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Running Head: Compensation Interdependence and Performance Consequences of Managerial Discretion

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Compensation Interdependence and Performance Consequences of Managerial Discretion

Abstract

We examine the performance consequences of managerial discretion when compensation payoffs are interdependent; that is, when rewards or penalties given to some employees cause others not to get them. Using proprietary data from a company that gives monthly rewards and penalties, we find evidence of both a *nominal* and an *opportunity* effect when managerial discretion overrides objective performance measures. The former refers to performance consequences associated with workers who received rewards or penalties due to managerial discretion (*actual* recipients). The latter refers to performance consequences associated with workers who would have received rewards or penalties had there been no managerial discretion (*would-be* recipients). In further tests, we show that these performance effects likely stem from a combination of economics-based and psychology-based reasons. Our findings provide important insights for the design of incentive systems involving managerial discretion.

Data availability: The data used in this project are subject to a confidentiality agreement and cannot be shared without the express consent of the research site's legal representatives.

I.   INTRODUCTION

Many organizations incorporate managerial discretion[1] in employee compensation decisions. Prior research describes a number of potential benefits, especially when complete contracting is impeded by environmental unpredictability or by noise in the measurement of performance (Baker, Gibbons, and Murphy 1994; Ittner, Larcker, and Meyer 2003; Gibbs, Merchant, Van der Stede, and Vargus 2004; Ederhof 2010; Höppe and Moers 2011; Bol, Hecht, and Smith 2015). Nonetheless, managers use discretionary adjustments in performance evaluations less frequently than theory would predict (Höppe and Moers 2011; Woods 2012; Bol et al. 2015). Among the proposed reasons is the concern about how it might influence future performance (Gibbs et al. 2004; Moers 2005; Bol et al. 2015; Abernethy et al. 2018). Prior literature shows that managers consider the interdependence of performance-rewarding systems when applying managerial discretion (Bol et al. 2015). Performance-related payoffs are interdependent when subjective adjustments giving rewards or penalties to some employees cause others not to get them.[2] In this study, we explore whether and how the use of managerial discretion influences future employee performance when compensation outcomes are interdependent.[3]

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[1] The terms managerial discretion and subjectivity are used interchangeably in this study.

[2] For example, employee performance evaluations and compensation decisions are highly interdependent in the presence of bonus pools or forced rankings (or tournaments); positive discretionary adjustments to one employee's compensation automatically implies negative adjustments to someone else's. Bol et al. (2015) provide experimental evidence that supervisors are less likely to apply discretionary adjustments when a positive adjustment to one set of employees is experienced by others as a missed adjustment and, therefore, as a negative outcome. Their results suggest that supervisors operating in high-interdependence conditions consider potential demotivating effects arising from missing out on a potential reward due to the application of positive discretionary adjustments benefiting others.

[3] Empirical evidence on the relation between the use of managerial discretion and future performance is scant in the literature. Exceptions include Gibbs et al. (2004), which, based on data from car dealerships, show that subjective bonuses are associated with pay satisfaction, productivity, and profitability. Ederhof (2010) studies a hand-collected sample of CEO compensation contracts and documents a positive association between CEO discretionary bonus payouts and the change in the following period's accounting performance after controlling for observable financial performance. Abernethy et al. (2018) find higher departmental performance associated with managers who voluntarily share their bonus with their subordinates and distribute their bonus in a way that reflects actual cooperation.

We posit that compensation interdependence gives rise to two distinct performance effects of managerial discretion: a *nominal effect* and an *opportunity effect*. The former refers to performance effects of discretionary adjustments associated with employees who directly gained (lost) by being given a reward (penalty) subjectively.[4] The latter relates to the performance effects associated with employees who did *not* receive an expected reward (penalty) that was subjectively given to someone else.

We obtain data from a company whose management has discretion to override objective performance outcomes in assigning monetary rewards and penalties. In each month, the members of the department with the highest performance receive a monetary bonus, while the members of the worst-performing department are penalized with pay deductions. The reward/penalty decision is made by top executives. While the company uses objective performance metrics to assess operational performance, management can subjectively override the rankings and assign the rewards (penalties) to departments that did *not* objectively rank first (last). Subjective criteria informing the decision or the weights assigned to objective and subjective elements of performance are not predetermined.[5] At the end of each month, management discloses to the whole organization both the objective performance of each department and which ones got the reward and the penalty.

Our research setting affords us empirical measures for the nominal and opportunity effects resulting from managerial discretion. Examining the subsequent performance of workers who have gotten either a reward or a penalty through subjective overriding of the observable performance ranking (hereafter, *actual* recipients) sheds light on the nominal effect, whereas examining the

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[4] Studies focusing on discretionary components in the CEO compensation literature (e.g., Ederhof 2010) primarily examine the nominal effect, as it is difficult (or irrelevant) to identify potential stakeholders who were affected due to the use of subjectivity in rewarding CEOs.

[5] Interviews with members of the management team indicated that subjective evaluations generally take into consideration attitude, morale, and the influence of uncontrollable factors that might have affected objective performance. We provide more details in Section III.

subsequent performance of those who fail to receive rewards and penalties due to subjective adjustments (hereafter, *would-be* recipients) allows us to observe the opportunity effect. Results of statistical tests indicate that discretionary adjustments are indeed related to future performance. Specifically, we find evidence of the nominal effect in that actual recipients of subjective rewards (penalties) subsequently perform better (worse). We also document performance consequences associated with the opportunity effect of managerial discretion. Specifically, performance of would-be recipients of a reward declines, while that of would-be recipients of a penalty improves.

There are several predictions motivated by economics-based and psychology-based theories that may explain the relation between the use of managerial discretion and subsequent performance. Whereas the economics-based explanation predicts that managerial discretion relates to subsequent performance due to endogenous reasons (i.e., managerial discretion is exercised due to the influence of non-contractible factors that are related to future contractible performance), the psychology-based explanation posits that the use of managerial discretion *causes* psychological reactions affecting employees' subsequent effort. In order to explore these possible explanations, we conduct several tests. First, we examine the persistence of performance consequences associated with nominal and opportunity effects and show that, subsequent to discretionary adjustments in period t, nominal effects observed in period $t+1$ reverse or disappear in period $t+2$, whereas opportunity effects persist. Second, we examine the variation in the intensity of the opportunity effect by expanding the definition of would-be recipients to *any* department that ranked higher (lower) than the actual recipient of the subjective reward (penalty) with respect to the observable metrics. We observe, on average, a significant opportunity effect for those departments that ranked below the punished one and were, therefore, "saved" from a potential penalty, whereas departments that were deprived of a potential reward do not exhibit significant

changes in performance unless they ranked first. Taken together, these asymmetries with respect to the performance effects of managerial discretion are difficult to explain based solely on an economics-based view, whereby the use of managerial discretion constitutes an informative signal for non-contractible factors that are reflected in future performance.

Finally, we design a randomized controlled experiment to directly explore the psychology-based predictions for the relation between managerial discretion and future performance. Participants recruited through Amazon's Mechanical Turk (M-Turk) are exposed to a workplace scenario in which the incentive system closely reproduces the one in our field setting. Participants are randomly assigned to conditions reflecting different outcomes. In each condition, they learn how their team ranked in the month that just ended based on objective performance metrics and whether their team had received a reward or a penalty. Each participant then indicates how much they would change their effort in the upcoming month, and provides reasons that motivate their choice using free-text answers. Our findings are consistent with prior studies that emphasize the credibility of the incentive system as an important determinant of its effectiveness (Lawler 1971; Folger and Konovsky 1989; Baker et al. 1994; Gibbs et al. 2004). In particular, our results show that participants interpreting the incentive system as biased tend to decrease effort in the next period independently from receiving a reward or a penalty, while other participants respond to both rewards and penalties with greater subsequent effort. Collectively, our findings suggest that the relation we observe in the field between the use of managerial discretion and subsequent performance is likely explained by a combination of economics-based and psychology-based reasons.

We conduct additional tests to address concerns about possible alternative explanations for our field-based results. First, we show that subjective adjustments are not correlated with

observable departmental characteristics, alleviating concerns that management's discretion might reflect discrimination toward certain functions or groups of workers (Prendergast and Topel 1993). Another concern is the possibility that management might use discretionary adjustments to make up for having set excessively difficult (easy) targets. In our setting, monthly targets are set annually and are not renegotiated during the year. If discretion was used simply to correct for unrealistic targets, we should observe different trends in its use at particular times of the year, especially in the late months. We find no evidence of such trends. Next, we explore whether performance changes associated with the nominal effect of subjectivity might be driven simply by the wealth effect of receiving a reward (penalty), independent of its subjective or objective allocation by management. Our tests show that subsequent performance effects are observed only in the presence of subjectively assigned rewards and penalties, while the allocation of rewards and penalties based on the objective rankings alone does not appear to drive changes in subsequent performance. Lastly, we examine whether the opportunity effects of subjectivity might simply depend on being ranked at the top or at the bottom. If that were the case, observed performance effects might be due to mean reversion or, alternatively, to relative performance information, independent of not receiving an expected reward or penalty. Results of our analyses are inconsistent with this alternative explanation.

Our study contributes to the literature and to the practice of designing incentives involving managerial discretion. First, we provide empirical evidence of the relation between subjective allocations of performance-related payoffs and *subsequent* performance. Prior literature has focused for the most part on incentive effects that operate ex-ante, with the individual making effort choices *in view* of a promised reward or penalty (Lazear and Rosen 1981; Libby and Lipe 1992; Hannan, Hoffman, and Moser 2005; Campbell 2008). Second, while prior research (Ederhof

2010; Abernethy et al. 2018) has primarily focused on incentive effects related to members of the organization who are *directly* affected by managerial discretion—that is, who *receive* a reward (penalty) subjectively—we explore the consequences of managerial discretion for workers who are *indirectly* affected by the subjective decision via opportunity effects—that is, who *fail to receive* a reward (penalty) as a result of managerial discretion. While the possibility of these effects has been discussed in the literature (e.g., Moers 2005; Bol et al. 2015), our study is the first, to the best of our knowledge, to provide empirical evidence. Finally, our findings are relevant to managers involved in the design of incentive systems that allow managerial discretion in settings where performance compensation is interdependent.

The paper proceeds as follows: Section II reviews the literature and develops our main hypotheses. Section III describes the field setting and the data. Section IV describes the research design and reports the results of statistical tests of our main hypotheses. Section V presents the results of our tests of possible alternative explanations. Section VI concludes.

