Vertical Pay Dispersion, Peer Observability and Misreporting

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March 2017

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Acknowledgements: We acknowledge the helpful comments received from Vicky Arnold, Jeremy Douthit, Khim Kelly and workshop participants at Bentley University, Clemson University, Northeastern University and the University of Central Florida. In addition, we thank the Social Sciences Research Council of Canada and the CPA/Laurier Centre for the Advancement of Accounting Research and Education at Wilfrid Laurier University for funding this project.
**Vertical Pay Dispersion, Peer Observability and Misreporting**

**Abstract**

In this study, we examine the interaction of vertical pay dispersion and peer observability on reporting behaviors. We use a budgetary setting to examine the interaction between members of superior-subordinate triads (two subordinates paired with each superior) in the presence of both vertical pay dispersion (high/low) and peer observability (present/absent). As predicted, we find that peer observability shapes subordinate’s reporting norms (i.e., more or less misreporting) differently based on different levels of vertical pay dispersion. Specifically, we find that when peer reports are observable, subordinates are influenced to a greater degree by reporting choices of peers who are more (vs. less) honest than themselves when vertical pay dispersion is low (vs. high). Thus, when vertical pay dispersion is low, subordinate misreporting is lower when subordinates can observe their peer’s reporting decisions than when they cannot. However, when vertical pay dispersion is high, subordinates misreport more when their peer’s reports are observable than when they cannot. Implications for theory and practice are discussed.

**Keywords:** vertical pay dispersion, peer observability, misreporting, fairness, social norms
I. INTRODUCTION

The Dodd-Frank Act of 2010 requires that public companies disclose the ratio of the CEO’s compensation to that of the median employee, which reflects growing public concerns over the pay gap between top management and the average employee.\(^1\) At the same time, tournament-like pay structures have resulted in widening gaps in pay between employees at different hierarchical levels in many organizations (Conyon, Peck and Sadler 2001). Vertical pay dispersion, defined as the difference in pay between employees at different levels in the organizational hierarchy (Siegel and Hambrick 2005), is of particular interest to both research and practice. The current study examines how vertical pay dispersion affects the social dynamics between subordinates and thus, influences their reporting decisions. Such dynamics are especially important in settings where peer employees can observe each other’s actions including their budgetary reporting decisions.

Prior research suggests that the ability to observe peer employees’ actions, which we refer to as peer observability, can affect employees’ effort, performance and willingness to collude (e.g., Hannan, Towry and Zhang 2013; Knez and Simester 2001; Towry 2003; Evans, Moser, Newman and Stikeleather 2016). In practice, peer observability can take many forms, ranging from direct observation due to the adjacency of work stations, casual chats that occur on a sporadic basis, to exchange of information over an enterprise system. To foster communication and collaboration, many firms are adopting “open office” designs that remove walls and barriers between office workers, increasing peer observability (Kaufman 2014; Waber, Magnolfi, and Lindsay 2014). Peer observability can make social norms such as honesty and fairness salient to

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\(^1\) The pay gap has also become increasingly transparent through websites like Glassdoor that collect salary information and then reveal to the public the average salaries of various positions.
employees, which in turn can affect their effort and reporting decisions (Hannan et al. 2013; Evans et al. 2016).

Social norms are defined as the informal rules of behavior that are considered acceptable and involve a shared understanding or consensus among individuals (Coleman 1990; Ostrom 2000). When multiple social norms are applicable to a given situation, situational cues often determine which norms become salient and which dominate (Bicchieri 2006). We argue that vertical pay dispersion is likely one such situational cue, as individuals often compare themselves with colleagues at both higher and lower ranks in the corporate hierarchy (Dornstein 1991; Brown, Ferris, Heller and Keeping 2007). Hence, we predict that vertical pay dispersion will moderate the effect of peer observability on employees’ behaviors by activating different social norms.

We focus specifically on middle managers’ reporting behaviors in a budgetary setting similar to that in Evans, Hannan, Krishnan and Moser (2001). We choose this setting because recent research in this area demonstrates the important role of social norms in affecting managers’ reporting honesty in this setting (e.g., Hannan, Rankin and Towry 2010; Douthit and Stevens 2015; Guo, Libby and Liu 2016). In particular, Guo et al. (2016) find that vertical pay dispersion stimulates feeling of unfairness on both the superior’s and the subordinate’s part. Perceptions of unfairness result in increased subordinate misreporting and reduced willingness of the superior to exercise control over subordinate misreporting. In this study, we extend Guo et al. (2016) by expanding the superior’s span of control so that each superior is paired with two subordinates (as opposed to one subordinate). By doing so, we are able to examine how peer

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2 The effect of peer influence on behavioral norms is evident in the recent Wells Fargo fraud case in which employees opened over two million fictitious deposit and credit card accounts. Press reports suggest that employees were aware of the things their peers were doing and often learned fraudulent “techniques” through observations or even direct instructions from their peers (Tippett 2016).
observability may activate different social norms under different levels of vertical pay dispersion, which ultimately shapes subordinates’ misreporting levels.

We predict that subordinates’ misreporting will be interactively affected by both vertical pay dispersion and the opportunity to observe the reporting choices of their peers. Specifically, we expect that a peer’s reporting behavior will have a different impact on the subordinate’s reporting choices depending on the level of vertical pay dispersion. When vertical pay dispersion is low, the vertical pay structure is more likely to be considered fair on average (Guo et al. 2016; Yu and Luu 2016). Peer observability will increase the pressure to comply with social norms of honesty and fairness since subordinates are likely to share the expectation that greater reporting honesty is more appropriate in a relatively fair pay environment (Blay, Gooden, Mellon and Stevens 2016). Thus, subordinates’ reporting behaviors will be more influenced by their more honest peers, leading to less misreporting in the presence of peer observability than in its absence. However, when vertical pay dispersion is high, we expect subordinates will view the relative pay structure to be unfair. Thus, in the presence of peer observability, subordinates are more likely to consider their peers’ less honest cost reports as norm-complying and justifiable. Consequently, subordinates’ reporting behaviors will be influenced more by the reports of their less honest peers, leading to greater misreporting when peer observability is present than when it is absent.

We test our predictions using a 2 (vertical pay dispersion high/low) × 2 (peer observability present/absent) × 8 (periods) mixed factorial experiment where participants are assigned the role of superior or subordinate. We manipulate vertical pay dispersion by varying the fixed salary paid to the superior and the subordinates. The subordinates are always paid a $10 fixed salary and the superior is paid a fixed salary of either $12 (low pay dispersion) or $25 (high
pay dispersion). We manipulate peer observability by revealing to (peer observability present) or withholding from (peer observability absent) subordinates the actual project costs and cost reports of their peers.

Participants (one superior paired with two subordinates) interact anonymously via networked computers and are randomly re-paired each period. Subordinates receive private information about the actual cost of a capital project and report to the superior a cost that can be higher than the actual cost. Subordinates are allowed to submit cost reports twice, once before observing the peer’s actual cost and cost report (when peer observability is present) and one after, and only the final submission bears economic consequences. Before receiving any cost reports, superiors set a cost threshold representing the maximum cost report they are willing to accept from the subordinates. Subordinates are not informed of this cost threshold. Any proposal with a reported cost at or below the threshold is accepted and the subordinate retains the cost surplus, i.e., the difference between actual and reported cost, if any. If the cost report is rejected, the project goes unfunded and the subordinate receives only the fixed salary. The superior only receives a fixed salary and does not share in the project profits.\(^3\)

As predicted, we find an interaction between vertical pay dispersion and peer observability on reporting behavior. Specifically, we find that the observed peer’s reporting honesty has an asymmetric influence on subordinate misreporting, and this asymmetric influence depends on the level of vertical pay dispersion. When subordinates can observe each other’s reports in our \textit{low} vertical pay dispersion condition, more honest peer reports decrease subordinate misreporting, whereas less honest peer reports have no significant effect on

\(^3\) In this study, we focus on distributional fairness that arises from different degrees of vertical pay dispersion, not from profit sharing between the superior and the firm as in some prior studies (e.g., Hannan et al. 2006; Rankin et al. 2008). We avoid any confounding effect of the superior’s fairness perception by paying the superior a salary, but not a shared profit.
subordinate misreporting. In comparison, when subordinates can observe each other’s reports in our high vertical pay dispersion condition, less honest peer reports increase subordinate misreporting, whereas more honest peer reports have no significant effect on subordinate misreporting. Driven by these asymmetric effects, subordinates misreport less (more) in the presence of peer observability than in its absence when vertical pay dispersion is low (high). Supplemental analysis indicates that subordinates’ misreporting choices are consistent with their concerns for distributional fairness.

