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## The Effect of Combining Partial RPI on Performance

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# **The Effect of Combining Partial RPI on Performance**

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## **Abstract**

This study examines the effect of combining partial relative performance information (RPI) on performance. Prior research has assumed that the same information is provided to everyone as an RPI. Theoretically, the appropriate RPI for feedback varies among employees. Our study demonstrates that providing feedback on the top three performers results in above-median performers increasing their performance, while below-median performers decreasing their performance. The results suggest the importance of providing appropriate feedback to employee situations.

## **Keywords**

relative performance information, feedback, peer group, laboratory experiment

# 1 Introduction

Many organizations provide employees with feedback on their performance relative to their peers (Kramer et al., 2016). For example, organizations may publicly disclose the performance of their salespeople, enabling them to learn about their peers' revenues and profits. This type of feedback is referred to as relative performance information (RPI), and according to social comparison theory, RPI feedback fosters competition and enhances employee performance (Festinger, 1954; Holderness et al., 2020; Tafkov, 2013, pp. 327–350).

Accounting research has demonstrated that RPI enhances employee performance. For instance, RPI feedback improves performance even in the absence of relative performance evaluation (RPE) (Frederickson, 1992; Hannan et al., 2008,). Furthermore, whether private or public, RPI feedback enhances performance (Tafkov, 2013). However, prior literature has found that utilizing RPI in the workplace makes it challenging to simultaneously motivate both high and low performers (Casas-Arce & MartinezJerez, 2009; Berger et al., 2013). The challenge arises because methods that motivate high performers may discourage low performers and vice versa. This is likely due to the perception of unfair competition or indifference to competition, which demotivates individuals when they perceive no opportunity to compete or win against others (Hannan et al., 2008).

We aim to examine whether providing feedback to a portion of the RPI on such issues can prevent a apathy and boost motivation. Instead of providing feedback to all other colleagues, we test the effect of providing a portion of the RPI, removing harmful elements. For high performers (low performers), only the information that motivated them is provided. The central question is: how does RPI that motivates high performers differ from RPI that motivates low performers? Prior research suggests that individuals prefer social comparison in situations that are perceived as fair competition (Hannan et al., 2008). However, they may become demotivated if they perceive competition with different people. Thus, we hypothesize that high performers are motivated by feedback on the performance of other high performers, while low performers are motivated by feedback on the performance of other low performers.

This study categorizes RPI into three types—median, top three performance, and bottom three performance—and tests the effects of combining these partial RPI through laboratory experiments. We focus on this classification because representative values, such as the median and mean, and ranking information, such as the top and bottom, are commonly used as RPI. Regarding high performers, the performance of the top three performers is beneficial; however, the performance of the bottom three performers is detrimental. The median has the effect of an external “carrot and stick”

(a mechanism used to motivate an individual), depending on an individual's standing. Concerning above-median performers, the median performance acts as a "stick" benchmark that keeps them below it, while for those below the median, it acts as a "carrot" that keeps them above it. Thus, for above-median performers, providing RPI on the top three (bottom three) performance, in addition to median performance, is expected to improve (decrease) performance. Conversely, for below-median performers, providing RPI on the bottom three (top three) performances, in addition to median performance, is expected to improve (decrease) performance.

Analyzing this situation through laboratory experiments has the following significance. If the impact on performance is observed when only a portion of the RPI is provided, additional insight into the impact of RPI on performance can be gained. In practice, this depends on whether a portion of the RPI can be formally provided by the company. Some companies establish such a system through their information systems, whereas others find it difficult. Even where this is challenging, informal feedback from supervisors is possible, and the information can be adjusted subjectively. However, it is difficult to obtain data from actual companies to control for individual subjectivity and verify its effects. Therefore, it is worthwhile to analyze these data using laboratory experiments.

We use a 2×3 experimental design, considering employees' rank within the peer group (above-or below-median) and RPI (median, top three, and median, bottom three, and median). The following conclusions are drawn: First, providing the top three and median peer performances as RPI improves performance for above-median employees, whereas providing the bottom three and median reduces their performance. Second, providing the top three and median peer performance as RPI decreases performance for below median employees, while providing the bottom three and median has no effect. These results suggest that the effectiveness of RPI in enhancing performance depends on the combination of RPI and employee rank in peer groups.