II.   LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Use of Managerial Discretion in Incentive Systems

Analytical work on performance evaluation systems posits that, in settings in which objective performance metrics are imperfect signals of the worker's effort, incentive systems integrating objective metrics with subjective assessments are superior to those based on objective measures alone (Baker et al. 1994; Baiman and Rajan 1995). Objective performance metrics, albeit informative of workers' effort and therefore useful for incentive contracting (Holmstrom 1979), are imperfect to the extent that they exhibit low sensitivity or precision, or lack congruence with organizational goals (Feltham and Xie 1994; Banker and Datar 1989), that they allow for gaming (Hopwood 1972; Baker et al. 1994), or that they provide distorted incentives focused excessively

on certain aspects of performance and/or the short term (Bol 2007; Baker et al. 1994; Kaplan and Norton 1992; Holmstrom and Milgrom 1991). Subjective assessments of performance can correct many of these shortcomings.

Subjectivity in performance evaluations can assume different forms. Managers can include explicit subjective performance metrics in evaluating performance (e.g., formalized assessments of how effectively senior employees mentor junior ones), they can subjectively determine the distribution of relative weights within the mix of performance metrics, and they can adjust their objective measurement of performance ex-post on the basis of information about factors and events that were not predictable or contractible ex-ante (Bol 2007; Campbell 2008). Research finds that managers apply discretion in evaluating subordinates' performance performance less frequently than theory would predict (Höppe and Moers 2011; Woods 2012; Bol et al. 2015). Proposed explanations include low trust between the supervisor and the employee, which can impair the effectiveness of subjective evaluations by confounding them with bias (Gibbs et al. 2004); the possible impact of subjective adjustments on multiple employees simultaneously (Bol et al. 2015); and the impact of managerial discretion on future performance (Moers 2005; Bol et al. 2015; Abernethy et al. 2018).

We examine how the use of subjectivity is associated with future performance by focusing on ex-post discretionary adjustments of objective performance measurement, whereby managers can decide whether and how they might use subjective assessments in determining performance-related payoffs for subordinates. Our study builds on experimental evidence provided by Bol et al. (2015), who find that supervisors are less likely to apply discretionary adjustments when a positive adjustment to one set of employees results in a negative adjustment to others; that is, when there is high compensation interdependence. Examining responses to post-experimental questions, they

find that supervisors operating in high-compensation-interdependence conditions were concerned about demotivating workers who would miss out on a reward subjectively assigned. To explore this possibility empirically, we examine the performance subsequent to discretionary adjustments of (a) employees directly targeted by the discretionary adjustments (*nominal* effect) and (b) employees affected indirectly by the discretionary adjustments (*opportunity* effect).

Use of Managerial Discretion and Subsequent Performance

Theories in economics and psychology motivate our inquiry about the nominal and the opportunity effects associated with the use of managerial discretion.

Economics-based Explanation: Informativeness

Prior research posits that when objective performance metrics are subject to contracting limitations, the use of managerial discretion can mitigate such imperfections and lead to superior contracting compared to objective measurement alone (Baker et al. 1994; Ittner et al. 2003; Gibbs et al. 2004; Ederhof 2010). For example, performance-based incentive schemes are limited to the extent that they are only confined to a number of observable performance metrics, while management desires additional employee behaviors (e.g., that are related to worker attitudes, or to employee creativity in solving problems unforeseeable ex-ante, or stewardship behaviors that benefit the organization above and beyond the workers' main responsibilities) that are non-contractible. Ederhof (2010) shows that managerial discretion exercised in the payout of bonuses reflects performance assessments based on non-contractible measures. Specifically, she finds that discretionary bonuses paid to CEOs are associated with future financial performance improvements beyond the effect of current financial performance trends. She concludes that discretionary bonuses are paid to reward non-contractible elements of current performance (i.e.,

actions and behaviors enacted in the present period) that are then reflected in future financial performance.

Moreover, to the extent that ex-post discretionary adjustments are informed by non-contractible signals representing the workers' *actual* effort, managerial discretion can correct many shortcomings of objective measures by taking into account exceptional environmental and uncontrollable factors impacting measurable performance. For example, if a machine breakdown or an unexpected delay in the delivery of a critical component led to a significant drop in production volumes, a discretionary adjustment that overrides the objective performance metric may account for such uncontrollable events and give credit to the workers for their actual effort.[6] Accordingly, the subjective decision to reward (penalize) performance might entail information reflected in the objective performance of subsequent periods, where such uncontrollable events are unlikely to repeat. In sum, the informativeness explanation suggests that actual recipients of a subjective reward (penalty) should exhibit subsequent objective performance improvements (declines). Similarly, would-be recipients of a reward (penalty) should exhibit objective performance declines (improvements).[7]

Psychology-based Explanations

Whereas the economics-based explanation links managerial discretion and subsequent performance through the informativeness of signals of current effort reflected in future performance, the psychology-based explanation posits that the use of managerial discretion may *affect* future effort through psychological reactions to perceptions of the incentive system

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[6] Bol and Smith (2011) find that managers are more likely to subjectively correct performance results to account for unfavorable events that hindered employees' objective performance than to correct for events that favored employees' performance. In other words, managers are more likely to use subjectivity to account for bad luck than to account for good luck. The cited experimental study, however, did not involve compensation interdependence.
[7] Definitions of actual and would-be recipients were given in the introduction section (see page 2).

(Prendergast and Topel 1993; Ittner et al. 2003; Gibbs et al. 2004; Moers 2005). Prior studies suggest several factors that may explain how employees interpret the use of managerial discretion, and influence their motivation to perform in the subsequent period:

Credibility. We argue that the performance effects arising from subjective adjustments of objective performance are a function of employees' *interpretation* of managerial discretion. The credibility of the reasons justifying discretionary adjustments of objective performance is critical to the determination of employees' reactions. Credible and valid reasons provided in support of managerial discretion could portray an intact link between effort and payoffs in the eyes of the employees and, therefore, sustain the credibility of the incentive system. For example, research shows that the effectiveness of managerial discretion as a driver of performance depends on how much employees trust the compensation system (Lawler 1971; Folger and Konovsky 1989; Baker et al. 1994; Gibbs et al. 2004). When employees exhibit high levels of trust in the incentive system, the use of managerial discretion is perceived to be a means to *maintain* the link between effort and payoffs. Perceptions of the incentive system as a fair and trustworthy process should, therefore, lead to greater future effort and, thus, performance.

However, management's subjective judgments may be also interpreted as bias and give rise to negative employee psychological reactions (Prendergast and Topel 1993; Baker et al. 1994; Baker, Jensen, and Murphy 1998; Ittner et al. 2003; Gibbs et al. 2004; Moers 2005). For example, Woods (2012) shows that managers use discretion in performance evaluations in an attempt to correct the deficiencies of objective performance metrics, but also for personal motives, including favoritism and seeking future ingratiatory behaviors from subordinates. An incentive system that is perceived to be biased is likely to be ineffective—or even damaging—in driving future effort (Prendergast and Topel 1993). Uncertainty in the relation between effort and payoffs increases the

risk associated with effort (even for employees that might have been unduly favored by managerial discretion), thus discouraging incremental effort in the future or leading to decreased levels, particularly if the outcome is unfavorable. Therefore, if managerial discretion is interpreted as bias, we expect to see a deterioration of subsequent effort, especially for those employees that experience a negative outcome (actual recipients of penalties and would-be recipients of rewards), while employees experiencing positive outcomes (actual recipients of rewards and would-be recipients of penalties) may maintain their current level of effort, but are unlikely to increase it.

Self-serving Bias. Social psychology theory predicts that employees will interpret positive and negative outcomes differently. In particular, research shows that people are prone to self-serving bias, whereby they attribute positive outcomes to their own abilities and negative ones to external factors outside of their control (Heider 1958; Miller and Ross 1975; Bradley and Greenwald 1978). Accordingly, these studies suggest that employees would trust an incentive system *selectively* depending on whether the outcome they experience is positive or negative. That is, actual recipients of subjective rewards and would-be recipients of penalties may interpret the discretionary adjustment as an intact link between pay and actual effort and should exhibit increased subsequent effort as a testament of a trustworthy incentive system. Conversely, actual recipients of penalties and would-be recipients of rewards may attribute the unfavorable outcome to a biased incentive system and to procedural injustice, which would result in subsequent performance declines.

Reciprocity. Objective performance metrics signal a worker's effort to managers and fellow workers alike. While the signal might be imperfect, it contributes to a worker's expectations with respect to performance-related payoffs (that is, in our study, rewards or penalties). Koszegi and Rabin (2006), in their theory of reference-dependent preferences, posit that individuals

interpret any favorable or unfavorable deviations from their rational outcome expectations as gains or losses. To the extent that workers experience subjectively determined rewards (penalties) as deviations from rational expectations based on objective metrics, they are likely to interpret management's discretion as favorable (unfavorable) treatment. Reciprocity theory predicts that workers receiving favorable treatment will respond with greater-than-expected effort, while those subject to unfavorable treatment will respond with undesired behaviors, ranging from lower-than-expected effort to retaliation that may damage profitability (Fehr and Schmidt 1995; Falk and Fischbacher 2006; Krueger and Mas 2009). If subjective rewards and penalties that override objective rankings are respectively perceived as a "gift" and as an "injustice," then we should observe positive reactions (more effort and better performance) to the former and negative reactions to the latter as workers attempt to rebalance the economic exchange with their organization (Akerlof 1984; Falk and Fischbacher 2006).

The hypothesized directional predictions based on the theories articulated above are summarized in Table 1.

----- Insert Table 1 here -----

III.   RESEARCH SETTING

We obtained data from a Chinese manufacturing firm that uses monetary rewards and penalties to incentivize performance in its 11 departments.[8] In each month, the members of the department with the highest performance receive a bonus (hereafter: the reward), while the members of the worst-performing department are penalized with a pay deduction (hereafter: the

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[8] We acknowledge that the cited theories refer to individual behavior, whereas our unit of analysis is a department. While, in our setting, we cannot control for intra-group dynamics, we follow Abernethy et al. (2018) and assume that the performance observed at the department level represents the average individual response to the use of managerial discretion in the allocation of performance-related payoffs.

penalty).[9] Department performance is evaluated based on a scorecard that aggregates multiple objective metrics. Management, however, has the option to override objective performance rankings and to integrate subjective performance assessments into their reward and penalty allocation decisions. Interviews with company executives reveal that their subjective considerations generally include assessments of employee attitude and morale. However, there are no company guidelines for these considerations and the rationale behind them is not disclosed ex-ante. Monetary rewards and penalties are fixed equivalent amounts—about 12% of the average monthly salary. For the most part, department teams are fixed across months and each team continues to perform the same activities throughout our sample period.