This study makes the following contributions. First, this study extends the growing accounting literature on social norms (e.g., Taylor and Bloomfield 2011; Davidson and Stevens 2013; Douthit and Stevens 2015). While extant literature demonstrates that social norms can affect individual behavior, our findings suggest that different control system design choices can make different social norms salient, which in turn have different impacts on employee decisions and thus have profit implications for the organization. Second, we contribute to both budgeting research and practice by identifying an interactive effect of a corporate incentive design feature (i.e., vertical pay dispersion) and an information policy feature (i.e., peer observability) on employees’ misreporting. While Guo et al. (2016) examine how vertical pay dispersion affects the superior-subordinate relationship, this study demonstrates that vertical pay dispersion, via peer observability, affects dynamics between subordinates. Specifically, we illustrate that when peer reporting honesty is observable, employees are more influenced by their more (less) honest peers in low (high) vertical dispersion. As a result, peer observability could either lead to more or less honest reporting norms depending on the level of vertical pay dispersion. Accordingly, our findings suggest that firms should align their information policy (e.g., peer observability) with their incentive structures to achieve a more positive budgeting environment.
This study differs from prior studies that examine cooperation or collusion in a multi-employee setting where economic payoffs are interdependent (e.g., Towry 2003; Zhang 2008; Hannan et al. 2013). Similar to these studies, we allow employees to observe one another’s private information (e.g., reporting honesty). Different from these prior studies, employees’ decisions do not affect their peer’s payoffs in any way; in other words, there is no strategic dependency among employees in this study (c.f., Charness and Kuhn 2010). Furthermore, we remove superior-subordinate economic interdependence and exogenously implement a vertical pay structure as opposed to allowing superiors to set pay for subordinates (e.g., Zhang 2008; Douthit and Stevens 2015). This design feature isolates the effects of perceived fairness and honesty on misreporting from that of reciprocity concerns arising from superior-subordinate economic interdependence and thus, offers a cleaner test of our research question.

The remainder of this paper is organized as follows. In the next section, we describe our research setting, review the literature and develop our hypotheses. In section III, we describe our experimental method, followed by a report of our results in section IV. Finally, we conclude with a discussion of our results and implications for research and practice in section V.

II. LITERATURE REVIEW AND HYPOTHESES

Setting

We adapt the setting from Guo et al. (2016) to a multi-agent context, where two subordinates each propose an investment project to one superior for funding. Project revenue and the probability distribution of actual costs is commonly known by both the superior and the subordinates, while only the subordinates know the actual cost of their own proposed project. The superior solicits a cost report or ‘budget’ from the subordinates. As we are interested in the
effect of peer observability on subordinates’ reporting honesty, we allow subordinates to submit to the superior an initial and a final cost report. When peer observability is present, subordinates can observe their peer’s actual project cost and initial cost report, so they can infer their peer’s initial degree of reporting (dis)honesty. This information is likely to affect a subordinate’s final reporting decision. Only the final cost report is sent to the superior and considered for project funding.

We follow prior literature and let the superior set a maximum threshold level that applies to both subordinates before receiving their cost reports (Rankin et al. 2008; Hannan et al. 2010). The threshold is not revealed to the subordinate and project proposals above the threshold are rejected. If a reported project cost is below or at the threshold, then the project proposal is accepted and the subordinate retains any surplus (i.e., the difference between the reported project cost and the actual project cost). Subordinates and superiors interact anonymously in triads and no triad is ever repeated; thus, there are no reputational concerns. Subordinates receive a fixed salary plus any budget surplus from projects accepted for funding and superiors only receive a fixed salary.

**Vertical pay dispersion**

According to prior literature (e.g., Siegel and Hambrick 2005), vertical pay dispersion is defined as the difference in pay across different hierarchical levels within the organization. Vertical pay dispersion arises from variations in skill and/or responsibility, or due to differences in labour markets for these jobs (Gupta, Conroy and Delery 2012; Brown, Sturman and Simmering 2003). Bloom and Michel (2002) suggest that some reasonable amount of vertical

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4 An *ex ante* (vs. *ex post*) hurdle is important for our multiple-subordinate setting in that when the threshold is set *ex ante*, the superiors will not wrongly assume that the information on one subordinate’s cost is informative of the other subordinate’s cost (Hannan et al. 2010).

5 We note that fixed-pay contracts are prevalent in practice (e.g., Fehr and Gachter 2000).
pay dispersion is necessary to attract, retain and motivate high-performing employees. Even so, vertical pay dispersion can also come at the cost of unfairness perceived by lower-level employees (Pfeffer and Langton 1993; Bloom 1999).

According to equity theory (Adams 1965; Walster, Berscheid and Walster 1973; Homans 1974), individuals judge fairness by comparing the inputs they contribute and the outcomes they obtain. Nevertheless, employees’ fairness perceptions are affected largely by outcome (instead of input) differences (Cowherd and Levine 1992) for the following reasons. Considerable differences in inputs (e.g., skill and experience) exist across hierarchical ranks, and as such, comparison of inputs is less straightforward. In contrast, outcome differences such as pay are often observable and relatively more objective. Furthermore, self-serving biases usually make the input comparison ambiguous. Hence, subordinates are likely to perceive high vertical pay differences as unfair, which in turn reduces their motivation and increases opportunistic behaviors.

Social Norms

Reporting decisions in budgetary settings can be influenced by social norms (e.g., Hannan, Rankin and Towry 2010; Douthit and Stevens 2015; Huddart and Qu 2016). Social norms are the informal rules of behavior that are considered acceptable in a group and often involve a shared understanding or consensus among a group of rational individuals (e.g., Coleman 1990; Ostrom 2000). Bicchieri (2006) argues that social norms are context-dependent and contingently activated with the decision to follow social norms, and the activation process is often subconscious (Bicchieri 2006; Biel and Thogersen 2007; Blay et al. 2016). In other words, individuals have conditional preferences for conforming to a social norm. Specifically, individuals prefer to follow a social norm if they expect others will comply with the norm
(empirical expectations) and believe that others expect them to follow the norm in a similar situation (normative expectations) (Bicchieri and Chavez 2010). Empirical expectations and normative expectations will increase behavior consistent with the norm (Blay et al. 2016). Prior research in budgetary reporting suggests that the opportunity for subordinates to observe each other’s reporting behavior (i.e., peer observability) can facilitate the convergence of reporting decisions toward more or less honest cost reports (e.g., Evans et al. 2016).

There is often uncertainty regarding what norm is applicable in a given situation (e.g., Schram and Charness 2015; Danilov and Silwka 2016). In our setting, we identify that at least two social norms will affect individual reporting behaviors, specifically, honesty and distributional fairness. We define the social norm for honest reporting as a preference that causes disutility from making false statements (Rankin et al. 2008; Douthit and Stevens 2015). Consistent with prior research, we define the distributional fairness social norm as a preference for equitable distributions in pay (Douthit and Stevens 2015; Fehr and Schmidt 1999). When multiple social norms are applicable to a given situation, situational cues often determine which norm(s) become salient or dominant (Hannan et al. 2013; Bicchieri 2006). Vertical pay dispersion is likely one such situational cue.

**Hypotheses Development**

Peer observability can significantly influence behavioral norms (e.g., Evans et al. 2016). That is, individuals often behave differently when they are being observed than not (Hannan et al. 2013; Maas and Van Rinsum 2013). The effect of peer observability on the subordinate’s misreporting is likely contingent upon institutional features such as vertical pay dispersion, as a different vertical pay structure activates a different distributional fairness norm (e.g., Guo et al. 2016). Next, we discuss how peer observability shapes reporting norms (i.e., more or less
misreporting), and in particular how subordinates react to peer reporting honesty, when vertical pay dispersion is low and when it is high. We first discuss the influence of peer observability on subordinates’ reporting choices in the low pay dispersion condition, and then in the high pay dispersion condition.