Our study contributes to RPI literature in two ways. First, while previous research has primarily focused on situations where a single piece of information, such as the median, mean, or rank, serves as the RPI, our study focuses on cases where multiple pieces of information are used as RPI. We extend this study by demonstrating that multiple types of information affect motivation. Second, our study reveals a performance feedback mechanism that enhances the performance of above-median employees. While studies have shown that RPI does not enhance the performance of above-median employees, our study demonstrates that performance improvement can be achieved by improving the performance of top employees.

The remainder of the paper is organized as follows: Section 2 develops the hypotheses. Section 3 describes the experiment, Section 4 presents the results, and Section 5 presents the concluding

remarks.

## 2 Previous Research and Hypotheses

### 2.1 Previous Research

According to social comparison theory, individuals compare themselves with others to maintain a positive self-image (Festinger, 1954). This comparison, known as social comparison, can induce a sense of competition that motivates individuals to outperform their peers, allowing RPI feedback to induce employee effort without requiring monetary incentives, as observed in RPE and tournaments (Kramer et al., 2016; Newman et al., 2022). However, efforts inducing social comparison may not occur if the abilities or environment of the peer group differ significantly from those of the individual (Frederickson, 1992; Hannan et al., 2008). Therefore, peer groups should comprise individuals with similar abilities and environments.

Previous research has examined whether RPI feedback improves employee performance (Schnieder, 2022). One stream of research examines whether differences in reward systems influence the effects of RPI on employee performance. For example, Frederickson (1992) found that RPI feedback increases employee effort, with a more significant effect when rewards are based on RPE rather than individual performance. Tafkov (2013) found that RPI feedback increases employee effort, even in fixed-wage contracts. Newman and Tafkov (2014) compared the RPI effect in two tournaments: one where winners received prizes (reward tournament) and another where winners received rewards and the lowest performers received penalties (reward-penalty tournament). Their analysis demonstrated that RPI feedback reduced performance in reward tournaments but improved performance in reward-penalty tournaments.

Another stream of research has focused on the effects of RPI characteristics on performance. These characteristics include attributes such as the type of RPI feedback provided and how it is provided. For example, Tafkov (2013) examined RPI publicity and found that public RPI leads to higher performance than private RPI, regardless of whether the compensation contract is fixed or performance-based. Murthy and Schafer (2011) and Kramer et al. (2016) explored the effects of the wording and framing of the RPI.

One of the most important characteristics of RPI is its type, which varies across studies (Schnieder, 2022). Some studies employed rank information on peer group performance as their RPI (Hannan et al., 2013; Chan, 2018; Yatsenko, 2022; Daly & Yatsenko, 2023), whereas others used statistical information on peer group performance (e.g., average performance or quartile

performance) as RPI (Frederickson, 1992; Brown et al., 2014; Newman et al., 2022,). Despite the various types of RPI, there is a paucity of research that has examined the impact of different types of RPIs on firm performance. (Hannan et al., 2008; Eyring & Narayanan, 2018). Hannan et al. (2008) examined how RPI information precision affects performance and demonstrated that coarse RPI improves employee performance more than precise RPI. Eyring and Narayanan (2018) also conducted a field experiment to test the performance of different reference points, comparing the median performance of the peer group as an RPI with that of another reference point. However, their findings indicated no discernible difference in performance outcomes between the two reference points. This paucity of research highlights the need for further investigation into the effectiveness of different RPI types on employee performance.

This study examines the impact of providing RPI within a peer group, focusing on a combination of three types of peer performance: median performance, top three performance, and bottom three performance. While providing “partial” ranking information, such as the top three or bottom three, is common, prior research has not examined its effects. We hypothesize that firms’ selection and provision of feedback on the performance of specific peers elicits more social comparisons among employees than providing feedback on all peers. Some studies indicate that when low performers receive performance information from high performers, their performance decreases, and vice versa (Hannan et al., 2008; Casas-Arce & Martinez-Jerez, 2009). The RPI, which is constructed by all peers, contains information that mitigates social comparisons among employees. Consequently, RPI constructed by partial peers can enhance social comparisons among employees. In the subsequent sections, we propose hypotheses regarding the effects of these different combinations of performance information on employee performance.