At the beginning of each fiscal year, top corporate executives set quantifiable monthly targets and weights for every dimension of objective performance included in the scorecard for all departments.[10] Departments participate actively in the target-setting process; final targets reflect consensus between management and workers in terms of congruence with strategic goals, appropriateness, and level of difficulty across all departments. Based on the annual targets, goals are set for each of the 12 months and are not renegotiated until the next annual target-setting cycle. Department goals take into consideration their different activities, interdependencies, and contribution to the firm's overall performance. While monthly goals are department-specific, the negotiation process ensures that they are all equally attainable. Departments then receive monthly scores based on their achievements relative to assigned goals. Departments meeting target

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[9] While, in the vast majority of cases, one department per month received the reward and one received the penalty, in four instances during our sample period, rewards were assigned to both the department ranked first based on objective evaluation and subjectively to another department and, in five instances, penalties were assigned to both the department ranked last based on objective evaluations and subjectively to another department. In 5 out of the 25 months, we did not observe any monetary reward at all, while monetary penalties were assigned in every month in our sample period. Our main inferences are not changed by these cases.
[10] Each department is assigned multiple monthly financial and nonfinancial goals, as well as goals for process improvement and human resources development.

expectations on every performance dimension earn 100 points and can score even more points by exceeding their targets. Every month, aggregate performance scores for each department are publicly disclosed within the firm.

Monetary rewards and penalties are assigned at the end of each month. There is no performance carry-over; each month's evaluation concerns only that month's results. Management can, however, choose to integrate subjective assessments in selecting departments to reward and penalize. Since management publicly discloses which departments were rewarded and penalized each month, as well as the objective performance rankings, their use of subjective evaluations to override objective rankings is visible to the employees. Monthly town hall meetings,[11] during which site performance is presented and discussed interactively, allow employees to inquire about the criteria used in the determination of the most recent rewards and penalties.

IV. RESEARCH DESIGN AND HYPOTHESES TESTING

Research Design

Our research setting allows us to obtain empirical measures of the nominal and opportunity effects because management discretion, when applied, results in observable discrepancies between the actual recipients of the reward and penalty and the distribution based on objective performance metrics. Figure 1 illustrates our empirical proxies for the nominal and opportunity effects of managerial discretion, using a hypothetical example with six departments. The left column represents the objective rankings. If, as described in the right column, managerial discretion results in a reward for the second-ranked department and a penalty for the fifth-ranked department (i.e., the *actual* recipients of the reward and penalty), then the first- and last-ranked departments (i.e.,

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[11] A town hall meeting in these settings refers to a site-wide meeting involving all employees.

the *would-be* recipients of the reward and penalty) experience an opportunity loss and an opportunity gain, respectively.

----- Insert Figure 1 here -----

To examine the *nominal* effect of subjectivity, we study the subsequent performance of the *actual* recipients. To examine the *opportunity* effect of subjectivity, we examine the subsequent performance of the *would-be* recipients.[12] We estimate the following equation:

$$\Delta PerfScore_{i,t} = \alpha + \beta_1 SubjRew_{i,(t-1)} + \beta_2 SubjPen_{i,(t-1)} + \beta_3 OppGain_{i,(t-1)} + \beta_4 OppLoss_{i,(t-1)}$$
$$+\beta_5 Busy\,Month_t + \beta_6 NEmpl_{i,t} + \beta_7 FPct_{i,t} + \beta_8 AgeLess30_{i,t} + \beta_9 \Delta PerfScore_{i,(t-1)}$$
$$+\varepsilon \tag{1}$$

where the dependent variable *ΔPerfScore*$_{i,t}$ captures the change in objective performance between months *(t-1)* and *t*.[13] Nominal effects of managerial discretion are captured by coefficients β_1, associated with *SubjRew*$_{i,(t-1)}$—an indicator variable equal to 1 if department *i* in month *(t-1)* was an actual recipient of a subjective reward, and 0 otherwise—and β_2, associated with *SubjPen*$_{i,(t-1)}$—an indicator variable equal to 1 if department *i* in month *(t-1)* was an actual recipient of a subjective penalty, and 0 otherwise. Opportunity effects of managerial discretion are captured by coefficients β_3, associated with *OppGain*$_{i,(t-1)}$—an indicator variable equal to 1 if department *i* in month *(t-1)* was a would-be recipient of a penalty, and 0 otherwise—and β_4, associated with *OppLoss*$_{i,(t-1)}$—an indicator variable equal to 1 if department *i* in month *(t-1)* was a would-be recipient of a reward, and 0 otherwise.

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[12] Our empirical tests further distinguish between actual recipients of rewards and of penalties. We refer to the distinct cases with respect to the nominal effect as subjective rewards (Department 2 in Figure 1) and subjective penalties (Department 5 in Figure 1), respectively. Similarly, we distinguish between would-be recipients of rewards and penalties. We refer to the distinct cases with respect to the opportunity effect as opportunity losses (Department 1 in Figure 1) and opportunity gains (Department 6 in Figure 1), respectively.

[13] We focus on predicting changes because we are interested in estimating performance *reactions*. A levels analysis would not be appropriate for this type of inference.

Our control variables include *BusyMonth$_t$*, an indicator variable equal to 1 if month t is considered a month of high production, and 0 otherwise;[14] *NEmpl$_{i,t}$*, the number of employees in department i in month t; *FPct$_{i,t}$*, the percentage of women in department i in month t; *AgeLess30$_{i,t}$*, the percentage of employees younger than 30 in department i in month t. We also control for possible preexisting performance trends by including the lagged change in performance observed in the previous month (*ΔPerfScore$_{(t-1)}$*). All our variables are defined in Appendix 1.

Data

Our sample includes 25 monthly observations spanning three consecutive fiscal years for each of the firm's 11 departments. Table 2 reports the descriptive statistics. Our main dependent variable is the change in performance score (*ΔPerfScore$_{i,t}$*), which is slightly negative on average ($\mu = -0.612$) but exhibits significant variation ($\sigma = 16.103$). Although achieving all targets awards a department 100 points, departments can exceed expectations and earn scores greater than 100.[15] During our sample period, the average department received a reward (penalty) 2.182 (2.727) times. About half of the rewards and penalties in our sample period were assigned subjectively.

----- Insert Table 2 here -----

Table 3 reports pairwise correlation coefficients for our main variables. Departments with a greater percentage of women appear to perform worse ($\rho = -0.154$, $p < 0.05$) and are more likely to be penalized ($\rho = 0.149$, $p < 0.05$). Departments with a younger employee base (*AgeLess30*) also exhibit lower performance ($\rho = -0.142$, $p < 0.05$), but are more likely to avoid being penalized when ranking at the bottom of objective rankings ($\rho = 0.157$, $p < 0.01$). This is probably due to managers considering the inexperience of younger workers when evaluating their performance.

----- Insert Table 3 here -----

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[14] The factory experiences seasonal demand volume, with peaks concentrated in specific months.
[15] Objective performance measures in our setting are therefore not subject to ceiling effects.

Empirical Results

Table 4 reports the results of our estimation of Equation (1) using heteroscedasticity-robust OLS. To account for idiosyncratic department-level characteristics, we included department fixed effects. To account for correlation in the behaviors of departments over time, we clustered standard errors by department.[16] Column (1) reports the results of estimating Equation (1) limited to the nominal effects. We find that the objective performance of actual recipients of subjective rewards exhibits significant improvement in the following month (β_1= 15.851, p<0.01), while the objective performance of actual recipients of subjective penalties declines (β_2= -11.301, p<0.01). Column (2) reports the results of estimating Equation (1) limited to the opportunity effects. Opportunity gains are associated with performance improvements in the subsequent month (β_3= 11.466, p<0.05), while opportunity losses are associated with performance declines (β_4= -12.750, p<0.05). The estimation of the full specification of Equation (1), reported in Column (3), shows performance effects similar to those estimated in columns (1) and (2). We conclude that managerial discretion in the determination of performance-related payoffs is indeed associated with future performance. Prior. Our results pertaining to the nominal effect of managerial discretion are consistent with prior literature documenting performance effects of subjective allocation of performance related payoffs. We add to this literature by providing empirical evidence supporting our prediction that managerial discretion in the presence of high compensation interdependence produces also an opportunity effect, in that we observe a significant performance effect associated

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[16] Panel data analyses often raise concerns about incidental parameter problems, which could bias the estimation of statistical models using OLS. The incidental parameter problem is typical of panels with large *n* and small *t* (respectively, a large number of subjects and a small number of periods). In our case, however, *t* is more than double *n*, thus rendering the concern about the incidental parameter problem negligible (Nickell 1981).

with workers for whom managerial discretion results in gains or losses that are defined only in opportunity terms.[17]

----- Insert Table 4 here -----

Exploratory Analyses of Potential Explanations

The empirical results of the analyses of our field data are consistent with the informativeness-, self-serving bias-, and reciprocity-based explanations described earlier (see Table 1). In order to further explore possible reasons for our findings, we perform three additional tests. First, we examine whether the nominal and opportunity effects differ in their persistence. Based on the economics-based informativeness explanation, changes in performance associated with the nominal effect of managerial discretion should mirror those associated with the opportunity effect. Recall that the informativeness explanation assumes that managers' discretionary adjustments operate as a correction of inadequacies of objective performance metrics to capture actual employee effort. As such, managerial discretion should correct the relation between effort and payoff for actual and would-be recipients simultaneously. We augment the specification of Equation (1) with lagged values of subjective rewards/penalties and opportunity gains/losses, and report the estimated coefficients in Table 5. Our results show that performance changes associated with the nominal effect of a reward (penalty) subjectively assigned in month t reverse or disappear in month ($t+2$), whereas those associated with the opportunity effect persist.[18] This asymmetry in persistence suggests that the informativeness explanation is not sufficient to

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[17] All our results are robust to the influence of outliers. Repeating all our tests winsorizing the dependent variables at the 1st and 99th, 5th and 95th, and 10th and 90th percentiles in each month, the results (untabulated) are consistent with those reported in this manuscript.