**Low Vertical Pay Dispersion**

When vertical pay dispersion is low, we predict that subordinates are likely to misreport less when they can observe their peer’s reporting behavior than when they cannot. If a subordinate’s reporting decisions can be observed by his/her peer, then the subordinate likely believes that others expect compliance with the social norm of honest reporting. Individuals tend to avoid publicly breaking a social norm due to an interest in maintaining one’s self-image in public and aversion to public shame (Bicchieri 2006; Ostrom 2000). This argument is consistent with Maas and Van Rinsum (2013) who find that performance overstatement is lower when individual reporting decisions are publicly announced than when they are not. If a subordinate’s cost reports are not revealed to his/her peer, then the subordinate is more likely to evade the honesty norm and instead, may overstate project costs (i.e., misreport) to increase his/her own financial payoff.

When vertical pay dispersion is low, subordinates are more likely to perceive their compensation relative to their superiors’ compensation as fair (Fehr and Schmidt 1999); thus, dishonest cost reports would be viewed as distributionally unfair to superiors (Guo et al. 2016). Bicchieri and Chavez (2010) propose that individuals tend to follow the distributional fairness norm in the presence of its expectation, but disregard it in its absence. Therefore, a subordinate likely misreports less (more) in the presence (absence) of peer observability, since the fairness-compliance expectation is not present when peer reports are not observable.
The honesty norm and the distributional fairness norm are congruent when vertical pay dispersion is low as compliance with either norm requires less misreporting. Peer observability heightens the salience of social norms such as honesty and fairness, increasing the normative pressure to report honestly. Peer observability further informs empirical expectations, i.e., what my peers do in a similar situation. When subordinates can observe their peer’s cost reports, they are likely to compare their reporting honesty with each other. If subordinates observe that their peers report more honestly, then their empirical expectation is consistent with their normative expectation, and subordinates are likely to decrease misreporting (Bicchieri 2006). If subordinates observe less reporting honesty from their peers, then their empirical expectation is at odds with their normative expectation, and subordinates’ reporting decisions are less likely to be impacted by the reporting choices of their peers. That is, in the low pay dispersion condition, we expect subordinates will likely align their reporting decisions with the more honest peer reports than with the less honest peer reports when peer reports are observable. In summary, when vertical pay dispersion is low, peer observability accentuates the salience of both the honesty and the fairness norms, both of which lead to less misreporting by subordinates. Our hypotheses are as follows:

**H1a:** When vertical pay dispersion is low, subordinate misreporting will be lower when they can observe one another’s reporting decisions than when they cannot.

**H1b:** When vertical pay dispersion is low and peer’s behavior is observable, subordinates’ cost reporting choices will be affected to a greater extent by more honest peer reports than less honest peer report.

**High Vertical Pay Dispersion**

When vertical pay dispersion is high, we predict that subordinates misreport more when they can observe each other’s cost reports than when they cannot. First, subordinates often
perceive high vertical pay dispersion to be unfair or inequitable (Fehr and Schmidt 1999; Guo et al. 2016). In the presence of peer observability, subordinates may therefore find each other’s cost overstatements justifiable and fair due to self-serving notions of fairness (Kagel, Kim and Moser 1996). Hannan et al. (2013) find that when subordinates are inclined to collude with one another, peer observability facilitates such collusion and reduces effort. Thus, after observing their peer’s overstatement, subordinates are more likely to be able to justify their own overstatement because their peer is doing the same. The ease of producing a self-serving justification for misreporting under peer observability will thus amplify cost overstatement.

Second, when vertical pay dispersion is high, while subordinates will continue to experience normative pressure to appear honest in the presence of peer observability, this pressure is likely dominated by the fairness norm. While the honesty norm suggests lower misreporting, the fairness norm dictates the exact opposite; that is, subordinates likely consider higher misreporting as fair and appropriate. When conflicting social norms are present and there is ambiguity about the appropriate behavior, individuals are more likely to act in their own self-interest (Dierynck and Roodhooft 2011; Gaertner, Sedikides, Vevea and Iuzzini 2002; Rowe 2004; Taylor and Bloomfield 2011). Thus, when vertical pay dispersion is high, subordinates can justify a higher level of misreporting as appropriate (i.e., normative expectation).

If subordinates find that their peers report less honestly, then the empirical expectation is consistent with the normative expectation, and subordinates likely respond by misreporting more (Bicchieri 2006). However, if subordinates observe more peer honesty, then the empirical expectation is at odds with the normative expectation, and subordinates are less likely to follow suit with their peers by misreporting less. To summarize, we expect that peer misreporting, when observable, will asymmetrically affect subordinates’ reporting choices. We predict that, when
vertical pay dispersion is high, subordinates will likely align their reporting choices with less honest peer reports than with more honest peer reports. These expectations on the final reporting outcome and its associated process are stated formally as follows:

**H2a:** When vertical pay dispersion is high, subordinate misreporting will be greater when they can observe one another’s reporting decisions than when they cannot.

**H2b:** When vertical pay dispersion is high and peer’s behavior is observable, subordinates’ cost reporting choices will be affected to a greater extent by less honest peers report than more honest peer reports.

### III. METHOD

**Design**

To test our hypotheses, we conduct a laboratory experiment using a $2 \times 2 \times 8$ mixed factorial design. The $2 \times 2$ between-subject factors include vertical pay dispersion (low vs. high) and peer observability (absent vs. present). Vertical pay dispersion is manipulated at two levels, specifically, ratios of superior to subordinate fixed pay of $12:10$ (“low pay dispersion”) and $25:10$ (“high pay dispersion”). The subordinates’ fixed pay remains constant between conditions so that the initial economic incentives are held constant across conditions. Peer observability is also manipulated at two levels. In the “peer observability absent” condition, subordinates cannot observe their peers’ actual or reported project costs, while in the “peer observability present” condition, subordinates are able to observe their peers’ actual project cost and both the initial and final reported costs. Period (1-8) is a within-subject repeated factor such that within an experimental session, participants complete 8 decision periods. The experiment is programmed and conducted using z-Tree software (Fischbacher 2007).

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6 Similar with Guo et al. (2016), our high vertical pay dispersion condition ($25:10$) reflects the average reported pay gap between CEOs and executives one level down (or VPs) for those firms included in Standard and Poor’s (S&P) ExecuComp database for the 1993-2004 time period (Kale, Reis and Venkateswaran 2009).
The dependent measure used in this study is subordinates’ cost overstatement, \textit{OVERSTATE}. Following prior literature, we measure overstatement as slack taken/slack available (e.g., Evans et al. 2001; Church, Hannan and Kuang 2012; Newman 2014). The slack taken is the amount of slack in the project budget, calculated as the difference between the subordinate’s reported project cost and the actual project cost. The slack available is calculated by taking the difference between the highest possible cost ($40 in our setting) and the actual cost.

Each session consists of a unique experimental condition with eight periods. Before starting a session, we randomly assign one of the four experimental conditions to that session. One third of participants are assigned the role of “superior” and two thirds the role of “subordinate” based on their performance on a cognitive task unrelated to the cost reporting task.\footnote{Different from prior experimental studies (e.g. Rankin et al. 2008; Hannan et al. 2010) in which participants’ roles are randomly assigned, we include a promotion stage (Task 1) prior to the main task to assign the role of superior to better performers in Task 1. This is to increase external validity because in practice, performance and/or merit are often considered in promotion decisions. Douthit and Majerczyk’s (2016) experiment shows that when role assignment is based on legitimate procedures (such as ours) compared to when it is random, subordinates misreport to a lesser degree. Therefore, our use of the promotion stage should work against finding support for our hypotheses because it likely makes vertical pay dispersion more justifiable and reduces variation in misreporting across all of our experimental conditions.} All participants remain in the same role throughout the session.