## 2.2 Hypotheses Development

According to social comparison theory, individuals who receive RPI are motivated through social comparison to develop a sense of competition, thereby prompting them to exert effort. However, individuals are not necessarily motivated by social comparison regardless of whom they compare themselves to. Theoretically, comparisons with superior individuals or environments are termed “upward comparison,” while comparisons with inferior individuals or environments are termed “downward comparison.” Slightly upward comparisons have been shown to stimulate a competitive drive to outperform others (Eyring & Narayanan, 2018). However, extreme upward comparisons may lead individuals to perceive that surpassing their competitors is unattainable, potentially resulting in abandonment of their efforts. This suggests that providing an RPI that encourages slight upward comparisons may stimulate employees’ competitive spirit, prompting

them to exert greater effort. Conversely, extreme downward comparisons may diminish effort as individuals may perceive that surpassing competitors is effortless without exerting themselves.

In the context of external motivation, the use of both “carrots and sticks” has been demonstrated to be effective (deCharms, 1968). Individuals who perceive reaching the top as impossible tend to withdraw effort in reward tournaments but strive to avoid penalties in reward and penalty tournaments (Newman & Tafkov, 2014). A similar dynamic emerges when applied to social comparisons. In this context, upward comparisons serve as “carrots,” incentivizing individuals to strive for excellence, whereas downward comparisons act as “sticks,” discouraging underperformance. Benchmarks, whether established through upward or downward comparisons, significantly influence individuals’ motivation. Extreme forms of upward or downward comparison can elicit perceptions of unfair competition, thereby undermining individuals’ efforts. Consequently, providing feedback with minor upward or downward comparisons may effectively encourage individual effort.

In this study, we focus on three types of RPI: the median, top three, and bottom three. Whether an individual makes a slight upward or downward comparison depends on their relative position in the peer group. The upper tier of peers represent a slight upward comparison for high performers but an extreme upward comparison for low performers. Similarly, the lower tier of peers represents an extreme downward comparison for high performers but a slight downward comparison for low performers. The median represents a downward comparison for high performers and an upward comparison for low performers.

If the median RPI is provided as feedback to high performers, it functions as a benchmark. Consequently, high performers are likely to avoid falling below the median. However, since this approach provides only the “stick” in the carrot and stick” framework, the incentive can be strengthened by providing the “carrot.” Therefore, for high performers, providing additional feedback on the performance of the top three performers would elicit more effort than providing feedback solely on the median RPI. Conversely, providing supplementary feedback to high performers regarding the performance of the bottom-three performers, in addition to the median RPI, can induce a decline in performance. This is because the performance of the bottom three performers may function as an anchor, leading to extreme downward comparisons. Thus, the above discussion leads to the following hypotheses.

H1a: Providing feedback on the median and top three performances leads to higher performance for above-median performers than for median performers.

H1b: Providing feedback on the median and bottom three performances leads to lower performance for above-median performers than for the median performance.

Conversely, the median RPI functions as a motivator for low performers, prompting them to exceed the median. However, the incentive can be strengthened by providing not only “carrots” but also “sticks.” Therefore, for low performers, providing additional feedback on the performance of the bottom-three performers elicits greater effort than providing feedback solely on the median RPI. By contrast, providing low performers with additional feedback on the performance of the top three performers, in addition to the median RPI, may result in a decline in performance. This is because the top three performers serve as anchors, leading to extreme upward comparisons.

H2a: Providing feedback on the median and top three performances leads to lower performance for below-median performers than for median performers.

H2b: Providing feedback on the median and bottom three performances leads to higher performance for below-median performers than for the median performance.

## 3 Experimental Design

### 3.1 Participants and Experimental Procedure

Similar to previous studies on RPI (Hannan et al., 2008; Holderness et al., 2020, pp. 137–158; Newman & Tafkov, 2014), we tested our hypotheses through a laboratory experiment. The experiment was conducted at a Japanese university between February 2023 and January 2025 in 12 sessions. The participants comprised 132 undergraduate students: 55 males, 76 females, and one student who did not disclose their sex. The mean age of the participants was 19.6 years, and compensation for participation was a fixed payment of JPY 2,000 (approximately USD 14).