[18] Perusal of our data does not indicate serial correlation between receiving awards (penalties) at the department level. In addition, no department received a discretionary reward or penalty for two months in a row.

explain by itself the observed changes in performance subsequent to the use of managerial discretion.

----- Insert Table 5 here -----

Second, we examine the intensity of the opportunity effect by adopting a broader definition of would-be recipients. Whereas, in our research setting, subjective performance evaluations generally give rise to a single actual recipient of a reward or penalty, *any* department that ranked higher (lower) than the actual recipient of the reward (penalty) in the objective rankings can be classified as a would-be recipient. This expanded definition is graphically illustrated in Figure 2, which relates to the previously discussed hypothetical example of a company with six departments. If managerial discretion results in a subjective reward (penalty) for department 3 (4), then departments 1 and 2 (5 and 6) may experience an opportunity loss (gain) because each of them scored higher (lower) objective performance compared to the actual recipient.

----- Insert Figure 2 here -----

Based on the informativeness explanation, the decision to override a particular distribution of objective rankings should reflect a correction for the ranking's shortcomings. Therefore, we should observe performance effects associated with the opportunity effect even with the expanded definition. To examine this possibility, we estimate Equation (1) replacing *OppGain* and *OppLoss* with indicator variables capturing the expanded definition. The variable $OppGainExp_{i,(t-1)}$ ($OppLossExp_{i,(t-1)}$) is equal to 1 if department i is ranked below (above) the department receiving the actual penalty (reward), and 0 otherwise. The estimation reported in Column 1 of Table 6 focuses on the expanded opportunity effects alone, while in Column (2) we also control for the nominal effects of subjectivity. In both estimations, the performance effect associated with the expanded definition of opportunity gain is positive and significant ($\beta_1 = 11.710$, p<0.01, in the

more conservative estimation), in line with our main results. In contrast, the performance effect associated with the expanded definition of opportunity loss is not significant. We infer that while an opportunity gain has broad influence for all the workers who were saved from a penalty, an opportunity loss seems to matter only to those who were ranked first, yet failed to receive the reward. Taken together, these asymmetric outcomes are incompatible with the economics-based prediction being the only explanation for the observed relation between the use of managerial discretion and subsequent performance.

----- Insert Table 6 here -----

Third, we designed a randomized controlled experiment to isolate and examine the performance effects associated uniquely with predictions rooted in psychology theory. We recruited 505 participants using Amazon's Mechanical Turk (M-Turk). Each was presented with a brief description of the purpose of the experiment and asked to sign an informed consent.[19] All who opted to participate read the same description of an incentive system mirroring the one in our research setting. Participants would assume the role of a member of a team whose performance was evaluated based on a combination of objective and subjective factors. Members of the best-performing (worst-performing) team would receive a monetary award (penalty) equal to 10% of their monthly salary. Next, participants learned about their team's objective performance and relative performance rankings in a certain month and whether management had decided to give them a reward (penalty) after considering their objective performance and subjective assessments. Participants were randomly assigned to one of 10 conditions representing the following scenarios: (a) objective rewards (penalties);[20] (b) subjective rewards (penalties) for workers ranking second

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[19] See Appendix 2 for details about the experiment materials.
[20] We refer to instances of rewards and penalties assigned without subjective adjustments – i.e. cases when workers ranked at the top (bottom) based on objective performance receive the reward (penalty) – as objective rewards (penalties).

(second to last); (c) subjective rewards (penalties) for workers ranking far from the top (bottom); (d) not receiving a reward (penalty) while ranking at the top (bottom); and (e) not receiving a reward (penalty) while ranking far from the top (bottom). Participants were then asked to indicate how much more or less effort they would be willing to apply to their work in the subsequent month using a seven-point scale ranging from -3 ("a lot less") to +3 ("a lot more"), where the midpoint 0 represented the status quo ("same effort"). They could also add free-text comments motivating their choice.[21] Lastly, they were asked a number of post-experiment questions to collect demographic information. Participants were rewarded for their time in accordance with Amazon M-Turk guidelines.[22]

To explore the psychology-based predictions, we estimate the following equation:

$$\Delta Effort_{i,t} = \alpha + \beta_1 SubjRew_{i,(t-1)} + \beta_2 SubjPen_{i,(t-1)} + \beta_3 OppGain_{i,(t-1)} + \beta_4 OppLoss_{i,(t-1)} + \beta_5 Female_i + \beta_6 Age_i + \beta_7 Manager_i + \varepsilon, \tag{2}$$

where $\Delta Effort$ is the individual participant's response indicated in the experiment; *Female* is an indicator variable equal to 1 if the participant identified as a female and 0 otherwise; *Age* is the participant's age in years, and *Manager* is an indicator variable equal to 1 if the participant declared himself or herself to have had managerial experience.[23] Our variables of interest (*SubjRew*, *SubjPen*, *OppRew*, and *OppPen*) are defined consistently with the variables used in our main tests.

Table 7, Panel A, reports the results of our OLS estimation of Equation (2). We find significant performance effects associated with actual and would-be recipients of subjective rewards. These experimental findings provide evidence supporting psychology-based explanations of the observed relation between managerial discretion and subsequent performance. In particular,

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[21] Appendix 3 shows a sample of those responses.

[22] The average duration of the experiment was 3 minutes and 57 seconds. Each participant was paid $0.50.

[23] We control for managerial experience in order to take into account the differences between our pool of experimental subjects and the workers included in our field sample, who are mostly line workers with no managerial responsibilities.

we find that receiving a subjective reward or a subjective penalty leads to greater effort in the subsequent month; that opportunity losses drive negative subsequent performance; and that opportunity gains have no significant effect on participants' effort choices.[24]

Because these results are difficult to reconcile with any particular psychology-based prediction as articulated in Table 1, we leverage on the free-text justifications to examine cross-sectional differences in changes in effort between participants interpreting the use of managerial discretion in a positive versus negative way. We define an indicator variable *NegInt* that is equal to 1 if the participants communicated distrust in the incentive system or interpreted the system as biased, and zero otherwise,[25] and estimate the following equation:

$$\Delta Effort_{i,t} = \alpha + \beta_1 SubjRew_{i,(t-1)} + \beta_2 SubjPen_{i,(t-1)} + \beta_3 OppGain_{i,(t-1)} + \beta_4 OppLoss_{i,(t-1)}$$
$$+\beta_5 SubjRew_{i,(t-1)} * NegInt_i + \beta_6 SubPen_{i,(t-1)} * NegInt_i + \beta_7 OppGain_{i,(t-1)} *$$
$$NegInt_i + \beta_8 OppLoss_{i,(t-1)} * NegInt_i + \beta_9 Female_i + \beta_{10} Age_i + \beta_{11} Manager_i + \varepsilon \ (3)$$

The results are reported in Table 7, Panel B, and show that the coefficients estimated for the interaction terms are negative and significant, which suggests that applying managerial discretion drives unfavorable nominal and opportunity motivation effects when participants interpret the incentive system as biased.[26] These results hold irrespective of whether participants gain or lose due to the discretionary adjustments. Taken together, our experimental results highlight the importance of the credibility of an incentive system that allows managerial discretion

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[24] Adopting the expanded definition of subjective rewards and penalties yields results similar to those in Table 7.

[25] The coding of the indicator variable was based on the consensus of the members of the research team with respect to the content of the text-based responses. Missing responses and responses that could not be interpreted as a manifestation of the participant's opinion of the incentive system were coded as missing values. Examples for negative and non-negative interpretations based on the text-based responses are provided in Appendix 3.

[26] The coefficient associated with each interaction term in Equation (3) provides a direct estimation of the difference in effort change between participants with negative versus non-negative interpretations pertaining to each of the four distinct cases. In an alternative model specification that would additionally include the main effect of *NegInt*, the coefficient on the interaction term would estimate a difference-in-differences for the effect of using managerial discretion (versus not) and the effect of interpreting the incentive system negatively (versus not). With that specification, we would need to use post-estimation tests (i.e. Wald tests) to validate the significance of the difference between negative and non-negative interpretations of the applied discretionary adjustments. For ease of interpretation, we chose to report the estimation results of Equation (3), but our results are robust to using the alternative model specification.

to drive desired performance outcomes, consistent with the predictions summarized in column 2 of Table 1.

----- Insert Table 7 here -----

In summary, based on the collective findings of our exploratory analyses, we conclude that the relation between the use of managerial discretion and subsequent performance we observed in our field setting is likely explained by a combination of economics-based and psychology-based reasons. As shown, the informativeness-based explanation is not sufficient to explain the asymmetric performance effects observed in the field. Moreover, our experiment provides evidence of nominal and opportunity effects in a laboratory setting that impedes the informativeness explanation from operating, further supporting the existence of causal effects of managerial discretion on workers' subsequent effort choices. However, our field setting precludes us from measuring workers' perceptions of the incentive system, which limits us from being able to disentangle the particular psychology-based explanations underlying our main results. We encourage future research to explore more deeply the mechanisms underlying the nominal and opportunity effect of managerial discretion.

V. ALTERNATIVE EXPLANATIONS

Predictable Determinants of Managerial Discretion

In this section, we explore potential determinants of the use of discretionary adjustments to assign rewards and penalties in our field setting. For example, managers could use discretionary adjustments to correct for performance effects stemming from targets that were set too high or too low for a particular department as a way to *unofficially* rebalance the relation between actual effort and the aggressiveness of the targets. Additionally, management could be consciously or unconsciously biased toward certain groups based on their individual characteristics, such as

gender or age, or based on their particular function in the operations. If these factors were to predict the allocation of discretionary rewards and penalties in a way that is uncorrelated with department performance, workers might incorporate such patterns into their rational expectations.