Two design choices are implemented to control for potential reputation effects. First, participants know their superior and peer are in the room, but they do not know their identity. Second, participants are aware that members of each superior-subordinate triad are re-paired each period and no one will be assigned to the same triad more than once. In addition to mitigating potential reputation effects between superior and subordinates, these design choices also allow us to avoid the development of reciprocity concerns among subordinate participants.
Participants, Procedures and Task

A total of 93 participants are recruited from upper-level accounting courses at a large public university. On average, participants are 24 years of age, have 4.72 years of work experience and 48% are female. Each participant completes two tasks in an experimental session. In Task 1, participants are given four minutes to answer five multiple-choice questions adapted from the graduate management admission test (GMAT). Their performance is ranked based on the number of questions they answer correctly. The top one-third of participants in a session are assigned to be superiors, and the remaining participants are assigned to be subordinates.\(^8\)

Next, the experimenter reads aloud the instructions for Task 2 and participants complete a quiz that tests their understanding of the instructions. The quiz includes 11 questions about the key components of the instructions, such as the participant’s role, anonymity, the determination of actual, reported and threshold cost, and earnings calculation. Once all participants answer all quiz questions correctly, they begin three practice periods in which decisions do not affect their final payoffs, followed by eight formal decision periods.

In each period, subordinates first learn the actual cost of the project which is determined randomly in advance. It is public knowledge that the actual project cost follows a uniform distribution of ($1, $2, $3 …. $40). To facilitate comparison across experimental conditions, we randomly selected two actual cost sequences (one sequence for each of the two subordinates of the firm) to be used across all conditions.\(^9\) Subordinates then submit an initial cost report to the

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\(^8\) T-tests do not show any significant difference between superior and subordinate participants in terms of age (p=0.68) and the amount of work experience (p=0.93). There are slightly more males acting as superiors than subordinates: 58.1% superiors are males whereas 47.5% of subordinates are males.

\(^9\) In order, the actual costs presented to one subordinate are 13, 28, 8, 14, 25, 5, 33 and 7, whereas those presented to the other subordinate are 17, 22, 6, 18, 27, 3, 29 and 10. The average actual costs across all formal periods are approximately the same for the two subordinates: 16.6 vs. 16.5.
superior, which cannot be less than the actual project cost nor greater than the maximum possible actual cost of $40.

After submitting the initial cost report, subordinates are given a chance to revise the reported cost and submit a final cost report. In the peer observability present condition, subordinates can observe their peer subordinate’s actual cost and initial cost report before submitting their final cost report, while in the peer observability absent condition, subordinates cannot observe this information. Only the final (not the initial) cost report is submitted to the superior for funding purposes. In the meantime, superiors are required to set a threshold cost before observing the cost reports from either subordinate. If the subordinate’s final reported cost is higher than the threshold cost, the project is rejected; otherwise, it is accepted. The subordinate is never informed of the threshold cost and projects are funded at the final reported cost, not the threshold cost.

This process is repeated over three practice periods and eight formal periods. After each period, all participants receive feedback on the funding decisions and related outcomes. In the peer observability present condition, subordinates also find out the actual cost and final reported cost of their peer subordinates. Then all participants complete a post-experimental questionnaire which includes manipulation checks, participants’ perceptions of various aspects of the task and demographic questions. At the end of each experimental session, participants are privately paid in cash.

**Payoffs**

Participants’ payoffs consist of earnings from both Task 1 and Task 2. In Task 1, participants receive $1 for each GMAT question they answer correctly. In Task 2, superiors’ earnings only include a fixed salary of $12 ($25) in the low (high) pay dispersion condition.
Subordinates’ earnings include a fixed salary ($10) and the surplus retained (i.e., the difference between actual project cost and final reported cost if the project is accepted) from one formal decision period, randomly drawn at the end of the experiment. Although superiors’ earnings are fixed, superiors are instructed that they are responsible for setting the threshold cost on behalf of the firm and to maximize the firm’s project profit, which is the difference between the project revenues of $40 and subordinates’ final reported cost. This design feature allows us to impose an identical objective function on superiors across all experimental conditions. Such an objective function also reflects superiors’ fiduciary role in actual companies.

Participants receive an average cash payment of $1.45 from Task 1, with a range from $0 to $5. On average, superiors received $3.65 and subordinates received $0.32 from this task. In Task 2, subordinates receive an average cash payment of $18.66, ranging from $10 to $34. Superiors received an average cash payment of $18.71, resulting in an overall average cash payment of $18.68 for all participants.

IV. RESULTS

Manipulation and Comprehension Checks

We test participants’ comprehension of the vertical pay dispersion manipulation by asking them to indicate both the superior’s and the subordinates’ fixed salaries. All participants correctly answered these questions. We also measure participants’ perceived magnitude of vertical pay dispersion by asking “In your opinion, the salary difference between the superior and the subordinates was ___ (1: too small; 10: too big).” The average response from the subordinate participants is significantly higher in the high (mean=6.56, sd=1.46) than in the low (mean=3.73, sd=1.86) vertical pay dispersion conditions (F =44.87, p<0.01) indicating that our
manipulation of vertical pay dispersion was successful. We use the following question to examine the effectiveness of the manipulation of peer observability: “Over the eight decision periods, were you shown the reported costs of your peer subordinate in your triad?” All but three participants answered this question correctly.\(^\text{10}\)

**Descriptive Statistics**

We focus on subordinates’ overstatement using their final cost reports, labelled \(OVERSTATE_j\). This is because the subordinates’ final, but not their initial, reporting decisions carry real economic consequences. Table 1 Panel A presents the descriptive statistics, and Figure 1A provides the average \(OVERSTATE_j\) across the four experimental conditions. In the low vertical pay dispersion condition, the average (median) of subordinates’ \(OVERSTATE_j\) across eight periods is 37.28% (32.84%) when they cannot observe their peers’ reporting decisions, and 28.39% (26.97%) when they can. In the high vertical pay dispersion condition, the average (median) of subordinates’ \(OVERSTATE_j\) across eight periods is 29.96% (25.46%) when they cannot observe their peers’ reporting decisions, and 43.40% (40.27%) when they can. Figure 1B presents the mean of \(OVERSTATE_j\) by period. In the low vertical pay dispersion condition, the subordinates’ average \(OVERSTATE_j\) is consistently lower across periods when they can observe each other’s reporting decisions than when they cannot; the results are the opposite when vertical pay dispersion is high, i.e., the average \(OVERSTATE_j\) is consistently higher across periods with peer observability than without peer observability.

[INSERT TABLE 1 AND FIGURE 1 ABOUT HERE]

\(^{10}\) These three participants are all in the peer-observability-absent condition. Since in the peer-observability-absent condition the subordinates were not shown their peers’ cost reports, we included these three subordinates’ data in the analyses. However, excluding these participants from our analysis does not change our inferences on all hypotheses.
Tests of Hypotheses

Tests of $H_{1a}$ and $H_{2a}$

$H_{1a}$ posits that peer observability decreases overstatement when vertical pay dispersion is low, while $H_{2a}$ predicts that peer observability increases overstatement when vertical pay dispersion is high. We formally test $H_{1a}$ and $H_{2a}$ using a repeated-measure ANOVA with period as the within-subject factor, and vertical pay dispersion and peer observability as the between-subjects factors. Results are presented in Table 2 Panel A. Consistent with the pattern presented in Table 1 and Figure 1A, the results of the repeated-measures ANOVA indicate a significant interaction effect of vertical pay dispersion and peer observability on $OVERSTATE_f$ ($F = 7.58$, $p<0.01$).

[INSERT TABLE 2 ABOUT HERE]

We further test simple effects and compare $OVERSTATE_f$ within each of the vertical pay dispersion condition. As reported in Table 2 Panel B, $OVERSTATE_f$ is marginally lower with peer observability than without peer observability when vertical pay dispersion is low ($F=2.63$, $p=0.06$, one-tailed), whereas it is significantly higher with peer observability than without peer observability when vertical pay dispersion is high ($F=5.13$, $p=0.02$, one-tailed). These results again support both $H_{1a}$ and $H_{2a}$. Simple effect tests also show that when peer observability is absent, $OVERSTATE_f$ does not differ significantly when vertical pay dispersion is high or low ($F=1.41$, $p=0.12$, one-tailed).\textsuperscript{11} When peer observability is present, however, $OVERSTATE_f$ is

\textsuperscript{11} This result differs from Guo et al. (2016) who employ a one-superior-one-subordinate structure (with no peer observability) and find that subordinates overstate costs more in the high (vs. low) vertical pay dispersion condition due to unfairness perceptions. In contrast, our findings show that subordinates overstate less, albeit insignificantly, in the high (versus low) vertical pay dispersion condition when subordinates cannot observe one another’s reporting choices. This result may be driven by the elevated sense of power of the superior due to an expanded span of control (i.e., two-subordinates report to the superior rather than one). Hannan et al. (2010) suggest that superiors derive greater utility from enforcing honesty norms when their span of control increases increasing their willingness to enforce honesty norms by setting lower thresholds.
significantly greater in the high (vs. low) vertical pay dispersion condition ($F=8.37$, $p<0.01$, one-tailed).