In this experiment, participants performed tasks on a computer. The procedures were as follows. First, participants were briefed on the experiment, including instructions, privacy policies, and informed consent. Students who understood and agreed to participate in the experiment were required to complete and submit the informed consent forms. Those who submitted their consent forms received a booklet outlining the rules of the task, which they were asked to read for approximately 10 min. A comprehension test was then administered to assess their understanding of



the task rules, and the test continued until all the questions were answered correctly. Once all the participants completed the comprehension test, they completed a practice round for the experimental task. Subsequently, the main experimental rounds began. Upon completing the main rounds, individual trait and cognitive questions were administered. Finally, compensation was provided, and a debriefing session was conducted to conclude the experiment.

### 3.2. Experimental Task

This experimental task was based on the decision-making task in Sprinkle (2000) and involved predicting product demand and determining production quantity to maximize profit points. This task captured participants' learning and growth and has been used in previous RPI research (Hannan et al., 2008; Holderness et al., 2020). The experiment comprised 12 rounds, and in each round, participants made five production quantity decisions (i.e., 60 decisions in total). The total profit from the five decisions in each round represents the profit point for that round. The relationships among demand, production quantity, and profit are shown in Figure 1. The time limit for each round was 180 s, and the time remaining at the end of the fifth decision in each round was the time point. The points that the participants could earn in a round included the profit and time points, with higher scores achieved through faster and more appropriate decisions.

Participants were unaware of the current demand but knew that demand was randomly determined at the start of each round and remained constant within that round. Therefore, the results of previous decisions in the round were valuable for estimating demand. They could choose to view the results after each decision, except for the fifth decision. If they chose to view the results, the combination of decision-making and profit points up to that stage in the round was displayed for 10 s. If they opted not to view the results, they could immediately proceed to the subsequent decision-making. Thus, viewing the results meant sacrificing 10 time points to gain useful information for estimating the current round's demand and earning higher profit points. Consequently, the participants had to learn when to view the results and when to forgo to maximize their total points (profit and time points) throughout the round.

Figure 1

Profit from Each Combination of Output Quantity and Profit Function Output Quantity Choice

| Profit Function | 1 | 2 | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19  | 20  |
|-----------------|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|
| 1               | 5 | 0 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 2               | 5 | 5 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 3               | 5 | 5 | 10 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 4               | 5 | 5 | 10 | 20 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 5               | 5 | 5 | 10 | 20 | 20 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 6               | 5 | 5 | 10 | 20 | 20 | 30 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 7               | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 8               | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 9               | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 10              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 11              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 12              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 13              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 60 | 0  | 0  | 0  | 0  | 0  | 0   | 0   |
| 14              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 60 | 80 | 0  | 0  | 0  | 0  | 0   | 0   |
| 15              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 60 | 80 | 80 | 0  | 0  | 0  | 0   | 0   |
| 16              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 60 | 80 | 80 | 95 | 0  | 0  | 0   | 0   |
| 17              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 60 | 80 | 80 | 95 | 95 | 0  | 0   | 0   |
| 18              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 60 | 80 | 80 | 95 | 95 | 95 | 0   | 0   |
| 19              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 60 | 80 | 80 | 95 | 95 | 95 | 100 | 0   |
| 20              | 5 | 5 | 10 | 20 | 20 | 30 | 30 | 30 | 45 | 45 | 60 | 60 | 60 | 80 | 80 | 95 | 95 | 95 | 100 | 100 |

### 3.3 Feedback Information

After making five decisions in each round, the participants received feedback on their performance, which included production quantity, profit points chosen in the five decisions, and points earned (profit, time, and total points) in the current round. This information was displayed on a computer screen for 15 s and did not affect the time constraints.

After individual performance feedback, RPI feedback was provided during rounds 3, 6, 9, and 12. In the median feedback group, participants were informed of the cumulative points earned in that round and the median of those in the same session. In the median and top three feedback groups (median and bottom three groups), participants were informed of the cumulative total points earned by that round and the median and top three (bottom three) of those in the same session. The RPI feedback duration was 15 s, which did not affect the time constraints.

