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Explanation and Misrepresentation in the Laboratory

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Explanation and Misrepresentation in the Laboratory

Abstract

We report the results of an experiment designed to examine the effect of opportunity to provide an explanation for inaccurate results and predictability of behavior on managers' reporting bias and investors' ability to decipher the bias. We conduct 20 experimental sessions, each comprised of one manager and three or four investors. The manager has an incentive, in general, to inflate investors' expectations and investors have an incentive to accurately predict value. We find that the manager reports with an upward bias a majority of the time. The magnitude of the bias, however, is lessened considerably when the manager's reporting behavior is unpredictable *and* the manager has an opportunity to explain inaccurate (biased) reports. The data suggest that under such conditions the manager seeks to avoid reporting inaccurately and having to choose an explanation. We also find that investors adapt to the manager's behavior and, strikingly, anticipate that explanation dampens reporting bias.

Keywords: reporting bias, misrepresentation, explanation, investor behavior, earnings reports, negative emotion

Explanation and Misrepresentation in the Laboratory

1. Introduction

This paper reports the results of an experiment designed to examine managers' reporting behavior and investors' reaction to such behavior. Research has long recognized that managers have incentives to report strategically, the purpose being to shape users' beliefs of firm performance (e.g., Verrecchia, 2001). In such cases, managers may not fully reveal private information and earnings reports may be biased.¹ Although the accuracy of earnings reports is typically revealed ex post (eventually), the cause for inaccuracies may be unknown: that is, inaccurate or biased reports may be attributable to managers' opportunistic behavior, to circumstances beyond the managers' control, or to a combination of the two.

In the face of bad news, managers may disclose an explanation for performance shortcomings to alleviate users' concern (e.g., Bettman and Weitz, 1983; Staw, McKechnie, and Puffer, 1983; Barton and Mercer, 2004). Extant research suggests that larger companies and companies in less regulated industries are more likely to augment earnings forecasts with an explanation, particularly for poor forecasts (Baginski, Hassell, and Kimbrough, 2004). Based on firm characteristics and reporting history, users may come to expect an explanation for sub-par performance in some cases and not others. We experimentally investigate whether the opportunity to provide an explanation (allow versus not allow) affects managers' behavior in a multi-period setting. The manipulation permits us to create an environment in which an explanation is expected (allowed) versus

¹ Earnings reports are defined broadly and include earnings forecasts and earnings announcements. In either case, the manager has private information as to future realizations – be it information on the production function or on the appropriateness of accruals.

not expected (not allowed). We contend that if an explanation is expected for deviations in performance, under certain conditions managers are subject to other behavioral influences, which affect reporting behavior.

A growing literature documents the importance of social preferences in understanding individual behavior (e.g., Fehr, Fischbacher, and Kosfeld, 2005; Sobel, 2005). Some people are fairness-minded and many are prone to honesty regardless of the situation (Hannan, Rankin, and Towry, 2006). Although others have preferences that are best modeled based purely on self-interest, even self-interested people want to minimize emotional discomfort (e.g., Elster, 1998; Dana, Cain, and Dawes, 2006). Under certain conditions, a manager who potentially has to explain an inaccurate report may be less prone to bias because the manager wishes to subsequently avoid feelings of guilt, shame, regret, or other negative emotion (Scheff, 1988; 2003; Smith, Webster, Parrott, and Eyre, 2002; Barclay, Skarlicki, and Pugh, 2005; Connolly and Butler, 2006). Managers may be less willing to bias earnings reports when they may have to explain their decisions *and* are concerned about what investors think of them.

In their experimental examination of internal reporting, Hannan, Rankin, and Towry (2006) conclude that a manager's behavior is affected by the trade-off between the benefits of honesty and those of misrepresentation. In their definition, the reports of honest managers accurately reflect private information. Honesty benefits a manager because it generates the trust of others and the positive feeling of self-esteem. At the same time, misrepresentation may increase a manager's income. Hannan, Rankin, and Towry find that their experimental managers want to appear honest. Other research also

suggests that managers are concerned with the appearance of honesty (Young, 1985; Stevens, 2002).