To examine whether management's discretionary selection of recipients is influenced by any of these factors, we examine the likelihood of subjective assignments of rewards and penalties based on department characteristics and on particular times in the year when management might be more or less likely than usual to assign subjective rewards or penalties to sustain workers' motivation. In our setting, monthly targets are set annually and are not renegotiated during the year. Moreover, it may require several months before it becomes evident whether targets are too aggressive or too easy. Therefore, in earlier months of the performance cycle, management would be less inclined to use discretionary adjustments of objective performance to assign rewards and penalties to unofficially revise targets. Instead, should an annual target result to be too aggressive (easy), management would be more likely to use discretion to rebalance the relation between actual effort and payoff toward the end of the year by becoming more lenient (demanding). We use the following model specification to test whether any of these explanations may lead workers to predict the use of managerial discretion:

$$
\begin{aligned}
SubjOutcome_{i,t} = \alpha &+ \beta_1 StartYear_t + \beta_2 EndYear_t \\
&+ \beta_3 NEmpl_{i,t} + \beta_4 FPct_{i,t} + \beta_5 AgeLess30_{i,t} + \beta_6 BusyMonth_{i,t} + \varepsilon.
\end{aligned}
\tag{4}
$$

In Equation (4), the dependent variable $SubjOutcome_{i,t}$ is replaced by either $SubjRew_{i,t}$ or $SubjPen_{i,t}$. $StartYear_t$ is an indicator variable equal to 1 if month t is one of the first two months of the year and $EndYear_t$ is an indicator variable equal to 1 if month t is one of the last two months of the year. All other variables are as previously defined. We estimate the model using logistic regression, including department fixed effects and clustering errors at the department level. The results, reported in Table 8, indicate no evidence of subjective rewards (penalties) being given

during times in the planning cycle when management's target readjustment efforts would be more evident. Among the department characteristics, we find that departments with a higher percentage of women are more likely to be penalized even when they are not ranked last, consistent with the correlation coefficient reported in Table 3.

----- Insert Table 8 here -----

Favoritism in Managerial Discretion

Another concern associated with our setting is that a particular department might be consistently favored (unfavored) by management. Reasons might include undue influence on management by department team members, perhaps through personal connections or political affiliations. We analyzed the sequence of assignments of subjective rewards and penalties and found no cases of departments receiving a discretionary reward (penalty) twice in a row.

Alternative Explanation of Nominal Effects: Reward (Penalty) Effects

The changes in performance we documented in association with the allocation of a subjective reward (penalty) might be due to a wealth effect associated with the reward (penalty) itself, independent of whether the allocation was determined by management's discretion or by objective rankings. Therefore, we compare changes in performance associated with actual recipients of rewards (penalties) with those associated with departments that received rewards (penalties) in the absence of any discretionary adjustments. We estimate the following equation:

$$
\begin{aligned}
\Delta PerfScore_{i,t} = {} & \alpha + \beta_1 Reward_{i,(t-1)} + \beta_2 Reward_{i,(t-1)} * SubjRew_{i,(t-1)} + \beta_3 Penalty_{i,(t-1)} \\
& + \beta_4 Penalty_{i,(t-1)} * SubjPen_{i,(t-1)} + \beta_5 BusyMonth_t + \beta_6 NEmpl_{i,t} + \beta_7 FPct_{i,t} \\
& + \beta_8 AgeLess30_{i,t} + \beta_9 \Delta PerfScore_{i,(t-1)} + \varepsilon,
\end{aligned}
\tag{5}
$$

where $Reward_{i,(t-1)}$ is an indicator variable equal to 1 if department i received a reward (without the use of discretion) in month $(t-1)$, and 0 otherwise; $Penalty_{i,(t-1)}$ is an indicator variable equal to 1 if department i received a penalty (without the use of discretion) in month $(t-1)$, and 0 otherwise.

In this specification, the interpretation of the coefficient associated with *Reward* (*Penalty*) is the effect on subsequent performance of receiving a reward (penalty) based on objective rankings alone, while the coefficient associated with the interaction term is the incremental effect of subjectivity in determining the reward/penalty.[27]

As summarized in Table 9, the coefficients associated with subjective rewards and penalties continue to be consistent with our main results and we find no significant objective performance effects associated with receiving a reward (penalty) in the absence of managerial discretion. Taken together, our results suggest that the nominal effect of managerial discretion hinges on the process used by management to determine the recipients of rewards and penalties and not simply on the changes in wealth caused by the awards or pay cuts.

----- Insert Table 9 here -----

Alternative Explanation of Opportunity Effects: Rank-first and Rank-last Effects

An alternative explanation for the opportunity effects of managerial discretion documented above might simply be the propensity to improve (diminish) performance after being ranked last (first) and might therefore be independent of not getting a reward or a penalty due to management discretion. Changes in performance associated with being ranked first or last might derive from regression to the mean. Top-ranked (bottom-ranked) performance might be unlikely to persist for a long time due to fluctuations in favorable (unfavorable) stochastic events influencing objective performance. Additionally, psychological reactions to *relative* performance information may explain a reversal of performance for top- and bottom-ranked departments. For example, top-

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[27] In this specification, we represent the event of a subjective reward (penalty) as the interaction between the assignment of a reward (penalty) and the fact that it originated from management's discretion. While the interaction term is equivalent to the variable *SubjRew* (*SubjPen*), we specify our variables in this way to highlight the interpretation of the interaction term as the *incremental* effect of receiving a reward (penalty) as a result of subjective evaluations, as opposed to simply receiving a reward (penalty) based on objective performance.

ranked workers might become overconfident and reduce effort due to complacency (Casas-Arce and Martinez-Jerez 2009), while being ranked at the bottom might trigger social comparison mechanisms (Fredrickson 1992), which in turn might lead to performance improvements to preserve reputation. Bottom ranking might also represent salient information for the workers about the likelihood of receiving a penalty in the future if their performance does not improve. To test whether this might be the case, we estimate the following model:

$$\Delta PerfScore_{i,t} = \alpha + \beta_1 RankLast_{i,(t-1)} + \beta_2 RankLast_{i,(t-1)} * OppGain_{i,(t-1)} + \beta_3 RankFirst_{i,(t-1)}$$
$$+ \beta_4 RankFirst_{i,(t-1)} * OppLoss_{i,(t-1)} + \beta_5 BusyMonth_t + \beta_6 NEmpl_{i,t} + \beta_7 FPct_{i,t}$$
$$+ \beta_8 AgeLess30_{i,t} + \beta_9 \Delta PerfScore_{i,(t-1)} + \varepsilon . \tag{6}$$

Estimation results are reported in Table 10. $RankLast_{i,(t-1)}$ ($RankFirst_{i,(t-1)}$) is defined as an indicator variable equal to 1 if department i is ranked last (first) based on objective performance in month t, and 0 otherwise. In estimating Equation (6), we compare subsequent performance across departments that ranked last (first) and did not get a penalty (reward) and departments that were ranked last (first) and did. The coefficients associated with the interaction terms represent the incremental effect of not getting a reward (penalty) while ranking first (last).[28] When we examine the opportunity effect of subjective penalties (opportunity gain), controlling for being ranked last, we continue to find a significant incremental effect on subsequent performance (β_2=10.426, p<0.01), which confirms our prior conclusions about the opportunity effect of managerial discretion on workers' subsequent performance. However, when we control for being ranked first, we find no additional effect of opportunity loss on subsequent performance. While we cannot conclusively rule out this alternative explanation for the performance effects of opportunity loss, our results further support our findings with respect to opportunity gain.

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[28] As in to our previous test of reward (penalty) effects, we specify our model in a way that highlights the incremental effect of not getting a reward (penalty) while ranking first (last). The interaction term is equivalent to the variable *OppLoss* (*OppGain*).

----- Insert Table 10 here -----

VI. CONCLUSIONS

This study explores the influence of discretionary adjustments of objective performance evaluations on subsequent performance in a setting with high compensation interdependence, in which the incentive system involves both rewards and penalties. In such settings, using subjectivity to assign monetary payoffs to some workers mechanically impacts other workers, who miss out on a reward or are spared from a penalty as a result of management's discretion. We posit that the use of subjectivity to determine performance-related payoffs in the presence of high compensation interdependence gives rise to a *nominal* performance effect (associated with workers who receive the reward (penalty) subjectively—the *actual* recipients) and an *opportunity* performance effect (associated with workers who fail to receive the reward (penalty) due to management's discretion—the *would-be* recipients).

We use field data from a Chinese manufacturing company that operates an incentive system whereby monthly monetary rewards and penalties are allocated to the best- and worst-performing of 11 departments in a particular production site. We show that the use of managerial discretion to assign performance-related monetary rewards and penalties is associated with changes in subsequent performance. Specifically, we document that workers experiencing managerial discretion either through the *nominal* effect or the *opportunity* effect exhibit similar performance changes. That is, both actual rewards (penalties) and opportunity gains (losses) are associated with higher (lower) objective performance in the following month. To the best of our knowledge, we believe that our study is the first to show empirically that managerial discretion impacts not only those workers who are *directly* affected by managerial discretion (that is, those who *receive* a subjective reward or penalty) but also those who are *indirectly* affected by the subjective decision

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via opportunity effects (that is, workers who *fail to receive* a reward or a penalty as a result of managerial discretion).

We further explore different explanations for our empirical results. Economics-based theory posits that the use of managerial discretion is an informative signal of non-contractible aspects that are related to future performance. This view suggests that the observed empirical relation is explained by the exercise of managerial discretion in the current period anticipating future performance. Second, psychology-based theory posits that the use of managerial discretion may cause employees to change the level of effort they are willing to provide in the future, and that their reactions depend on how they interpret the exercised discretionary adjustments. Based on a battery of additional tests, we conclude that performance effects associated with the use of managerial discretion in settings with high compensation interdependence are likely explained by a combination of these theories.

Whereas our research site is ideal to explore our phenomenon of interest, our work is subject to many limitations common to field-based research. In particular, since our study is based on a single Chinese manufacturing organization, the generalizability of our results to other industries and cultures is limited. Additionally, our findings—especially those relative to opportunity gains and losses—depend on workers having sufficient information on their objective performance to detect the application of discretionary adjustments to the compensation outcomes. While explicit disclosure of both objective and subjective performance evaluation results is rarely observed, we argue, nonetheless, that our findings generalize to any situation in which workers receive objective signals about their performance, on which they form rational expectations of potential payoffs. Finally, difficulties to capture workers' perceptions of the incentive system in place in our field setting preclude us from examining cross-sectional variations that could shed

light on the specific psychological mechanisms underlying the observed changes in performance associated with managerial discretion.