### 3.4 Questionnaire Items

The participants were asked to answer the following questions after completing the experimental task. Regarding personal attributes, we inquired about participants' gender and age (Holderness et al., 2020). Concerning motivation, we asked two questions: "I enjoyed the current experimental task" and "If we were to participate in the same experiment again in the future, we

believe we would enjoy the current experimental task.” Regarding a sense of competition, we asked a single item: “I felt competitive during the current experimental task” (Black et al., 2019). Need for cognition, defined by Cacioppo and Petty (1982) as an individual’s intrinsic tendency to engage in and enjoy effortful cognitive activities, was assessed using a 15-item questionnaire. Given that the task involved learning and adjusting optimal behaviors, participants’ cognitive needs may have influenced their performance, which justifies the inclusion of these questionnaire items.

## 4 Analysis and Results

### 4.1. Regression Model and Variables

This study tests the hypothesis using multiple regression analysis based on Equation (1). The subscript  $i$  in Equation (1) denotes individual participants, whereas the dependent variable represents their performance. The experimental tasks used in this study are designed to capture learning and growth. Following Hannan et al. (2008), we measure performance in two ways. First, performance is assessed by determining whether a participant’s performance is high, calculated using the cumulative profit points earned in rounds 4 to 12 ( $Perform_i$ ). Second, performance improvement through learning is calculated as the difference between the cumulative profit points in rounds 10 to 12 and rounds 1 to 3 ( $\Delta Perform_i$ ).  $TopFB$  represents a dummy variable that assumes a value of one if the median and top three performances of the peer group are provided as RPI and zero otherwise.  $BottomFB$  represents a dummy variable that assumes a value of one if the median and bottom three performances of the peer group are provided as RPI and zero otherwise.  $Q1Perform$  denotes a variable representing the first-quarter performance, which is the cumulative profit points earned over rounds 1 to 3.  $Woman$  represents a dummy variable that assumes a value of one if the participant identifies as female and zero otherwise.  $NoAnswer$  denotes a dummy variable that takes a value of one if the response to the sex question is "prefer not to answer" and zero otherwise.  $Age$  denotes a variable representing the participants’ age.  $NFC$  refers to the average value of questionnaire items related to the need for cognition.

$$\begin{aligned}
 Perform_i \text{ or } \Delta Perform_i & & (1) \\
 &= \beta_0 + \beta_1 TopFB_i + \beta_2 BottomFB_i + \beta_3 Q1Perform_i + \beta_4 Woman_i \\
 &\quad + \beta_5 NoAnswer_i + \beta_6 Age_i + \beta_7 NFC_i + \varepsilon_i
 \end{aligned}$$

In the actual analysis, participants were divided into two subsamples, and Equation (1) was estimated. The subsamples were based on whether the cumulative profit points at the conclusion of round 3 were above or below the median of the participants in the same session. In the subsample with above-median performance, if  $TopFB$  ( $BottomFB$ ) is statistically positive (negative) and

significant, H1a (H1b) is supported. Conversely, in the subsample with below-median performance, if *TopFB* (*BottomFB*) is statistically negative (positive) and significant, H2a (H2b) is supported.

#### 4.2. Descriptive Statistics

Table 1 presents the descriptive statistics of the variables used in this analysis. Concerning the conditions, “Median FB” refers to the group that received feedback only on the median performance, “Top FB” represents the group that received feedback on both the median and the top three performers (*TopFB* = 1), and “Bottom FB” corresponds to the group that received feedback on both the median and the bottom three performers (*BottomFB* = 1).