A critical element of the reporting environment that impacts managers' behavior is the nature of underlying incentives: more specifically, whether knowledge of underlying incentives enables investors to predict managers' reporting bias. Practically speaking, investors have some insight into managers' incentives because proxy statements provide details of executive compensation plans, including base salary, cash bonuses, stock options granted, options exercised, and value realized. But, compensation packages, including relationships between pay and performance, are often rather opaque (Bebchuk, 2006a; 2006b). Furthermore, the link between underlying incentives and the predictability of managers' behavior can vary dramatically. Executive compensation plans exhibit wide cross-section variation, which implies differences across companies in the pay-performance relation (e.g., Kole, 1997; Hartzell and Starks, 2003; Stathopoulos, Espenlaub, and Walker, 2004).² The structure of the compensation plan, thus, determines the link between pay and earnings reports, which sheds light into the predictability of managers' reporting behavior.

For our purposes, we vary managers' incentive scheme such that compensation is *indirectly* linked to earnings reports in one treatment and *directly* linked in another.

Managers' behavior is less predictable in the former and more predictable in the latter.³

We experimentally investigate whether the predictability of managers' behavior affects

² In addition, the level of detail included in compensation disclosures can differ considerably, which affects investors' knowledge of the underlying incentives and, in turn, ability to infer reporting behavior (e.g., Coulton, James, and Taylor, 2004; Muslu, 2005).

³ Stock options that can be exercised over a period of time provide an example of an incentive mechanism that corresponds to the unpredictable treatment. A cash bonus tied to annual earnings, on the other hand, provides an example of an incentive mechanism that corresponds to the predictable treatment.

reporting bias and, in turn, investors' ability to adapt to such behavior. As discussed subsequently, we argue that if managers' actions are *not* predictable, the opportunity to provide an explanation for deviations in performance lessens managers' reporting bias in an effort to avoid negative emotions. By comparison, if the managers' actions are predictable, the effect of explanation on managers' behavior is weakened. In this case, explanation does not deter managers' reporting bias because investors expect performance deviations.

We find that the manager reports with an upward bias a majority of the time. The magnitude of the bias, however, is lessened considerably when the manager's reporting behavior is unpredictable *and* the manager has an opportunity to explain inaccurate (biased) reports. Under such conditions, the manager appears to avoid reporting inaccurately and having to choose an explanation. We also find that investors adapt to the manager's behavior and anticipate that explanation dampens reporting bias.

The remainder of the paper is organized as follows. In section 2, we develop a framework and provide testable hypotheses. In section 3, we describe the experimental procedures and, in section 4, present the results. Lastly, we offer concluding remarks, provide implications for practice, and make suggestions for future research.

2. Framework

2.1 Experiment Overview

We conduct 20 experimental sessions. Each session consists of five rounds and each round lasts four periods. Each session includes a manager and three or four investors. At the beginning of each period, the manager privately observes a signal of the

forecasted outcome for the period. The manager then chooses an outcome to report to investors. Upon receiving the manager's report, each investor predicts an outcome for the period. The manager's compensation, in general, is positively associated with his or her ability to inflate investors' predictions. By comparison, investors' experimental earnings are positively associated with the accuracy of their predictions. Furthermore, each party's incentive is common knowledge: that is, the manager knows how investors generate experimental earnings and *vice versa*.

We manipulate the manager's opportunity to explain inaccurate reports (allow versus not allow an explanation) and the predictability of the manager's reporting behavior (predictable versus unpredictable) via the manager's incentive scheme. For predictability, we vary the link between the manager's period-by-period compensation and reported outcome. We conduct five sessions for each experimental group.

2.2 Participants

We recruit 93 students from a large Canadian university to participate in the experiment. We conduct 20 sessions with four or five participants per session.⁴ Participants have a mean age of 21.43 years. All participants are in at least their third year of university studies in business, with the vast majority concentrating in accounting or finance. Students earn, on average, \$43.42 (Canadian dollars) for participating 90 to 105 minutes.

⁴ All sessions have one manager. Seven sessions have three investors and 13 have four investors.

2.3 Procedures

Prior to administering the experimental sessions, participants are assigned a role (manager or investor) and told where to report. Logistically the manager arrives at one location and investors at another. An experimenter distributes the instructions and reads them aloud. The instructions are the same, regardless of the participant's role, except that the manager receives additional information on the forecasted outcome (discussed below).