Despite these limitations, our study contributes to the literature on subjectivity in incentive contracting by providing empirical evidence of performance effects associated with the use of managerial discretion that were only theorized in prior research. Our results provide important insights to the practitioner community by highlighting how subjective performance evaluations impact subjects who are not the immediate target of managers' discretionary decisions and how that may significantly influence an incentive system's overall effectiveness. We encourage future research to further explore underlying mechanisms for the nominal and opportunity effects of managerial discretion.

Appendix 1: Variables Definition

Variable	Description
$PerfScore_{i,t}$	Total performance score by department i in month t
$Reward_{i,t}$	Indicator variable equal to 1 if department i receives a reward in month t, and 0 otherwise
$Penalty_{i,t}$	Indicator variable equal to 1 if department i receives a penalty in month t, and 0 otherwise
$SubjRew_{i,t}$	Indicator variable equal to 1 if department i receives a subjective reward in month t, and 0 otherwise
$SubjPen_{i,t}$	Indicator variable equal to 1 if department i receives a subjective penalty in month t, and 0 otherwise
$OppGain_{i,t}$	Indicator variable equal to 1 if department i is ranked at the bottom of the objective performance rankings in month t but does not receive a penalty, and 0 otherwise
$OppLoss_{i,t}$	Indicator variable equal to 1 if department i is ranked at the top of the objective performance rankings in month t but does not receive a reward, and 0 otherwise
$OppGainExp_{i,t}$	Indicator variable equal to 1 if department i is ranked below the department receiving a penalty in the objective performance rankings in month t but does not receive a penalty, and 0 otherwise
$OppLossExp_{i,t}$	Indicator variable equal to 1 if department i is ranked above the department receiving a reward in the objective performance rankings in month t but does not receive a reward, and 0 otherwise
$RankFirst_{i,t}$	Indicator variable equal to 1 if department i ranks at the top of the objective performance rankings in month t, and 0 otherwise
$RankLast_{i,t}$	Indicator variable equal to 1 if department i ranks at the bottom of the objective performance rankings in month t, and 0 otherwise
$BusyMonth_t$	Indicator variable equal to 1 if month t is considered to be a busy month for production, and 0 otherwise
$StartYear$	Indicator variable equal to 1 if month t is one of the first two months of the year, and 0 otherwise
$EndYear$	Indicator variable equal to 1 if month t is one of the last two months of the year, and 0 otherwise
$NEmpl_{i,t}$	Number of employees in department i in month t
$Fpct_{i,t}$	Percentage of female employees in department i in month t
$AgeLess30_{i,t}$	Percentage of employees younger than 30 in department i in month t

Appendix 2:   Experimental Material

We recruited 503 participants via Amazon Mechanical Turk (M-Turk). Participants were provided with a link to an electronic survey (Qualtrics) administered by a person not involved in the research project or familiar with the purpose of the simulation.

After reading and electronically signing an informed consent, each participant was asked to read a description of the task he or she was required to perform and the description of the workplace scenario as reported in Panel A below. All participants were shown the same description of the task and the same workplace scenario.

Next, each participant was asked to answer a single question, as reported in Panel B. Each participant was assigned to one of the 10 conditions reported in the table in Panel C. Each condition included a different manipulation of the text of the question in Panel B, rendered by substituting the text "CONDITION FIRST PART" and "CONDITION SECOND PART" with the corresponding details described in the table (Panel C)

Panel A: Task Definition and Workplace Scenario

Task definition:
Researchers are studying how people respond to rewards and penalties in the workplace. You will be given a scenario describing a work environment and performance review process. In light of this description, you will be asked to describe how hard you would work under the given conditions. You may be shown a different description than others who take this survey.

Workplace scenario:
You work as part of a team for a company that rewards its workers based on team performance. Each month, management assigns each member of the best performing team a monetary bonus equal to 10% of their salary, and an equivalent monetary penalty to each member of the worst performing team.

Team performance is measured based on quantifiable aspects, such as number of units produced, number of orders processed, number of quality defects, etc. However, management can also observe other aspects of performance, such as workers' attitude, good citizenship behaviors, and favorable or unfavorable unpredictable events (examples might include unexpected mechanical problems to the production equipment, or unexpected large sales orders). Management can take into consideration all aspects of performance to make the ultimate decision about giving rewards and penalties.

Panel B: Experimental Instrument

Q: It is now the end of October. Based on the quantifiable measures of performance, **CONDITION FIRST PART**. Taking into consideration all aspects of performance, **CONDITION SECOND PART**. How much effort would you apply to your job in November compared to the effort you applied in October?

(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)
a lot less	significantly less	slightly less	same effort	slightly more	significantly more	a lot more

Why?
_____

Panel C: Experimental Cells

Condition #	CONDITION FIRST PART	CONDITION SECOND PART
1	your team ranked at the top	management assigned the reward to your team
2	your team ranked at the bottom	management assigned the penalty to your team
3	your team ranked second from the top	management assigned the reward to your team
4	your team ranked fourth from the top	management assigned the reward to your team
5	your team ranked second from the bottom	management assigned the penalty to your team
6	your team ranked fourth from the bottom	management assigned the penalty to your team
7	your team ranked at the top	management assigned the reward to a team that ranked below yours
8	your team ranked second from the top	management assigned the reward to a team that ranked below yours
9	your team ranked at the bottom	management assigned the penalty to a team that ranked above yours
10	your team ranked second from the bottom	management assigned the penalty to a team that ranked above yours

Panel D: Post-Experimental Questions

What is your gender: M: __   F:__   Prefer to self-describe:_____   Prefer not to answer:__

What is your age? ____

What is the highest education degree you completed?   High School or Below: __   Undergraduate: __   Graduate: __

What is your employment status?
        Currently Employed, Full Time: __
        Currently Employed, Part Time: __
        Currently Self Employed: __
        Currently Unemployed, Previously Employed: __
        Currently Unemployed, Never Employed: __
        Retired: __
        Other (please describe): _____

How many years of work experience do you have?   Less than 2: ___   Between 2 and 5: ___   More than 5: ___

In what industry are you currently employed or have been previously employed? Please check all that apply:
        __ Banking & Financial Services
        __ Education
        __ Food & Beverage
        __ Government & Non-Profit
        __ Healthcare
        __ Manufacturing
        __ Media & Entertainment
        __ Retail, Wholesale & Distribution
        __ Software & IT Services
        __ Non-Profit

Have you ever been a manager?   Yes: __   No: __
If yes, how many people did you supervise?   Less than 5: __   Between 5 and 10: __   More than 10: __

Appendix 3: Selected Quotes from the Experiment's Text-based Answers

	Response to the "Why?" question	Negative interpretation (*NegInt=1*)
Subjective reward (nominal effect)	It will motivate me to work harder	0
	Being at the top of the board is a great honor and we should strive to make the top of the list every month	0
	This is a great motivator for me.	0
	My hard work was recognized and rewarded. That would encourage more hard work from me. Not that lack of immediate reward would discourage hard work from me. Lack of pay would. There has to be incentive for me to work.	0
	That the other "non-quantifiable" aspects of performance propelled our team from fourth place to first place is important knowledge. That means we're doing a lot of things right. But if we work significantly harder and move our quantifiable measures of performance closer to the top, we can presumably greatly increase our chances of continuing to get the bonus (or at the least, guarantee that we do not end up with the monetary penalty).	0
	I think the reward structure is miserable and would not like working there. I'd continue to work as hard as I need to have job security.	1
	Working on 'rewards and penalties' for the entire team is rarely motivating, because it's not concrete and specific to outcomes. There is a lot of subjective consideration for management in the above description, and not a lot of objective specifics (example: unpredictable events, citizenship behaviors, attitude) that I, personally could control.	1
Subjective penalty (nominal effect)	I would feel unfairly penalized. My team wasn't the worst, but was assigned the penalty due a holistic view, which honestly seems a bit arbitrary. It would be hard to care about doing a good job in this situation.	1
	I was assigned a penalty despite giving good effort. Now, I could care less. I'll give the absolute minimum effort possible to keep my job. I may even try to bring down morale with co-workers out of spite.	1
	I would feel very discouraged, and this practice of penalizing groups that perform worse than others wouldn't make me feel wanted by the company. I would probably feel like putting less effort in at work.	1
	This is a very disheartening scenario. If it's understood that I performed well during this period, then I am being penalized for the failure of another team member. This offers me no incentive to try as hard, because I cannot be assured that the team member will increase their performance. Why put forth extra effort if I will still be penalized ultimately?	1

This table continues on the next page

Subjective penalty (nominal effect) cont'd	I'd try a bit harder so we would not get the penalty again. Maybe our attitude or other more subjective things brought us to the bottom so I'd work on that.	0
	There must be a reason why my team was ranked so low in October. From November I must do more to raise my team's status and it starts with my performance.	0
Opportunity gain (opportunity effect)	I feel like my team lucked out this time but we have to improve our performance.	0
	I feel our team came up short this time, and we were very lucky to not be penalized the 10%, but everyone has to be on the same page and want to do better; it helps with camaraderie as well.	0
	Well, based off my work ethic I always try to put the most into my job. It appears from this scenario that while we had the worst performance as far as numbers go we were spared this based off another factor. I could imagine one of these factors could be our positive outlook and hard work. I would choose to continue and build upon this.	0
	I would do everything I could to prevent my team from ranking at, or near, the poorest performers. I would make sure that I was performing at my best in all controllable aspects of my work. Losing more than a month's salary could greatly impact all aspects of my life and I would be incredibly motivated to avoid that.	0
	Because I'd be worried that next time I might get the penalty, but not much more because I'm confused as to why the manager penalized the team above us instead of us, and would also worry that doing better could actually hurt me.	1
	I don't think it's fair that those that couldn't perform their best this month get punished when there are a lot of factors that sometimes you can't control.	1
Opportunity loss (opportunity effect)	We didn't get the reward we deserved, so why work harder when it doesn't matter?	1
	I couldn't consciously bring myself to apply less effort, but given my disappointment in the outcome it would be hard to motivate myself to apply more. Unfortunately using the quantifiable data is the only way to know the decision is being made fairly. Despite what management said, there could be favoritism at play in which case I would be fighting a losing battle.	1
	The system is too easily corrupted by playing favorites. I wouldn't work for the company at all.	1
	I would not feel as motivated due to the reward going to a team ranked lower in October.	1
	Meritocracy is key to a democratic and just society and decent existence. This flies in the face of the importance of meritocracy and unfairly deprives me of my deserved reward. Thus, the reason I would not work as hard as I did.	1