Table1: Descriptive Statistics

|                         | <b><u>Median FB</u></b> | <b><u>Top FB</u></b> | <b><u>Bottom FB</u></b> |
|-------------------------|-------------------------|----------------------|-------------------------|
| <i>Perform</i>          | 1808.91<br>(181.50)     | 1762.67<br>(230.50)  | 1812.50<br>(180.56)     |
| $\Delta$ <i>Perform</i> | 73.73<br>(104.42)       | 25.35<br>(34.41)     | 87.94<br>(94.04)        |
| <i>Q1Perform</i>        | 682.18<br>(114.03)      | 655.70<br>(117.63)   | 670.59<br>(89.42)       |
| <i>Age</i>              | 19.89<br>(1.95)         | 19.58<br>(1.29)      | 19.14<br>(1.35)         |
| <i>NFC</i>              | 4.52<br>(0.85)          | 4.50<br>(0.99)       | 4.62<br>(0.78)          |
| Sex: Male               | 23<br>(42%)             | 18<br>(42%)          | 14<br>(41%)             |
| Sex: Female             | 31<br>(56%)             | 25<br>(58%)          | 20<br>(59%)             |
| Sex: No Answer          | 1<br>(2%)               | 0<br>(0%)            | 0<br>(0%)               |
| n                       | 55                      | 43                   | 34                      |

*Perform* represents the cumulative profit points over 4 to 12 rounds.  $\Delta$ *Perform* is calculated as the difference between the cumulative profit points in rounds 10 to 12 and rounds 1 to 3. *Q1Perform* represents the cumulative profit points over 1 to 3 rounds. The mean values (standard deviations) for each variable, profit points, total points, age, and motivation, are presented. Gender is represented by real numbers (percentages) in the responses of each group.

*Perform* represents the cumulative profit points over rounds 4 to 12.  $\Delta$ *Perform* is calculated as the difference between the cumulative profit points in rounds 10 to 12 and rounds 1 to 3. *Q1Perform* represents the cumulative profit points over rounds 1 to 3. The mean values (standard deviations) for each variable, profit points, total points, age, and motivation, are presented. Sex is represented by real numbers (percentages) based on the responses from each group.

### 4.3. Regression Results

Prior to estimating Equation (1), the random assignment of the sample estimating Equation (2) was verified, and the results are presented in Table 2. *Q1Perform* represents performance prior to receiving RPI feedback. Therefore, if *TopFB* and *BottomFB* do not significantly influence *Q1Perform*, it can be inferred that the samples are unbiased across different RPI feedback conditions. The coefficient of *Woman* was found to be significantly negative, whereas the coefficients of *TopFB* and *BottomFB* were not statistically significant. Given the absence of gender bias in subject assignments across different RPI types, no issues were identified with the subject assignments.

$$Q1Perform_i = \beta_0 + \beta_1 TopFB_i + \beta_2 BottomFB_i + \beta_3 Woman_i + \beta_4 NoAnswer_i + \beta_5 Age_i + \beta_6 NFC_i + \varepsilon_i \quad (2)$$

Table 3 presents the estimation results of Equations (1). For the above-median performance sample, neither *TopFB* nor *BottomFB* significantly affected the *Perform*. These results indicate no difference in performance between those who received only the median performance of their peer group and those who received additional peer performance. For the above-median performance sample, *TopFB* had a positive significant effect on  $\Delta Perform$  ( $\beta_1=38.95$ ,  $p < 0.1$ ); however, *BottomFB* had no significant effect. This result suggests that the performance improvement of participants who received the median and top three performances of the peer group was higher than that of those who received only the median. These results imply that high performers who received the top three RPI were motivated by the RPI. However, no difference was observed in performance improvement between those who received only the median performance of the peer group and the bottom three performances. These results suggest that H1a is partially supported and H1b is not supported.

Table 2. Estimation results of Equation (3)

|                 | <i>Q1Perform</i>   |                |
|-----------------|--------------------|----------------|
|                 | <u>coefficient</u> | <u>Std err</u> |
| Intercept       | 755.44***          | (126.16)       |
| <i>TopFB</i>    | -27.02             | (21.95)        |
| <i>BottomFB</i> | -17.11             | (23.86)        |
| <i>Woman</i>    | -41.41***          | (19.23)        |
| <i>NoAnswer</i> | 27.82              | (109.30)       |
| <i>Age</i>      | -6.84              | (5.92)         |
| <i>NFC</i>      | 18.96**            | (10.84)        |
| N               | 132                |                |
| Adj.R2          | 0.039              |                |

\*, \*\*, and \*\*\*\* mean significant at the 10%, 5%, and 1% levels, respectively.