Participants are informed that the realized outcome per period is generated from a normal distribution with a mean of 200 and a standard deviation of 50. The instructions state that the probability the realized outcome is between 150 and 250 is 68.3 percent and the probability it is between 100 and 300 is 95.5 percent.

At the beginning of each period, the manager receives a forecast of the firm's outcome.⁵ The realized outcome (R), announced at period end, equals the forecasted outcome (F) plus a random error term (e). The error term is generated from a normal distribution with a mean of zero and a standard deviation of 20. The manager is informed of the specifics of the distribution and receives forecasted and realized outcomes from ten practice trials. Because the error term is mean zero and normally distributed, the forecasted outcome represents the manager's unbiased estimate of the outcome for the period. Investors know the manager has private information on the specifics of the error term, but nothing more.

⁵ The experimental instructions do not use the terms manager and investor. Rather, participants are referred to as sender and predictor. We use generic language to avoid potential confounds introduced by terminology.

After receiving the forecast, the manager reports an outcome (S).⁶ The reported amount cannot exceed ± 20 of the forecasted outcome.⁷ The experimenter takes the manager's report to the room in which the investors are located and announces the reported outcome. The investors then individually predict the outcome (P) for the period. After all have recorded their prediction, the experimenter determines the median predicted outcome (P^M) and announces it publicly. In addition, the manager is informed of the realized outcome for the period. Investors are not informed of the realized outcome until round end.

The investors have an incentive to predict the outcome accurately. Investors' experimental earnings per period (Inv) are computed as follows.⁸

$$\text{Inv} = \text{constant} - |P - R|,$$

bounded at zero from below. Hence, earnings increase as the absolute prediction error approaches zero.

The manager, on the other hand, has an incentive to inflate investors' expectations of the outcome. We manipulate *when* it is advantageous for the manager to do so. In the predictable treatment, the manager's compensation per period (Mgr) is computed as follows.

$$\text{Mgr} = \text{fixed wage} + (P^M - F),$$

⁶ An important feature of our experiment is that the manager is an active participant, which means that reports are determined endogenously. In previous studies, the manager's reporting behavior is often imposed exogenously. Because we allow the manager to be an active participant, we are able to observe reporting behavior over time in a dynamic setting: that is, the extent that private information is reflected in the reported outcome and whether reporting behavior changes over time

⁷ Investors are informed of this constraint: i.e., that the managers' reported outcome is bounded by ± 20 of the forecasted outcome. We chose ± 20 because it is 10 percent of the mean of the outcome distribution and, under generally accepted accounting principles, amounts in excess of 10 percent are generally considered to be material (i.e., not permissible).

⁸ Note that investors cannot compute their experimental earnings until round end: i.e., not until the realized outcome per period is revealed.

bounded at zero from below. In this case, the manager has an incentive to inflate investors' expectations each period: that is, to the greatest extent possible over the course of a round.

In the unpredictable treatment, the manager's compensation is based on only one period per round, specified by the manager. Using the specified period, the manager's compensation is computed as follows.

$$\text{Mgr} = 4 \times [\text{fixed wage} + (P^M - F)].$$

The other three periods in the round do not affect compensation. In this case, the manager has an incentive to inflate investor's expectations one of four periods. In terms of procedure, the manager is informed of the investors' median prediction of the outcome at period end. The manager then elects whether to choose the current period to determine compensation. The manager may defer to a future period, but cannot return to a previous one. Once a period is chosen, it is announced to investors at the beginning of the next period.⁹

The procedures for each period within a round are similar. At the end of a round, the manager is provided the opportunity to explain inaccurate reports in one treatment but not the other. Inaccurate reports are defined as those that produce a difference between the reported and realized outcome, cumulated over a round, of at least 20.¹⁰ If the cumulative difference for the round exceeds ± 20 , the manager may offer an explanation. The manager chooses from the following: apologizes for inaccurate reports, attributes inaccurate reports to circumstances beyond control (denies blame), or remains silent

⁹ As mentioned earlier, the manager and investors' incentive schemes are common knowledge.

¹⁰ The difference per period is signed such that a difference of +10 in one period is cancelled by -10 in another. This approach is consistent with the reversing nature of accruals.