Interestingly, the interaction effect on subordinates’ overstatement in their initial cost reports ($OVERSTATE_i$) is only marginally significant (untabulated repeated-measure ANOVA results $F=2.85$, $p=0.10$) and peer observability does not affect $OVERSTATE_i$ significantly when vertical pay dispersion is low ($F=0.83$, $p=0.37$). This suggests that our manipulated factors have the most effect when subordinates revise their cost reports for their final submissions. To understand how subordinates revise their cost reports in reaction to our manipulations, we construct a variable, $\Delta OVERSTATE$, by taking the difference in overstatement (in %) between a subordinate’s initial cost submission and his/her final cost submission. This variable measures the change in reporting honesty, and captures the peer influence arising from observing the peer’s reporting decisions.

Figure 2 and Table 1 Panel B report the descriptive statistics for $\Delta OVERSTATE$ across experimental conditions. When vertical pay dispersion is low, the average $\Delta OVERSTATE$ is not different from zero when peer reports are not observable (-0.32%, $p=0.42$), but it is significantly negative when subordinates can observe each other’s reporting decisions (-4.60%, $p<0.01$). In the high vertical pay dispersion condition, the average $\Delta OVERSTATE$ is not significantly different from zero when peer reports are not observable (-0.15%, $p=0.72$), whereas it is significantly positive when peer reports are observable (3.93%, $p=0.01$).\footnote{When subordinates cannot observe each other’s reporting decisions, it is conceivable that subordinates will make little change in their reports between the initial and the final cost submissions.}

We now turn to $\Delta OVERSTATE$ for an alternative test of $H1a$ and $H2a$. We run a repeated-measures ANOVA with $\Delta OVERSTATE$ as the dependent variable, vertical pay dispersion and
peer observability as the between-subjects factors, and period as the within-subject factor. Results are presented in Table 3 Panel A. Similar to the pattern observed for \(\text{OVERSTATE}_f\) (Table 2 Panel A), Table 3 Panel A reveals a significant interaction between vertical pay dispersion and peer observability on \(\Delta\text{OVERSTATE}\) \((F = 4.92, p=0.03)\).\(^{13}\) Simple effects analyses, as presented in Table 3 Panel B, show that peer observability reduces cost overstatement \((F=4.12, p=0.03, \text{ one-tailed})\) in the low vertical pay dispersion condition while it marginally increases cost overstatement \((F=1.77, p=0.10, \text{ one-tailed})\) in the high vertical pay dispersion condition. Again, these results are consistent with both H1a and H2a.

**[INSERT TABLE 3 ABOUT HERE]**

Simple effect tests further suggest that when subordinates cannot observe each other’s reporting decisions, \(\Delta\text{OVERSTATE}\) does not differ between the low and high vertical pay dispersion conditions \((F=0.07, p=0.40 \text{ one-tailed})\) whereas when they can observe each other’s reporting decisions, \(\Delta\text{OVERSTATE}\) is significantly higher in the high than in the low vertical pay dispersion condition \((F=4.94, p=0.02, \text{ one-tailed})\).

**Tests of H1b and H2b**

The above analysis on \(\Delta\text{OVERSTATE}\) suggests that the subordinates revise their cost reports in different directions depending on the level of vertical pay dispersion. We next examine how subordinates’ final reporting choices are affected by their peers’ initial reporting decisions. H1b and H2b posit that when subordinates can observe their peers’ reporting decisions, the peer’s reporting honesty, or their lack of reporting honesty, will affect focal subordinates’ reporting decisions in an asymmetric manner. Specifically, we predict that when vertical pay

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\(^{13}\) We note that \(\text{DISPERSION}\) is also significant in this analysis \((F = 5.33, p=0.02)\), but the interpretation of the main effect is of little value in a disordinal interaction when the interaction term is significant (Cox 1984).
dispersion is low (high), the subordinates will be more influenced by peers who are more (less) honest than themselves.

To test H1b and H2b, we focus on the peer observability present condition, because subordinates are subject to peer influence only when they can observe each other’s reporting decisions. We subsequently construct the following regression model:

\[ \Delta \text{OVERSTATE} = \beta_1 \times \text{PMORE-HONEST} \times \text{PDIFF} + \beta_2 \times \text{PLESS-HONEST} \times \text{PDIFF} + \text{PERIOD} \]

where \( \Delta \text{OVERSTATE} \) is as defined above. Consistent with Huddart and Qu (2014), we define \( \text{PDIFF} \) as the difference in the overstatement (in %) between the peer and the focal subordinate in their initial cost reports. \( \text{PMORE-HONEST} \) is defined as 1 if \( \text{PDIFF} < 0 \), and 0 otherwise; and \( \text{PLESS-HONEST} \) is defined as 1 if \( \text{PDIFF} > 0 \), and 0 otherwise. We also include the period fixed effect (\( \text{PERIOD} \)). We estimate the above regression model for the low vertical pay dispersion condition and the high vertical pay dispersion condition, separately. Following H1b, we predict \( \beta_1 \) to be greater than \( \beta_2 \) when vertical pay dispersion is low. In comparison, we predict \( \beta_2 \) to be greater than \( \beta_1 \) when vertical pay dispersion is high (H2b).

The regression results are presented in Table 4. When vertical pay dispersion is low, the coefficient for \( \text{PMORE-HONEST} \times \text{PDIFF} \) is significantly positive (\( \beta_1 = 0.60, t = 6.60, p < 0.01 \)), but \( \text{PLESS-HONEST} \times \text{PDIFF} \) is insignificant (\( \beta_2 = 0.02, t = 0.18, p = 0.86 \)). Consistent with H1b, this result suggests that the subordinate’s final report is sensitive to his/her peer’s initial reporting honesty when the peer is more honest, but not when the peer is less honest. When vertical pay dispersion is high, we find the opposite to be the case, that is, \( \text{PLESS-HONEST} \times \text{PDIFF} \) is significant (\( \beta_2 = 0.49, t = 4.38, p < 0.01 \)), but \( \text{PMORE-HONEST} \times \text{PDIFF} \) is not (\( \beta_1 = 0.01, t = 0.07, p = 0.94 \)). This result suggests that only when the peer’s initial report is more dishonest, the subordinate follows suit and reports less honestly in his/her final report, supporting H2b.
One may argue that $PDIFF$ could be defined as the difference in dollar amount (rather than in percentage) between the peer and focal subordinates in their initial cost reports. The results (untabulated) are similar in pattern and in significance levels when we calculate $PDIFF$ and $ΔOVERSTATE$ in dollar amounts. Specifically, in low pay dispersion condition, $ΔOVERSTATE$ is only influenced by more honest peer reports ($β_1 =0.47$, $t=4.93$, $p<0.01$), but not by less honest peer reports ($β_2 =0.04$, $t=0.40$, $p=0.69$). In high pay dispersion condition, $ΔOVERSTATE$ is only influenced by less honest peer reports ($β_2 =0.29$, $t=2.48$, $p=0.01$), but not by more honest peer reports ($β_1 =0.18$, $t=1.56$, $p=0.12$). This again lends support to $H1b$ and $H2b$.

Supplemental Analyses

We conduct a few supplementary analyses to better understand our main results by examining the potential effects of strategic concerns (i.e., the anticipation of the superior’s threshold level) and some post-experimental questions (e.g., fairness concerns).

Superiors’ Threshold Decisions

Each superior makes a threshold decision ($THRESHOLD$) every period prior to receiving cost reports from the two subordinates. The threshold determines the maximum reported cost, below which a subordinate can receive funding for a proposed project. Assuming that subordinates can anticipate the threshold level imposed by their superiors, it is likely that the subordinates’ reporting decisions are also driven, at least in part, by superiors’ threshold decisions. Figure 3A and Table 5 Panel A presents the mean (and median) of $THRESHOLD$ across experimental conditions, and Figure 3B presents the average $THRESHOLD$ over the eight periods by condition. As reported, when vertical pay dispersion is low, the average
THRESHOLD is relatively lower in the presence of peer observability (mean=28.13, median=30) than in its absence (mean=30.86, median=30). When vertical pay dispersion is high, the average THRESHOLD is relatively higher in the presence of peer observability (mean=32.05, median=32) than in its absence (mean=29.34, median=30). Thus the pattern of average THRESHOLD across experimental conditions (as shown in Figure 3A) is similar to those of average OVERSTATE$_{f}$ and AOVERSTATE. Table 5 Panel B provides the repeated-measures ANOVA results on THRESHOLD.¹⁴ The interaction effect is marginally significant (F=1.99, p=0.08, one-tailed). Thus, superiors’ threshold decisions may have accounted for some of the variance in subordinates’ misreporting behaviors across experimental conditions.