In Equation (1), for the below-median performance sample, *TopFB* had a negative significant effect ( $\beta_1 = -129.24, p < 0.05$ ) on *Perform*; however, *BottomFB* had no significant effect. Additionally, for the below-median performance sample, *TopFB* had a negative significant effect ( $\beta_1 = -67.34, p < 0.05$ ) on performance improvement ( $\Delta Perform$ ); nonetheless, *BottomFB* had no significant effect. These results suggest that participants who received the median and top three performances of the peer group exhibited lower performance and performance improvement than those who received only the median. These results imply that RPI feedback promoting extreme upward comparisons can discourage employee effort. However, no difference was observed in performance and performance improvement between those who received only the median performance of the peer group and those who received the median and bottom three performances. These results support H2a but not H2b.

Table 3. Estimation results of Equation (1).

|                    | <u>Above-median</u>     |                       | <u>Below-median</u>  |                     |
|--------------------|-------------------------|-----------------------|----------------------|---------------------|
|                    | <u>Perform</u>          | <u>ΔPerform</u>       | <u>Perform</u>       | <u>ΔPerform</u>     |
| Intercept          | 1,543.07***<br>[413.68] | 544.57***<br>[187.95] | 753.51*<br>[396.99]  | 99.61<br>[210.77]   |
| <i>TopFB</i>       | 60.91<br>[47.97]        | 38.95*<br>[21.79]     | -129.24**<br>[60.54] | -67.34**<br>[32.14] |
| <i>BottomFB</i>    | 74.52<br>[51.23]        | 29.06<br>[23.31]      | -12.71<br>[70.11]    | -15.37<br>[37.22]   |
| <i>Q1Perform</i>   | 1.06***<br>[0.31]       | -0.41***<br>[0.14]    | 1.15***<br>[0.41]    | -0.27<br>[0.22]     |
| <i>Woman</i>       | 20.41<br>[45.32]        | 11.49<br>[20.59]      | -5.94<br>[58.22]     | -6.80<br>[30.91]    |
| <i>NoAnswer</i>    | 151.95<br>[156.02]      | 43.11<br>[70.88]      |                      |                     |
| <i>Age</i>         | -23.94<br>[18.14]       | -12.65<br>[8.24]      | 30.06*<br>[16.41]    | 14.47<br>[8.71]     |
| <i>NFC</i>         | -13.12<br>[24.74]       | 4.13<br>[11.24]       | -58.13<br>[35.29]    | -15.72<br>[18.74]   |
| n                  | 62                      | 62                    | 70                   | 70                  |
| Adj R <sup>2</sup> | 0.13                    | 0.22                  | 0.25                 | 0.19                |

represents standard errors, and \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively. One sample of  $NoAnswer_i = 1$  exists, and it is included in above-median subsample.

#### 4.4. Additional Analysis

Two additional analyses were also performed. First, to examine the impact of differences in feedback information on competitiveness, we analyzed competitiveness as the dependent variable, using Equation (1). The results demonstrated that differences in feedback information did not influence competitiveness. Second, to examine the effect of differences in feedback information on motivation, we analyzed motivation as the dependent variable using Equation (1). The results indicated that providing feedback to employees ranked in the bottom three improved their motivation. This finding suggests that upward comparison may reduce employee motivation.

## 5 Conclusion

This study examines the effect of combining partial RPI on performance using laboratory experiments. The main findings are as follows: First, providing the top three and median performance of the peer group positively influences the performance improvement of above-median performers compared to providing only median performance. Second, it negatively influences the performance and improvement of below-median performers compared to providing only median performance. Finally, providing the bottom three and median performance of the peer group has no effect on performance. These results suggest that providing RPI feedback based on high performance enhances the performance of above-median employees and mitigates the performance of below-median employees. Therefore, it is imperative to provide feedback tailored to employees' positions.

This study contributes to the literature in two ways. First, it examines the influence of combining partial RPI on employee performance, a topic that has not been widely explored. Previous RPI research has primarily focused on situations where a single piece of information is provided to all employees. By examining the impact of combining information on employee behavior, this study provides insights not only into RPI research but also into feedback research. This study reveals a performance feedback mechanism that enhances the performance of above-median employees, contradicting the findings of prior RPI studies. These studies demonstrate that RPI does not improve the performance of above-median employees. Thus, this study substantiates the idea that performance enhancement can be attained by improving the performance of top employees.

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