(states that an explanation is not being provided).¹¹ By including the three options, we allow the manager to choose from the feasible set of explanations. The manager's choice is recorded and then announced to investors.

Each experimental session proceeds for five rounds or 20 periods. The number of rounds is not announced beforehand, but participants are informed that a session will not last longer than 120 minutes. At the conclusion of the fifth round, participants complete a post-experiment questionnaire designed to collect demographics and elicit information about the experiment, including assessments of the manager's reporting behavior. Subsequently participants are paid and dismissed.¹²

3. Framework

We develop a framework to consider the interactive effect of opportunity to explain inaccurate reports and the predictability of behavior on the manager's reporting bias and investors' ability to decipher such bias. The research hypotheses are developed in the context of the experimental setting. To aid the reader, we summarize the experimental procedures and parameters in Table 1.

Our setting is one in which the manager is motivated to inflate investors' expectations (for at least one of four periods), which can prompt the manager to misrepresent private information and report with bias. Prior research indicates that

¹¹ Research in psychology is mixed concerning the most effective response. Bottom, Gibson, Daniels, and Murnighan (2006) suggest that an apology can mitigate punishment. But the apology can backfire if it is perceived as manipulative or insincere (Skarlicki, Folger, and Gee, 2004). Denial also can be effective in preserving one's standing with others, but as mentioned earlier it must be plausible (e.g., Kaplan and Reckers, 1993; Sigal, Hsu, Foodim, and Betman, 1988; Barton and Mercer, 2004). Remaining silent may be preferable if the other explanations cannot be conveyed credibly over time. It is beyond the scope of the current study to empirically examine what type of explanation is most effective. But we are able to collect data on the frequency that each type of explanation is chosen, which may facilitate future research.

¹² Experimental earnings are converted to cash using a conversion rate known to participants at the beginning of the experiment.

misrepresentation occurs in this type of setting, particularly with information asymmetry or an unknown other (e.g., O'Connor and Carnevale, 1997; Schweitzer and Croson, 1999; Boles, Croson, and Murnighan, 2000).

3.1 Explanation and Reporting Behavior

We consider whether the opportunity to provide an explanation for inaccurate reports mitigates managers' willingness to misrepresent private information, the effect being to lessen reporting bias. Dickhaut and McCabe (1997) contend that the act of recording information and making it public can affect managers' behavior. In our treatment with explanation, if reporting inaccuracies occur the manager *must* choose and record a message that is conveyed to investors. The message may include an explanation for reporting inaccuracies (i.e., an apology or denial of blame) or it may state that an explanation is not being sent. The act of choosing and recording the message may cause the manager to empathize with investors and to reflect on self. Researchers have long recognized that individuals' actions are affected by their beliefs about how others interpret actions, which Cooley (1922) referred to as the *looking-glass self*. Individual behavior can be affected even when social interactions are anonymous (e.g., Forsythe, Horowitz, Savin, and Sefton, 1994; Dana, Cain, and Dawes, 2006).¹³

In our treatment with explanation, the necessity to choose and record a message represents a public statement that is most likely to occur when the manager misrepresents

¹³ An example includes experiments in which participants are asked to make a binding choice on splitting a sum of money with another, anonymous participant (i.e., dictator games). The evidence indicates that participants give their paired recipient more than might be expected with fully selfish preferences because they do not want to be perceived as selfish, even though the decision is anonymous (refer to Davis and Holt, 1993).

private information and reports with bias.¹⁴ The manager likely perceives that such behavior (i.e., sending a required message) is evaluated negatively by investors. In this case, the manager's self monitoring in relation to others (investors) can give rise to guilt, shame, regret, or other negative emotions (Cooley, 1922; Goffman, 1967; Scheff, 1988; Williams, 1993; Dana, Cain, and Dawes, 2006). The anticipation of a negative emotion, even at a subconscious level, can influence behavior (e.g., Scheff, 1988; Posner and Rasmusen, 1999; Barr, 2001; Smith, Webster, Parrott, and Eyre, 2002). Reflecting on self, under such conditions, results in psychological discomfort and individuals prefer to avoid such behavior (Thibodeau and Aronson, 1992; Stone and Cooper, 2001; Scheff, 1988; 1997; Larrick, 1993; Williams, 1993; Barr, 2001; Smith, Webster, Parrott, and Eyre, 2002). Accordingly, the manager prefers to avoid choosing an explanation, all else equal, and reacts by reporting with less bias when an explanation is allowed.