[INSERT TABLE 5 ABOUT HERE]

**Post-Experimental Questions**

In the post-experiment questionnaire (PEQ), we measure subordinate participants’ perceptions of the fairness of the pay distribution between superiors and subordinates, labeled UNFAIRNESS. Participants indicate the extent to which they agree with the statement that “I felt a sense of unfairness about my pay relative to my superior (1: strongly disagree; 10: strongly agree).” Table 6 Panel A presents the mean and median values of UNFAIRNESS by experimental condition. When vertical pay dispersion is low, UNFAIRNESS is lower with peer observability than without it (mean = 2.86 versus 4.00). In contrast, when vertical pay dispersion is high, UNFAIRNESS is higher with peer observability than without it (mean = 6.25 versus 5.19). To test the difference more systematically, we conduct an ANOVA with UNFAIRNESS as the

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¹⁴ Guo et al. (2016) find that, driven by inequity aversion, superiors on average set more lenient cost thresholds when vertical dispersion is high compared to when it is low. Different from Guo et al. (2016), we do not find a main effect of DISPERSION on THRESHOLD (F=0.25, p=0.62) when subordinates cannot observe each other’s reporting decisions. One possible reason is that our design includes two (rather than one) subordinates reporting to the same superior. As suggested by Hannan et al. (2010), superiors derive greater utility for enforcing honesty norms when their span of control increases. Superiors may feel they have greater power when vertical pay dispersion is high than low, and therefore, enforce social norms more conscientiously by setting lower thresholds.
dependent variable, and vertical pay dispersion and peer observability as the independent variables. Table 6 Panel B presents the results. There is a marginally significant interaction between \textit{DISPERSION} and \textit{OBSERVABILITY} (F=2.98, p=0.09, two-tailed). This result is consistent with the findings on \textit{OVERSTATE}_f and \textit{\Delta OVERSTATE} suggesting that the salience of fairness norm may partly influence subordinates’ misreporting decisions.

[INSERT TABLE 6 ABOUT HERE]

We also ask subordinates to estimate the percentage of their peers that overstated costs (labelled \textit{OVERSTATE}_PEER\%). Specifically, subordinates respond to the question, “By your estimation, roughly what \% of your peer subordinates overstated their project costs (choose a number between 10\% and 100\%).” When vertical pay dispersion is low, \textit{OVERSTATE}_PEER\% is lower with peer observability than without it (mean = 68.57\% versus 71.88\%). In contrast, when vertical pay dispersion is high, \textit{OVERSTATE}_PEER\% is higher with peer observability than without it (mean = 75.63\% versus 56.88\%). ANOVA results (untabulated) indicate there is a significant interaction between peer observability and vertical pay dispersion (F=4.40, p=0.04, two-tailed). This pattern of results is consistent with the results reported above for \textit{OVERSTATE}_f and \textit{\Delta OVERSTATE}, suggesting subordinates’ perceptions of their peers’ reporting honesty are consistent with peers’ actual reporting behaviors.

\textbf{Project Profit Analysis}

We next examine the effect of pay dispersion and peer observability on project profit \textit{(PROFIT)}. Similar to Rankin et al. (2008), we define \textit{PROFIT} as the difference between the project revenue ($40) and the subordinate’s reported project cost; it thus captures the residual earnings a firm derives from projects that are funded. Profit receives a value of zero when the proposal is rejected. Project profit is jointly determined by both subordinates’ reporting decisions
and the superior’s *THRESHOLD* decisions. Specifically, project profit decreases with subordinates’ cost overstatement as long as the reported cost is less than the *THRESHOLD* level chosen by superiors. As shown in Table 7 Panel A, when vertical pay dispersion is low, the mean (median) of *PROFIT* is $23.28 ($24) in the absence of peer observability and is $27.61 ($30) in its presence. When vertical pay dispersion is high, the mean (median) of *PROFIT* is $28.47 ($28) in the absence of peer observability and $23.55 ($22) in its presence. Table 7 Panel B provides repeated-measures ANOVA analyses for *PROFIT*. We find a significant interaction effect between pay dispersion and peer observability on *PROFIT* (F=6.95, p=0.01). Simple effect analyses (untabulated) further suggest that when vertical pay dispersion is high, peer observability reduces *PROFIT* significantly (F=6.86, p=0.02, two-tailed), whereas when vertical pay dispersion is low, the effect of peer observability on *PROFIT* is insignificant (F=2.05, p=0.18, two-tailed).

[V. DISCUSSION

This study finds that vertical pay dispersion moderates the relation between peer observability and subordinates’ reporting honesty in a budgetary setting. We present evidence to indicate that when subordinates can observe the actual cost and the cost reports of their peers, subordinates’ reporting decisions are more sensitive to more (less) honest reporting behaviors of their peers when vertical pay dispersion is low (high). Thus, when vertical pay dispersion is low, subordinates misreport less when peer reports are observable than not observable. When vertical pay dispersion is high, subordinates report less honestly when peer observability is present than when it is absent. These results suggest that peer observability contributes to different degrees of
misreporting depending on the level of vertical pay dispersion. The supplementary analyses also suggest that our results are, at least partially, driven by subordinates’ perceptions of the honesty of their peers and perceptions of distributional fairness in pay between superiors and subordinates.

This paper contributes to the literature in several important ways. First, we identify peer observability as an important control mechanism in shaping reporting decisions. While peer observability can worsen misreporting when vertical pay dispersion is high, interestingly, it can reduce misreporting when vertical pay dispersion is low. Therefore, our findings provide a more nuanced understanding of the interaction between a firm’s incentive system and its information policy in affecting corporate budgeting culture. Second, while Guo et al. (2016) focus primarily on interaction in a superior-subordinate reporting dyad, we investigate the interplay of a reporting triad consisting of one superior and two subordinates. We extend Guo et al. (2016) by examining how both vertical and lateral social comparisons interactively affect employees’ reporting behaviors.

Our results also suggest several avenues for future research. First, we chose to examine a setting consistent with the idea of mutual monitoring. Thus, in our triad setting, subordinates are not provided opportunities to communicate with each other. In practice, such communication can be important in channeling peer influence and forming social norms. Communication among subordinates is likely to exacerbate reporting dishonesty when vertical pay dispersion is high, although we leave tests of this conjecture to future research. Second, to ensure that the superior’s objective function is comparable across experimental conditions, we limit the superior’s pay to a fixed salary only. Future research could examine how providing financial incentives to the superior would change their threshold decisions. We expect that when the superior shares project
profits, since overstatement will effectively reduce the superior’s compensation, driven by fairness concerns, the subordinates may be more motivated to misreport project costs when the vertical pay dispersion is high. Third, it would be interesting to examine how peer observability affects misreporting when there are career concerns (i.e., the subordinates desire to leave their superior a good impression in exchange for future returns such as a promotion). In such a setting, honest reporting can be driven not only by norm compliance but also by self-interest.

Notwithstanding its limitations, this study extends the budgeting literature and practice by identifying how peer observability shapes misreporting decisions depending on the level of vertical pay dispersion. We find that, in order to preserve a relatively honest reporting environment, a firm’s information (openness) policy needs to be aligned with its incentive system. When firms choose a high level of vertical pay dispersion to attract or motivate employees, they should consider carefully whether to also implement an open information policy as information openness likely compromises honesty in the firm’s reporting environment. On the other hand, when vertical pay dispersion is low, information policies that encourage information exchange among peers are likely more conducive to a more honest reporting environment. Therefore, while it is worthwhile to encourage transparency among peers when vertical pay dispersion is low, promoting it warrants caution when vertical pay dispersion is high.
References


FIGURE 1
Effect of Vertical Pay Dispersion and Peer Observability on Subordinates’ \( OVERSTATE_f \)

FIGURE 1A: Subordinates’ Average \( OVERSTATE_f \) by Condition

![Graph showing \( OVERSTATE_f \) by Condition]

FIGURE 1B: Subordinates’ \( OVERSTATE_f \) by Period and by Condition

![Graph showing \( OVERSTATE_f \) by Period and Condition]

\( OVERSTATE_f \) - Represents subordinates’ percentage of cost overstatement in their final cost submissions, calculated as (reported cost – actual cost) / (maximum cost of $40 – actual cost)

\( DISPERSION \) – Represents vertical pay dispersion, being either low ($12:$10) or high ($25:$10).