This table continues on the next page

|		
Opportunity loss (opportunity effect) cont'd	I would feel like we weren't rewarded because of things that weren't quantifiable such as our team's attitude, etc. It would make me want to work harder for the reward next month.	0
	I would usually apply a high level of effort regardless, but I would try to add a bit more so that it counted toward those aspects which aren't measurable for my team the next month.	0

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Figure 1: Empirical Measures for Nominal and Opportunity Effect
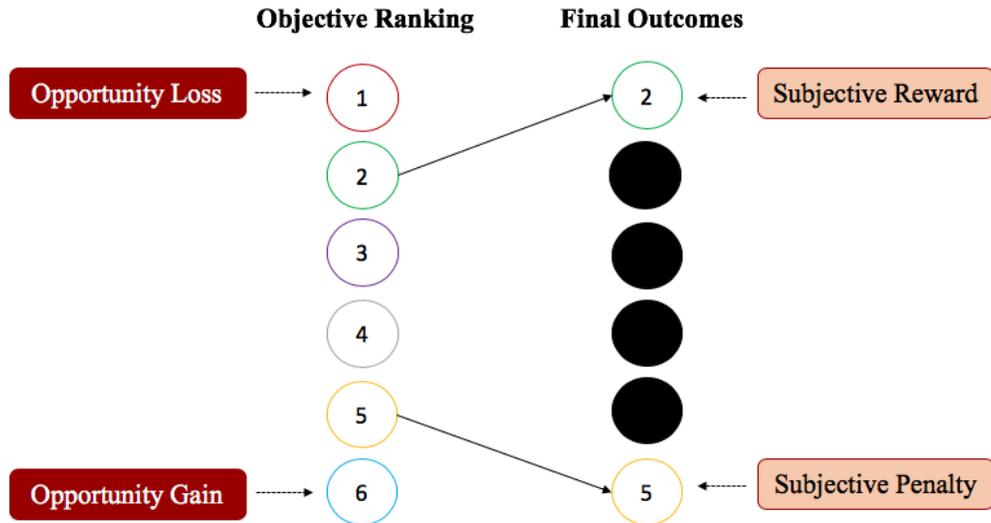
Notes: Figure 1 illustrates how using discretionary ex-post overrides of objective performance results to assign rewards and penalties gives rise to *opportunity gains* and *losses*. The figure represents a hypothetical sample of 6 departments. We posit that managers use discretionary adjustments to assign the monetary reward (penalty) to department 2 (5). Department 1 (6), which scored higher (lower) based on objective performance evaluations, experiences the subjective assignment as an opportunity loss (gain).

Figure 2: Expanded Definitions of Opportunity Gains and Losses
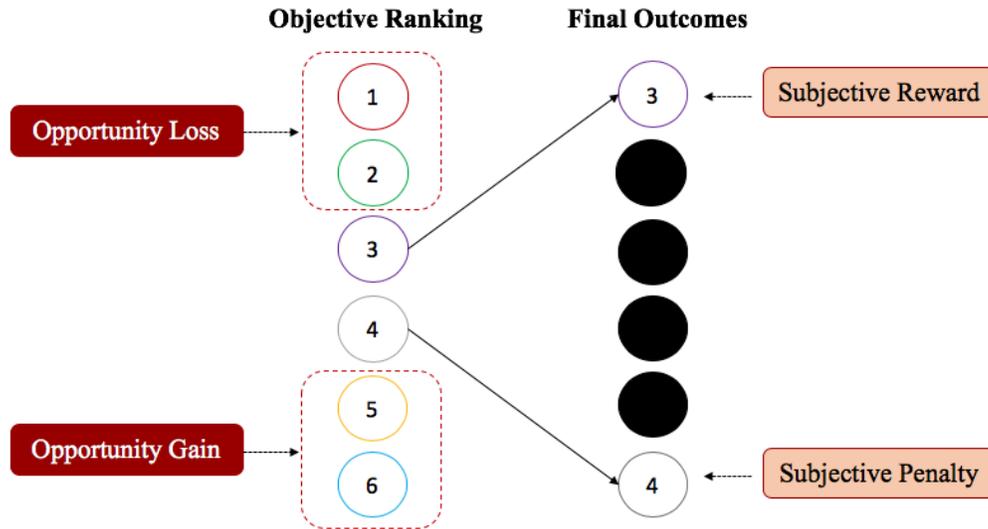
Notes: Figure 2 proposes a situation similar to that in Figure 1 (hypothetical sample of 6 departments), but using an extended definition of opportunity gains and losses, wherein we posit that *any* department scoring higher (lower) than the ultimate recipient of the actual reward (penalty) in month *t* experiences an opportunity loss (gain). The difference between this definition and the one described in Figure 1 is that the more restrictive definition considers only the top (bottom) performer's response to the discretionary ex-post adjustment, whereas the expanded definition includes *all* departments that were ranked above (below) the department receiving the actual reward (penalty).

Table 1: Summary of Theoretical Predictions for the Relation between Managerial Discretion and Subsequent Performance

		Economics-based Explanation	Psychology-based Explanation		
		Informativeness	Credibility (Yes/No)	Self-serving Bias	Reciprocity
Nominal Effect	Actual Recipient of Reward (*Subjective Reward*)	+	+/?	+	+
	Actual Recipient of Penalty (*Subjective Penalty*)	-	+/-	-	-
Opportunity Effect	Would-be Recipient of Penalty (*Opportunity Gain*)	+	+/?	+	+
	Would-be Recipient of Reward (*Opportunity Loss*)	-	+/-	-	-

Table 2: Descriptive Statistics

Variable	N	Mean	Std. dev.	Min	p25	p50	p75	Max
PerfScore	275	63.479	17.001	23.000	52.000	65.000	75.000	107.000
ΔPerfScore	264	-0.612	16.103	-62.000	-9.500	0.500	9.250	45.000
Reward	275	0.087	0.283	0.000	0.000	0.000	0.000	1.000
Penalty	275	0.109	0.312	0.000	0.000	0.000	0.000	1.000
SubjRew	275	0.044	0.205	0.000	0.000	0.000	0.000	1.000
SubjPen	275	0.047	0.213	0.000	0.000	0.000	0.000	1.000
OppGain	275	0.029	0.168	0.000	0.000	0.000	0.000	1.000
OppLoss	275	0.047	0.213	0.000	0.000	0.000	0.000	1.000
BusyMonth	275	0.480	0.501	0.000	0.000	0.000	1.000	1.000
NEmpl	275	16.255	14.944	2.000	7.000	10.000	18.000	68.000
Fpct	275	0.412	0.274	0.034	0.200	0.333	0.667	1.000
AgeLess30	275	0.377	0.235	0.000	0.222	0.340	0.500	1.000

Table 3: Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11
1. PerfScore	1.0000										
2. Reward	0.3432***	1.0000									
3. Penalty	-0.4127***	-0.1082*	1.0000								
4. SubjRew	0.1392**	0.6908***	-0.0747	1.0000							
5. SubjPen	-0.1436**	-0.0689	0.6366***	-0.0476	1.0000						
6. OppGain	-0.3020***	-0.0535	-0.0606	-0.0370	-0.0386	1.0000					
7. OppLoss	0.3198***	-0.0689	-0.0779	-0.0476	-0.0496	-0.0386	1.0000				
8. BusyMonth	0.0303	-0.0392	0.0374	-0.0271	-0.0082	-0.0797	0.0261	1.0000			
9. NEmpl	-0.0306	-0.0847	-0.0560	-0.0550	0.0284	-0.0131	-0.0406	-0.0208	1.0000		
10. Fpct	-0.1537**	-0.0508	0.1485**	-0.0893	0.0725	0.0776	-0.0435	-0.0131	-0.0307	1.0000	
11. AgeLess30	-0.1423**	-0.0020	0.0920	0.0136	0.0080	0.1569***	-0.0633	-0.0329	-0.2613***	0.1866***	1.0000

Notes: This table reports the Pearson correlation coefficients among all of our variables of interest for the estimation of our statistical models. Two-tail statistical significance of the correlation coefficients is indicated as follows: * = ($p<0.10$), ** = ($p<0.05$), *** = ($p<0.01$).

Table 4: Nominal and Opportunity Performance Effects of Managerial Discretion

		(1) $\Delta PerfScore$	(2) $\Delta PerfScore$	(3) $\Delta PerfScore$
$SubjRew_{i,(t-1)}$	b_1	15.851***		15.136***
		(3.80)		(3.44)
$SubjPen_{i,(t-1)}$	b_2	-11.301***		-10.780***
		(-4.61)		(-4.55)
$OppGain_{i,(t-1)}$	b_3		11.466**	10.846***
			(3.17)	(3.39)
$OppLoss_{i,(t-1)}$	b_4		-12.750**	-11.643**
			(-3.01)	(-2.64)
$BusyMonth_t$		3.687	4.073	3.733
		(1.43)	(1.74)	(1.50)
$NEmpl_t$		0.155	0.117	0.148
		(1.07)	(0.57)	(0.86)
$Fpct_t$		16.672	4.157	11.967
		(1.31)	(0.37)	(1.18)
$AgeLess30_{i,t}$		3.673	3.450	3.066
		(0.55)	(0.64)	(0.53)
$\Delta PerfScore_{i,(t-1)}$		-0.348***	-0.279***	-0.307***
		(-7.18)	(-4.39)	(-5.31)
$Intercept$		-13.295**	-7.165	-10.785**
		(-3.08)	(-1.44)	(-2.57)
N		253	253	253
$Adj.\ R\text{-}squared$		0.160	0.134	0.188
$Department\ fixed\ effects$		Yes	Yes	Yes
$Clustering$		Department	Department	Department
$Test\ if\ |b_1|=|b_4|$				0.23
				(0.641)
$Test\ if\ |b_2|=|b_3|$				0.00
				(0.989)

Notes: Table 4 reports the coefficients estimated for Eq. (1). Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. The dependent variable, $\Delta PerfScore$, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = ($p<0.10$), ** = ($p<0.05$), *** = ($p<0.01$). The bottom row reports the results of Wald tests, with which we analyze the statistical significance between the indicated coefficients. The null hypothesis is that the difference between the absolute value of the coefficients is not statistically different from zero. A p-value (reported in brackets) below 0.10 (0.05) [0.01] would allow us to reject the null with confidence at the 90% (95%) [99%] level, two-tailed.