A competing factor that affects the managers' reporting bias, and interacts with the effect of explanation, is the predictability of the manager's behavior. We manipulate the predictability of reporting behavior between experimental sessions via the manager's compensation scheme. In half the sessions, the manager has an incentive to inflate investors' expectations each and every period, referred to as the predictable treatment. In the other half, the manager has an incentive to inflate investors' expectations in at least one of four periods, referred to as the unpredictable treatment.

¹⁴ As noted previously (in the description of the experimental procedures), the manager knows that his or her private information is an unbiased estimate of the realized outcome.

3.2 Predictable Reporting Behavior

According to game theory, in the predictable treatment the manager biases the reported outcome upward each period by the maximum allowable amount: $S = F + 20$ (refer to Table 1). But investors are not disadvantaged by such behavior. Rather they anticipate the manager's reporting bias and discount the reported outcome downward each period: $P = S - 20$. Thus, the manager is unable to inflate investors' expectations, investors are not hurt by the manager's actions, and investors thus are unlikely to have ill feelings toward the manager.¹⁵ When reporting bias is predictable, the potential for negative emotion is suppressed and the manager's reporting behavior is unlikely to be affected by the opportunity to provide an explanation. Cain, Loewenstein, and Moore (2005) suggest that when conflicts of interest are honestly disclosed, making incentives transparent and behavior predictable, individuals feel morally licensed and strategically encouraged to exaggerate reporting bias. In this case, potential feelings of negative emotions, associated with misrepresentations, are reduced. Likewise, Rankin, Schwartz, and Young (2006) suggest that misrepresentation occurs in strategic settings in which such behavior is expected and predictable. Therefore, the manager is expected to bias the reported outcome upward in the predictable treatment, regardless of whether explanation is allowed. We posit the following, using the superscript M to denote the managers' reporting behavior.

H1^M: *If reporting behavior is predictable, the manager reports with an upward bias.*

H2^M: *If reporting behavior is predictable, the manager's reporting bias is not affected by explanation.*

¹⁵ Recall that the manager's compensation increases as the difference between the median predicted outcome and the forecasted outcome ($P^M - F$) increases. The investors' compensation, on the other hand, increases as the difference between the predicted and realized outcome ($P - R$) decreases.

Investors react to the manager's reporting behavior over the course of an experimental session. As time progresses and realized outcomes are revealed at the end of each round, investors gain insight into the manager's behavior, discerning how to anticipate and adjust for reporting bias. Dynamic models of learning suggest that individuals adjust to factors that reinforce successful outcomes (e.g., Camerer and Ho, 1999; Capra, Goeree, Gomez, and Holt, 1999; Goeree and Holt, 2004). In essence, investors adapt to situational factors in determining predicted outcomes each round. When the manager's reporting behavior is predictable, investors' discount the reported outcome and the adjustment is not affected by explanation. We provide the following, using the superscript I to denote the investors' reaction to the reported outcome.

H1^I: *If reporting behavior is predictable, investors adjust the reported outcome downward.*

H2^I: *If reporting behavior is predictable, investors' adjustment of the reported outcome is not affected by explanation.*

3.3 Unpredictable Reporting Behavior

When the manager's reporting behavior is unpredictable, the setting is more complex. Backward induction implies that the manager biases the reported outcome upward in the first period by the maximum allowable amount ($S = F + 20$). Such behavior occurs because nothing can be gained from deferring the choice.¹⁶ For periods 2 – 4, the manager reports without bias ($S = F$). Investors' anticipate such behavior and react accordingly. In other words, the reported outcome is discounted by the maximum allowable amount in the first period ($P = S - 20$) and taken at face value in periods 2 – 4

¹⁶ Because investors are not informed of the realized outcome per period until round end, they discount the reported outcome by the maximum allowable amount until the manager chooses a period to determine compensation. Accordingly, the manager is indifferent between choosing the first period or a later period to determine compensation.