\( OBSERVABILITY \) – Represents peer observability condition (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.
FIGURE 2
Effect of Vertical Pay Dispersion and Peer Observability on Subordinates’ $\Delta OVERSTATE$

$\Delta OVERSTATE$ – Represents subordinates’ change in percentage of cost overstatement between their final and initial cost submissions within each decision period.

$DISPERSION$ – Represents vertical pay dispersion, being either low ($12:10$) or high ($25:10$).

$OBSERVABILITY$ – Represents peer observability condition (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.
FIGURE 3

Effect of Vertical Pay Dispersion and Peer Observability on Superiors’ \textit{THRESHOLD}

FIGURE 3A: Superiors’ Average \textit{THRESHOLD} by Condition

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{threshold_bar_chart.png}
\caption{Superiors’ Average \textit{THRESHOLD} by Condition}
\end{figure}

\begin{itemize}
\item \textbf{THRESHOLD} - Represents superiors’ choice of maximum threshold above which proposed projects will be rejected. It can be any whole number between 1 and 40.
\item \textbf{OVERSTATE} - Represents subordinates’ percentage of cost overstatement in their final cost submissions, calculated as (reported cost – actual cost) / (maximum cost of $40 – actual cost)
\item \textbf{DISPERSION} - Represents vertical pay dispersion, being either low ($12:$10) or high ($25:$10).
\item \textbf{OBSERVABILITY} - Represents peer observability (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.
\end{itemize}
TABLE 1
Descriptive Statistics

Panel A: Mean (Standard Deviation) and Median for Subordinates’ $OVERSTATE_f$ by Pay Dispersion and by Peer Observability

<table>
<thead>
<tr>
<th>OBSERVABILITY</th>
<th>LOW DISPERSION ($12:$10)</th>
<th>HIGH DISPERSION ($25:$10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mean (Std. Dev.)</td>
<td>37.28% (0.23)</td>
<td>28.39% (0.18)</td>
</tr>
<tr>
<td>Median</td>
<td>32.84%</td>
<td>26.97%</td>
</tr>
<tr>
<td># of Obs.</td>
<td>N = 128</td>
<td>N = 112</td>
</tr>
</tbody>
</table>

Panel B: Mean (Standard Deviation) and Median for Subordinates’ $\Delta OVERSTATE$ by Pay Dispersion and by Peer Observability

<table>
<thead>
<tr>
<th>OBSERVABILITY</th>
<th>LOW DISPERSION ($12:$10)</th>
<th>HIGH DISPERSION ($25:$10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mean (Std. Dev.)</td>
<td>-0.32% (0.04)</td>
<td>-4.60% (0.16)</td>
</tr>
<tr>
<td>Median</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td># of Obs.</td>
<td>N = 128</td>
<td>N = 112</td>
</tr>
</tbody>
</table>

$OVERSTATE_f$ - Represents subordinates’ percentage of cost overstatement in their final cost submissions, calculated as (reported cost – actual cost) / (maximum cost of $40 – actual cost).

$\Delta OVERSTATE$ - Represents subordinates’ change in percentage of cost overstatement between their final and initial cost submissions within each decision period.

DISPERSION – Represents vertical pay dispersion, being either low ($12:$10) or high ($25:$10).

OBSERVABILITY – Represents peer observability condition (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.
TABLE 2
Test of H1a & H2a – Effect of Pay Dispersion and Peer Observability on Subordinates’ OVERSTATEf

Panel A: Repeated-Measures ANOVA Results

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between-Subjects</td>
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<tr>
<td>DISPERSION</td>
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<td>DISPERSION*OBSERVABILITY</td>
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<td>7.58</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Error</td>
<td>58</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Within-Subjects</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERIOD</td>
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<td>0.12</td>
<td>5.09</td>
<td>&lt;0.01</td>
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<td>Error (PERIOD)</td>
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Panel B: Simple Effect Analyses

<table>
<thead>
<tr>
<th>Effect Description</th>
<th>F</th>
<th>p-value (one-tailed)</th>
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</thead>
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<tr>
<td>H1a: Effect of peer observability under low dispersion condition</td>
<td>2.63</td>
<td>0.06</td>
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<tr>
<td>H2a: Effect of peer observability under high dispersion condition</td>
<td>5.13</td>
<td>0.02</td>
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<td>Effect of pay dispersion under no peer observability condition</td>
<td>1.41</td>
<td>0.12</td>
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<tr>
<td>Effect of pay dispersion under peer observability condition</td>
<td>8.37</td>
<td>&lt;0.01</td>
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</table>

OVERSTATEf - Represents subordinates’ percentage of cost overstatement in their final cost submissions, calculated as (reported cost – actual cost) / (maximum cost of $40 – actual cost).

DISPERSION – Represents vertical pay dispersion, being either low ($12:$10) or high ($25:$10).

OBSERVABILITY – Represents peer observability condition (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.
### TABLE 3
Effect of Pay Dispersion and Peer Observability on Subordinates’ ΔOVERSTATE

Panel A: Repeated-Measures ANOVA Results

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>MS</th>
<th>F-value</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISPERSION</td>
<td>1</td>
<td>0.23</td>
<td>5.33</td>
<td>0.02</td>
</tr>
<tr>
<td>OBSERVABILITY</td>
<td>1</td>
<td>&lt;0.01</td>
<td>0.00</td>
<td>0.96</td>
</tr>
<tr>
<td><strong>DISPERSION*OBSERVABILITY</strong></td>
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<td>0.22</td>
<td>4.92</td>
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</tr>
<tr>
<td>Error</td>
<td>58</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERIOD</td>
<td>7</td>
<td>0.02</td>
<td>1.24</td>
<td>0.28</td>
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<tr>
<td><em><em>PERIOD</em> DISPERSION</em>*</td>
<td>7</td>
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<td>0.34</td>
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<tr>
<td><strong>PERIOD<em>DISP</em>OBSERV</strong></td>
<td>7</td>
<td>0.01</td>
<td>0.51</td>
<td>0.83</td>
</tr>
<tr>
<td>Error (PERIOD)</td>
<td>406</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel B: Simple Effect Analyses

<table>
<thead>
<tr>
<th>H1b: Effect of peer observability under low dispersion condition</th>
<th>F</th>
<th>p-value (one-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.12</td>
<td>0.03</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H2b: Effect of peer observability under high dispersion condition</th>
<th>F</th>
<th>p-value (one-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.77</td>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>

Effect of pay dispersion under no-peer-observability condition | F    | p-value (one-tailed) |
| 0.07                                                             | 0.40 |

Effect of pay dispersion under peer-observability condition | F    | p-value (one-tailed) |
| 4.94                                                             | 0.02 |

ΔOVERSTATE - Represents subordinates’ change in percentage of cost overstatement between their final and initial cost submissions within each decision period.

DISPERSION – Represents vertical pay dispersion, being either low ($12:$10) or high ($25:$10).

OBSERVABILITY – Represents peer observability condition (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.
### TABLE 4

Test of H1b & H2b: Asymmetric Effect of Peer (Dis)Honesty on Subordinates’ \( \Delta OVERSTATE \)

Regression Results under Peer-Observability Conditions: t-value (p-value) and Standardized Coefficient

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>H1b Low Pay Dispersion ($12:$10)</th>
<th>H2b High Pay Dispersion ($25:$10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t-value (p-value) Standardized Coefficient</td>
<td>t-value (p-value) Standardized Coefficient</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.35 (0.73) 0.98 (0.33)</td>
<td></td>
</tr>
<tr>
<td>PMORE-HONEST* PDIFF</td>
<td>6.60 (&lt;0.01) 0.60</td>
<td></td>
</tr>
<tr>
<td>PLESS-HONEST* PDIFF</td>
<td>0.18 (0.86) 0.02</td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>&lt;1.07 (&gt;0.28) &lt;0.11</td>
<td>&lt;1.20 (&gt;0.23) &lt;0.13</td>
</tr>
<tr>
<td>Number of observations</td>
<td>N=112</td>
<td>N=128</td>
</tr>
</tbody>
</table>

\( \Delta OVERSTATE \) – Represents the difference in overstatement between a subordinate’s final and initial cost submissions.

