split.

The results from this supplemental study suggest that most individuals equate fairness with just deserts. Moreover, it should be noted that our experimental design ensures that manager-participants who hold alternative notions of fairness are matched randomly with employee-participants. We therefore conclude that it is reasonable to assume that individuals who exhibit no willingness to buy the information in our main study do so because they do not care about the fairness of the allocation, and not because they hold alternative notions of fairness.

V. DISCUSSION AND CONCLUSIONS

This study uses an experiment to examine the effect of social preferences on managers' allocations of discretionary bonus pools. We find that very few managers behave in accordance with the traditional model of economic man. Most managers are willing to obtain additional, costly

[21] Notably, in this latter case, just deserts would require A to be allocated 47.4 percent and B 52.6 percent, reasonably close to the 50-50 benchmark.

TABLE 8

Scenarios and Results of Supplemental Study

Scenario #	Investment of A	Investment of B	Total Investment	Mean Allocation to A[a]	Frequencies of Allocations[b]		
					50-50 Split	In Proportion to Investment (Just Deserts)[c]	Other
1	10 (100%)	0 (0%)	10	96.1%	4 (2.4%)	151 (90.4%)	12 (7.2%)
2	10 (66.7%)	5 (33.3%)	15	66.5%	7 (4.2%)	145 (86.8%)	15 (9.0%)
3	0 (0%)	1 (100%)	1	8.41%	3 (1.8%)	143 (85.6%)	21 (12.6%)
4	9 (47.4%)	10 (52.6%)	19	46.7%	19 (11.4%)	135 (80.8%)[d]	13 (7.8%)
5	4 (40%)	6 (60%)	10	40.8%	10 (6.0%)	144 (86.2%)[d]	13 (7.8%)
6	1 (25%)	3 (75%)	4	25.6%	3 (1.8%)	148 (88.6%)	16 (9.6%)

[a] The mean percentage of the bonus pool allocated to A. n = 167.
[b] Number of participants choosing a specific allocation. n = 167.
[c] Considered in proportion to relative effort if proportions of bonus pool allocations are within 10 percentage points of relative efforts. We chose this measure because some participants consistently round their allocation to the nearest 10 percent.
[d] Excluding the cases in which the allocation is exactly 50.0-50.0.

information that allows them to unravel the readily available metric of aggregate performance and, thus, to reward their employees' relative efforts. However, this willingness is influenced by the outcome of aggregate performance. Specifically, this willingness increases as aggregate performance becomes less extreme and (given a specific level of extremeness) as aggregate performance increases. These results are consistent with models that incorporate social preferences and, in particular, preferences for fairness and trust reciprocity (e.g., Falk and Fischbacher 2006a, 2006b). Our findings have implications for both the accounting literature and research on human altruism and third-party interventions.

The study contributes to accounting research, as it is one of the first to systematically investigate how non-selfish motivations influence discretionary bonus pool allocations. The existing literature has shown that discretionary bonus pools provide a useful mechanism for managers to incorporate information not included in the formal contract into compensation. However, this literature has not taken into account that much performance-relevant information can only be obtained at some cost to the manager. This may be problematic because managers do not always have incentives to use their discretion in a value-enhancing way. Our study shows that even in the absence of such monetary incentives, social preferences can motivate managers to obtain additional costly information in order to evaluate and reward their employees according to their efforts. This may help explain why discretionary performance evaluation is so common in practice, even in situations where managers do not have explicit incentives to use their discretion to protect their employees from the inherently incomplete nature of objective performance measures.

Future research is needed to shed more light on how self-interest, cognitive biases, and social preferences interact to influence the use of discretion. For example, researchers could examine how incentive structures of both employees and managers influence evaluation outcomes. They could

also investigate how evaluations are affected by individual differences and by manager-employee relationship characteristics such as a history of working together. Another potentially fruitful direction for future research is examination of how social preferences influence incentive contracting and other accounting-related issues such as budgeting processes and transfer-pricing mechanisms. Our research shows how theories and research methods originating in behavioral and experimental economics can inform accounting research in this respect.

This study is one of the earliest to focus on a 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 willing to incur a cost to ensure that resources are allocated according to these preferences. The findings furthermore show that paying for fairness is not a dichotomous choice, as willingness to pay increases with the potential unfairness of the situation. Thus, individuals seem to make a deliberate trade-off between the costs and benefits of self-sacrificing acts of fairness. Our study also indicates that intentions matter (Falk et al. 2008) and that managers' willingness to pay is not solely driven by inequality aversion (Bolton and Ockenfels 1993; Fehr and Schmidt 1999).[22] Instead, it seems to originate in an experienced need to enforce a social norm of fair cooperation (Falk and Fischbacher 2006a, 2006b) and to repay trust (Berg et al. 1995; Fehr and Fischbacher 2004b). Consequently, the results presented in this paper are supportive of the notion of strong reciprocity (Fehr and Fischbacher 2004b; Fehr et al. 2002) and cannot be explained by normal reciprocity, in which an individual responds to others' acts that have directly affected his/her payoffs.

One important limitation of our study is that we do not formally derive expectations or predictions of equilibrium behavior from an analytical model. The reason is that the current state of the literature does not allow us to provide well-established mathematical representations of the social preferences we examine. Existing analytical accounting research still predominantly relies on the traditional wealth-maximizing assumption, and formal theories about social preferences are only beginning to emerge in the economics literature. We therefore take the approach used in most behavioral economics-based experimental studies (e.g., Fehr and Fischbacher 2004b; Charness et al. 2008; Rigdon 2009) and rely on consistent empirical findings and the intuition provided by recent models (Falk and Fischbacher 2006a, 2006b) in developing our expectations. In relation to this, we have built our analyses on specific notions of fairness (just deserts, Falk and Fischbacher 2006a, 2006b) and trust (Berg et al. 1995), while acknowledging that many other notions of these concepts exist and might be relevant to our setting.

We believe that future research in accounting would benefit if it moved beyond the pure wealth-maximization model and incorporated formal social preference models from the behavioral economics literature. For example, while not straightforward, the setting that we examine in our study could, in principle, be analyzed using a model that incorporates preferences for fairness and trust reciprocity. Such an analysis could start from a general social preference model such as the models developed by Levine (1998) or Falk and Fischbacher (2006a, 2006b). In both of these models, an individual's utility is affected by his/her own payoff and by the payoff of others, where the effect of a specific other's payoff on the person's utility depends on the perceived cooperativeness or kindness of this other.

[22] To illustrate, in 26.0 percent of the cases in which the manager obtains the information about the individual effort levels, the bonus pool is allocated in such a way that the difference between the final payoffs of the employees is larger than the difference that would have resulted had the pool been split equally. Also, in 37.4 percent of the cases managers use the information to provide at least one employee with a payoff that is higher than the manager's own payoff.

In summary, our experiment shows that social preferences affect behavioral responses to accounting mechanisms. However, as the existence of social preferences is now becoming increasingly more established in the economics literature, future accounting research should also take the next step and try to develop models that allow us to compare the relative efficiency of alternative accounting mechanisms under the assumption that such preferences exist. We believe closer interaction between analytical and experimental accounting research is important in this respect. As in related fields such as labor economics (cf. Charness and Kuhn 2011), analytical accounting research is likely to learn from lab experiments that challenge assumptions, and experimentalists are likely to benefit from deriving their hypotheses from formal models.

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