($P = S$). Although game theory prescribes equilibrium play, it is unlikely to explain behavior in the unpredictable treatment. Foremost, backward induction fails to explain behavior in the laboratory and significant off-equilibrium behavior typically is observed (e.g., McKelvey and Palfrey, 1992; Fey, McKelvey and Palfrey, 1996; Johnson, Camerer, Sen, and Rymon, 2002; Binmore, McCarthy, Ponti, Samuelson, and Shaked, 2002).

The unpredictable treatment produces much greater uncertainty for investors (compared to the predictable treatment) – specifically in discerning the manager’s reporting bias on a period-by-period basis. In this case, the investors are disadvantaged relative to the manager and both parties recognize that the manager has the upper hand. The necessity to provide an explanation for inaccurate reports evokes negative emotions because it publicly signifies that the manager has exploited his or her position – solely for personal gain at the expense of others (i.e., the investors). As such, the opportunity to explain inaccurate reports likely affects the manager’s reporting behavior.

Recall that in the unpredictable treatment, the manager selects one of four periods to determine earnings for the round, referred to as the compensation period. The manager decides at period end whether to select the current period or defer to a future period. The manager has an incentive to inflate investors’ expectations *prior* to choosing the compensation period. Once the period is chosen and announced, the incentive disappears. But when explanation is allowed, another incentive arises. The manager prefers to avoid providing an explanation for inaccurate reports due to anticipated negative emotions. In this case, subsequent reports are aimed at offsetting upward bias reported in earlier periods (i.e., prior to selecting the compensation period). The manager’s subsequent reports in essence expunge the upward bias reported earlier.

Therefore, when the manager's behavior is unpredictable, explanation likely impacts reporting behavior *after* the compensation period is selected, but not before. The preceding discussion suggests the following hypotheses.

H3^M: *If reporting behavior is unpredictable, the manager reports with an upward bias before the compensation period is chosen.*

H4^M: *If reporting behavior is unpredictable, the manager's reporting bias before the compensation period is chosen is not affected by explanation.*

H5^M: *If reporting behavior is unpredictable, the manager is more likely to report with a downward bias after the compensation period is chosen when explanation is allowed than not allowed.*

We also provide hypotheses for the investors' reaction that mirror those for the managers' reporting behavior. Investors presumably adapt over time and recognize that reporting bias differs before and after the compensation period is chosen. Investors also come to realize that the reported outcome must be adjusted upward after the compensation period is chosen when explanation is allowed. The hypotheses are as follows.

H3^I: *If reporting behavior is unpredictable, investors adjust the reported outcome downward before the compensation period is chosen.*

H4^I: *If reporting behavior is unpredictable, investors' adjustment of the reported outcome before the compensation period is chosen is not affected by explanation.*

H5^I: *If reporting behavior is unpredictable, investors are more likely to adjust the reported outcome upward after the compensation period is chosen when explanation is allowed than not allowed.*

4. Results

We examine the effect of explanation and the predictability of behavior on the manager's reporting behavior and investors' reaction. We focus on two aspects: (1) the

difference between reported and forecasted outcome ($S - F$), which reflects the manager's reporting bias, and (2) the difference between reported outcome and investors' median prediction ($S - P^M$), which reflects investors' adjustment. Initially, we examine the manager's reporting bias, which enables us to assess $H1^M - H5^M$. Then we turn to investors' adjustment, which enables us to assess $H1^I - H5^I$. In each case, we report descriptive findings followed by formal statistical tests.

4.1 Manager's Reporting Behavior

4.1.1. Descriptive Findings. The manager has an incentive to inflate investors' expectations. We examine the frequency that the manager reports with an upward bias ($S > F$), partitioning the data by experimental group. When behavior is predictable, the manager reports with an upward bias over 80 percent of the time and explanation does not appear to affect behavior (refer to Panel A of Figure 1), consistent with $H1^M$ and $H2^M$, respectively.