Table 5: Persistence of the Nominal and Opportunity Effects

		(1) $\Delta PerfScore$	(2) $\Delta PerfScore$	(3) $\Delta PerfScore$
$SubjRew_{i,(t-1)}$	b_1	15.909***		15.698***
		(3.85)		(3.36)
$SubjRew_{i,(t-2)}$	b_2	-9.651***		-4.738
		(-3.34)		(-1.10)
$SubjPen_{i,(t-1)}$	b_3	-10.232***		-8.630***
		(-4.28)		(-3.79)
$SubjPen_{i,(t-2)}$	b_4	8.741**		8.027**
		(2.63)		(2.96)
$OppGain_{i,(t-1)}$	b_5		11.135**	9.415**
			(2.88)	(3.05)
$OppGain_{i,(t-2)}$	b_6		15.714**	16.233**
			(2.30)	(2.23)
$OppLoss_{i,(t-1)}$	b_7		-11.180**	-7.515
			(-2.38)	(-1.18)
$OppLoss_{i,(t-2)}$	b_8		-9.542**	-8.352*
			(-2.29)	(-2.01)
$BusyMonth$		3.810	3.854	3.613
		(1.55)	(1.67)	(1.48)
$NEmpl$		0.136	0.138	0.168
		(0.80)	(0.61)	(0.90)
$FPct$		9.780	2.603	5.567
		(0.73)	(0.25)	(0.53)
$AgeLess30_{i,t}$		4.941	1.452	1.964
		(0.83)	(0.26)	(0.34)
$\Delta PerfScore_{i,(t-1)}$		-0.305***	-0.337***	-0.338***
		(-5.48)	(-4.71)	(-5.03)
$Intercept$		-10.706**	-6.123	-8.593*
		(-2.36)	(-1.17)	(-1.88)
N		253	253	253
$Adj.\ R\text{-}squared$		0.181	0.169	0.228
$Department\ fixed\ effects$		Yes	Yes	Yes
$Clustering$		Department	Department	Department

Notes: Table 5 reports the coefficients estimated for Eq. (1) augmented with the inclusion of lagged variables for both the nominal effect (subjective rewards and penalties) and the opportunity effect (opportunity gains and losses) of managerial discretion. Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. The dependent variable, $\Delta PerfScore$, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

Table 6: Expanded Measure of Opportunity Gains and Losses

	(1) $\Delta PerfScore$	(2) $\Delta PerfScore$
$OppGainExp_{i,(t-1)}$	12.055***	11.710***
	(4.06)	(4.32)
$OppLossExp_{i,(t-1)}$	-1.997	-1.331
	(-1.13)	(-0.76)
$SubjRew_{i,(t-1)}$		14.950***
		(3.48)
$SubjPen_{i,(t-1)}$		-9.487***
		(-4.34)
$BusyMonth_t$	4.055	3.735
	(1.71)	(1.47)
$NEmpl_t$	-0.023	-0.007
	(-1.11)	(-0.28)
$FPct_t$	0.497	2.566
	(0.29)	(1.49)
$AgeLess30_{i,t}$	-1.082	-1.337
	(-0.91)	(-1.14)
$\Delta PerfScore_{i,(t-1)}$	-0.275***	-0.300***
	(-4.74)	(-5.76)
Intercept	-2.048	-3.320***
	(-1.59)	(-3.78)
N	253	253
Adj. R-squared	0.118	0.168
Department fixed effects	YES	YES
Clustering	Department	Department

Notes: Table 6 reports the results of the estimation of Eq. (1). However, in this model we use the expanded definition of opportunity gains (losses) as described in Figure 2. This expanded definition allows us to consider the reaction of *any* department that scored greater (lower) performance with respect to the objective metrics than the actual recipient of the reward (penalty) did. With this expanded definition, we analyze whether subsequent performance reactions are driven by having scored better (worse) than the recipient of the reward (penalty) independent of being ranked first (last) based on objective performance metrics. Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient we reported t-statistics in parentheses. The dependent variable, *ΔPerfScore*, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

Table 7: Experimental Evidence of the Motivation Channel

Panel A: Combined Effects

	(1) $\Delta Effort$	(2) $\Delta Effort$	(3) $\Delta Effort$
$SubjRew_{i,(t-1)}$	0.421***		0.360**
	(2.64)		(2.14)
$SubjPen_{i,(t-1)}$	0.437***		0.376**
	(2.80)		(2.28)
$OppGain_{i,(t-1)}$		0.034	0.219
		(0.17)	(1.05)
$OppLoss_{i,(t-1)}$		-0.767***	-0.582***
		(-3.81)	(-2.75)
$Female_i$	0.327***	0.311**	0.308**
	(2.68)	(2.55)	(2.54)
Age_i	-0.009	-0.009	-0.009
	(-1.54)	(-1.62)	(-1.52)
$Manager_i$	0.016	0.034	0.026
	(0.13)	(0.28)	(0.21)
$Intercept$	1.370***	1.629***	1.428***
	(6.19)	(7.49)	(6.24)
N	505	505	505
$Adj.\ R\text{-}squared$	0.031	0.037	0.047

Panel B: Cross-sectional Variation Based on Interpretation of Managerial Discretion

	(1) ΔEffort	(2) ΔEffort	(3) ΔEffort
$SubjRew_{i,(t-1)}$	0.483***		0.426**
	(3.15)		(2.77)
$SubjPen_{i,(t-1)}$	0.892***		0.838***
	(5.58)		(5.25)
$OppGain_{i,(t-1)}$		0.366	0.557
		(1.79)	(2.78)
$OppLoss_{i,(t-1)}$		-0.228	-0.034
		(-1.02)	(-0.16)
$SubjRew_{i,(t-1)}*NegInt_i$	-1.468**		-1.462**
	(-2.22)		(-2.34)
$SubjPen_{i,(t-1)}*NegInt_i$	-2.455***		-2.468***
	(-7.44)		(-7.91)
$OppGain_{i,(t-1)}*NegInt_i$		-2.225***	-2.230***
		(-4.43)	(-4.75)
$OppLoss_{i,(t-1)}*NegInt_i$		-2.005***	-2.028***
		(-4.87)	(-5.28)
$Female_i$	0.329***	0.280**	0.278**
	(2.84)	(2.38)	(2.53)
Age_i	-0.006	-0.007	-0.003
	(-1.08)	(-1.27)	(-0.65)
$Manager_i$	0.021	0.000	0.046
	(0.18)	(0.00)	(0.41)
Intercept	1.279***	1.578***	1.283***
	(6.10)	(7.54)	(6.20)
N	505	505	505
Adj. R-squared	0.133	0.111	0.225

Notes: Table 7, Panel A, reports the results of the estimation of Eq. (2). Panel B reports the estimation results of Eq. (3). The sample includes cross-sectional observations of a sample of 505 participants in our experiment. Estimations are performed using OLS. For each coefficient, we report t-statistics in parentheses. Two-tail statistical significance indicated by: * = ($p<0.10$), ** = ($p<0.05$), *** = ($p<0.01$).

Table 8: Test of Alternative Explanations: Determinants of Use of Managerial Discretion

	(A) *SubjPen*	(B) *SubjRew*
StartYear	0.473	0.789
	(0.37)	(1.00)
EndYear	0.610	-0.405
	(0.49)	(-0.32)
NEmpl	-0.102	-0.126
	(-1.20)	(-0.62)
FPct	16.125**	-1.042
	(2.17)	(-0.19)
AgeLess30	3.507	1.249
	(0.92)	(0.29)
BusyMonth	0.191	0.290
	(0.16)	(0.51)
Intercept	-9.968	-1.998
	(-1.61)	(-0.71)
N	200	200
Pseudo R-squared	0.136	0.050
Department fixed effects	YES	YES

Notes: Table 8 reports the results of the estimation of Eq. (4). Estimations are performed using logit with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = ($p<0.10$), ** = ($p<0.05$), *** = ($p<0.01$).

Table 9: Test of Alternative Explanations: Reward (Penalty) Effects

	$\Delta PerfScore$
$Reward_{i,(t-1)}$	-7.967
	(-1.29)
$Reward*SubjRew_{i,(t-1)}$	23.216**
	(2.52)
$Penalty_{i,(t-1)}$	-0.396
	(-0.18)
$Penalty*SubjPen_{i,(t-1)}$	-11.036***
	(-4.57)
$BusyMonth_t$	3.720
	(1.45)
$NEmpl_{i,t}$	0.147
	(0.98)
$FPct_{i,t}$	17.740
	(1.35)
$AgeLess30_{i,t}$	3.368
	(0.51)
$\Delta PerfScore_{i,(t-1)}$	-0.331***
	(-9.11)
$Intercept$	-13.110**
	(-3.10)
N	253
$Adj.\ R$-squared	0.162
Department fixed effects	Yes
Clustering	Department

Notes: Table 9 reports the results of the estimation of Eq. (5). Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. The dependent variable, $\Delta PerfScore$, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = (p<0.10), ** = (p<0.05), *** = (p<0.01).

Table 10: Test of Alternative Explanations: Rank-first and Rank-last Effects

	$\Delta PerfScore$
$RankLast_{i,(t-1)}$	1.084
	(0.32)
$RankLast*OppGain_{i,(t-1)}$	10.426***
	(4.59)
$RankFirst_{i,(t-1)}$	-10.479
	(-1.50)
$RankFirst*OppLoss_{i,(t-1)}$	-3.249
	(-0.47)
$BusyMonth_t$	4.085
	(1.78)
$NEmpl_{i,t}$	0.106
	(0.49)
$FPct_{i,t}$	4.093
	(0.33)
$AgeLess30_{i,t}$	3.629
	(0.64)
$\Delta PerfScore_{i,(t-1)}$	-0.252***
	(-4.53)
Intercept	-6.586
	(-1.21)
N	253
Adj. R-squared	0.143
Department fixed effects	Yes
Clustering	Department

Notes: Table 10 reports the results of the estimation of Eq. (6). Estimations are performed using OLS with heteroscedasticity-robust standard errors. For each coefficient, we report t-statistics in parentheses. The dependent variable, $\Delta PerfScore$, is calculated as $PerfScore_{(t)} - PerfScore_{(t-1)}$. We include department fixed effects and we cluster our standard errors at the department level. Two-tail statistical significance indicated by: * = ($p<0.10$), ** = ($p<0.05$), *** = ($p<0.01$).