Period Dummy Variables – Represent seven dummy variables that are coded as 1 if it is Period 2, Period 3, Period 4, Period 5, Period 6, Period 7 and Period 8, respectively, and 0 otherwise.

PDIFF – Represents the OVERSTATE difference between the peer and the focal subordinate’s initial cost submission.

PMORE-HONEST: dummy variable; it equals 1 when peer is more honest than the focal subordinate in the initial cost submission, and 0 otherwise.

PLESS-HONEST: dummy variable; it equals 1 when peer is less honest than the focal subordinate in the initial cost submission, and 0 otherwise.
TABLE 5
Effect of Pay Dispersion and Peer Observability on Superiors’ \textit{Threshold}

Panel A: Mean (Standard Deviation) and Median - \textit{Threshold}

<table>
<thead>
<tr>
<th></th>
<th>\textit{LOW DISPERSION}</th>
<th></th>
<th>\textit{HIGH DISPERSION}</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>\textit{($12:$10)}</td>
<td></td>
<td>\textit{($25:$10)}</td>
<td></td>
</tr>
<tr>
<td>\textit{OBSERVABILITY}</td>
<td>\textit{No}</td>
<td>\textit{Yes}</td>
<td>\textit{No}</td>
<td>\textit{Yes}</td>
</tr>
<tr>
<td>Mean</td>
<td>30.86 (7.17)</td>
<td>28.13 (5.66)</td>
<td>29.34 (5.43)</td>
<td>32.05 (5.48)</td>
</tr>
<tr>
<td>(Std. Dev.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td># of Obs.</td>
<td>N = 64</td>
<td>N = 56</td>
<td>N = 64</td>
<td>N = 64</td>
</tr>
</tbody>
</table>

Panel B: Repeated-Measures ANOVA Results - \textit{Threshold}

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>\textit{p-value} (one-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between-Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\textit{DISPERSION}</td>
<td>1</td>
<td>89.45</td>
<td>0.39</td>
<td>0.27</td>
</tr>
<tr>
<td>\textit{OBSERVABILITY}</td>
<td>1</td>
<td>0.02</td>
<td>0.00</td>
<td>0.50</td>
</tr>
<tr>
<td>\textit{DISPERSION} \times \textit{OBSERVABILITY}</td>
<td>1</td>
<td>456.75</td>
<td>1.99</td>
<td>0.08</td>
</tr>
<tr>
<td>Error</td>
<td>27</td>
<td>229.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within-Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\textit{PERIOD}</td>
<td>7</td>
<td>9.01</td>
<td>0.75</td>
<td>0.31</td>
</tr>
<tr>
<td>\textit{PERIOD} \times \textit{DISPERSION}</td>
<td>7</td>
<td>15.13</td>
<td>1.26</td>
<td>0.14</td>
</tr>
<tr>
<td>\textit{PERIOD} \times \textit{OBSERVABILITY}</td>
<td>7</td>
<td>10.50</td>
<td>0.88</td>
<td>0.26</td>
</tr>
<tr>
<td>\textit{PERIOD} \times \textit{DISP} \times \textit{OBSERV}</td>
<td>7</td>
<td>6.39</td>
<td>0.53</td>
<td>0.40</td>
</tr>
<tr>
<td>Error (\textit{PERIOD})</td>
<td>189</td>
<td>11.98</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textit{Threshold} - Represents superiors’ choice of maximum threshold above which proposed projects will be rejected. It can be any whole number between 1 and 40.
\textit{Dispersion} – Represents vertical pay dispersion, being either low ($12:$10) or high ($25:$10).
\textit{Observability} – Represents peer observability condition (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.
TABLE 6
Analysis of Variance on Subordinates’ Perceived UNFAIRNESS

Panel A: Mean (Standard Deviation) and Median - UNFAIRNESS

<table>
<thead>
<tr>
<th>OBSERVABILITY</th>
<th>LOW DISPERSION ($12:$10)</th>
<th>HIGH DISPERSION ($25:$10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mean (Std. Dev.)</td>
<td>4.00</td>
<td>2.86</td>
</tr>
<tr>
<td>Median</td>
<td>3.50</td>
<td>2.00</td>
</tr>
<tr>
<td># of Obs.</td>
<td>N = 16</td>
<td>N = 14</td>
</tr>
</tbody>
</table>

Panel B: ANOVA Results for perceived UNFAIRNESS

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPERSION</td>
<td>81.02</td>
<td>1</td>
<td>81.02</td>
<td>12.87</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>OBSERVABILITY</td>
<td>0.02</td>
<td>1</td>
<td>0.02</td>
<td>0.00</td>
<td>0.95</td>
</tr>
<tr>
<td>DISPERSION*OBSERVABLE</td>
<td>18.78</td>
<td>1</td>
<td>18.78</td>
<td>2.98</td>
<td>0.09</td>
</tr>
<tr>
<td>Error</td>
<td>2.48</td>
<td>58</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UNFAIRNESS – Represents subordinate’s distributional fairness concerns, which is measured by subordinate’s response to the statement of “I felt a sense of unfairness about my pay relative to my superior (1: strongly disagree; 10: strongly agree).”

DISPERSION – Represents vertical pay dispersion, being either low ($12:$10) or high ($25:$10).

OBSERVABILITY – Represents peer observability condition (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.
### TABLE 7
Effect of Pay Dispersion and Peer Observability on PROFIT

**Panel A: Mean (Standard Deviation) and Median - PROFIT**

<table>
<thead>
<tr>
<th>OBSERVABILITY</th>
<th>LOW DISPERSION ($12:$10)</th>
<th>HIGH DISPERSION ($25:$10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mean</td>
<td>23.28</td>
<td>27.61</td>
</tr>
<tr>
<td>(Std. Dev.)</td>
<td>(16.55)</td>
<td>(19.93)</td>
</tr>
<tr>
<td>Median</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td># of Obs.</td>
<td>N = 64</td>
<td>N = 56</td>
</tr>
</tbody>
</table>

**Panel B: Repeated-Measures ANOVA Results**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>p-value (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between-Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISPERSION</td>
<td>1</td>
<td>19.63</td>
<td>0.10</td>
<td>0.75</td>
</tr>
<tr>
<td>OBSERVABILITY</td>
<td>1</td>
<td>5.49</td>
<td>0.03</td>
<td>0.87</td>
</tr>
<tr>
<td>DISPERSION*OBSERVABILITY</td>
<td>1</td>
<td>1321.16</td>
<td>6.95</td>
<td>0.01</td>
</tr>
<tr>
<td>Error</td>
<td>27</td>
<td>189.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within-Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERIOD</td>
<td>7</td>
<td>6518.45</td>
<td>47.99</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>PERIOD* DISPERSION</td>
<td>7</td>
<td>52.12</td>
<td>0.38</td>
<td>0.91</td>
</tr>
<tr>
<td>PERIOD*OBSERVABILITY</td>
<td>7</td>
<td>47.97</td>
<td>0.35</td>
<td>0.93</td>
</tr>
<tr>
<td>PERIOD<em>DISP</em>OBSERV</td>
<td>7</td>
<td>176.44</td>
<td>1.30</td>
<td>0.25</td>
</tr>
<tr>
<td>Error (PERIOD)</td>
<td>189</td>
<td>135.82</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PROFIT** – Represents the project profit generated from both subordinates of the same firm. For each project, it is the total project profits (i.e., $40 of revenue minus project cost as reported by the subordinate in his/her final submission) from both subordinates reporting to the same superior.

**DISPERSION** – Represents vertical pay dispersion, being either low ($12:$10) or high ($25:$10).

**OBSERVABILITY** – Represents peer observability condition (i.e., whether subordinates could observe their peers’ actual cost and cost reports), being either absent or present.