When behavior is unpredictable, explanation looks to reduce the frequency that the manager reports with an upward bias. We partition the data by whether the compensation period has been chosen, which is of primary interest.¹⁷ Recall that the manager has an incentive to bias the reported outcome upward *before* the period is chosen, regardless of whether explanation is allowed (refer to $H3^M$ and $H4^M$). By

¹⁷ As mentioned earlier, game theory suggests the manager will choose the first period to determine compensation. But the data are not consistent with this conjecture: the frequency that the first period is chosen is only 28 percent (14 of 50). When explanation is allowed, the manager chooses period 1, 2, 3, or 4 with a frequency of ten, five, six, and four, respectively. When explanation is not allowed, the frequencies are four, five, ten, and six, respectively. A chi-square test suggests that explanation is associated with the manager's decision to choose the first period as the compensation period ($\chi^2 = 3.571$, $p = 0.059$, two-tailed test).

comparison, the manager is more inclined to bias the reported outcome downward bias *after* the period is chosen when explanation is allowed than not allowed (H5^M).

The data indicate that before the compensation period is chosen, the manager reports with an upward bias roughly 75 percent of the time (refer to Panel B of Figure 1), which is consistent with H3^M. In this case, explanation does not seem to affect reporting behavior, as suggested by H4^M. Once the compensation period is chosen, though, explanation looks to impact reporting behavior. The frequency of reports with upward bias is considerably less when explanation is allowed as opposed to not allowed (36 percent versus 71 percent). Additional inspection of the data indicates that after the compensation period is chosen, the manager reports with a *downward* bias 58 percent of the time when explanation is allowed versus 24 percent when it is not allowed, which is supportive of H5^M.¹⁸

4.1.2. Statistical Analysis. We perform a linear mixed model analysis, using maximum likelihood estimation (see Greene, 1997, Ch. 14). The approach expands the general linear model by allowing the data to exhibit correlated and non-constant variability.¹⁹ The independent variables include the predictability of reporting behavior (predictable versus unpredictable), the opportunity to explain inaccurate reports (allow versus do not allow), and the interaction effect. The dependent variable is the manager's

¹⁸ We also examine the type of explanation selected when one is required. When reporting behavior is predictable, the manager chooses denial eight times, apology twice, and remains silent five times. When reporting behavior is unpredictable, the manager chooses denial five times, apology three times, and remains silent once. The manager's preference for denial is consistent with archival evidence (e.g., Bettman and Weitz, 1983; Staw, McKechnie, and Puffer, 1983).

¹⁹ We investigate whether reporting bias exhibits autocorrelation or heterogeneity of variance. We find an association between reporting bias in adjacent periods: the Pearson correlation coefficient is significant at $p < 0.03$ for periods 2 and 3 and periods 3 and 4. We also find evidence of heterogeneity of variance: Box's test rejects the null hypothesis of equality of covariance matrices across groups at $p = 0.001$. Accordingly, we use an AR(1) covariance structure with heteroskedasticity in the mixed model analysis. The results reported in the paper, though, are robust to other specifications.

reporting bias per period ($S - F$), repeated over four periods per round and five rounds per session (i.e., period and round are included as repeated measures).²⁰

Table 2 presents the results of the mixed model analysis. The first hypothesis ($H1^M$) suggests that the manager reports with an upward bias when behavior is predictable. The positive estimated marginal means (in excess of 11.0) are consistent with $H1^M$. Furthermore, we find that when behavior is predictable, the reporting bias is positive in 163 of 200 periods (81.5 percent). We also cumulate the reporting bias over the course of a round (i.e., over the four periods in a round) and find that the sum is positive in 45 of 50 rounds (90 percent). Binomial tests confirm that the manager reports with an upward bias a majority of the time ($p < 0.001$).

The second and fifth hypotheses ($H2^M$ and $H5^M$) suggest that the effect of explanation is contingent on the predictability of reporting behavior. The significant interaction effect ($p < 0.01$), as illustrated in Panel B of Table 2, provides evidence of the contingent relationship. Planned comparisons indicate that when the manager's behavior is predictable, explanation does not affect reporting behavior, consistent with $H2^M$. By comparison, when behavior is unpredictable, explanation has a significant effect on reporting behavior ($p < 0.01$), consistent with $H5^M$.

We further we assess the manager's reporting behavior in the unpredictable treatment. The third, fourth, and fifth hypotheses suggest differences before and after the compensation period is chosen. For each session, we compute the manager's reporting bias before the compensation period is selected as well as afterward. Because different periods are chosen across rounds, we compute the average reporting bias per period

²⁰ Inferences are unaffected if we use an ex post measure of reporting bias: that is, the difference between reported and realized outcome ($S - R$).

within a round (before and after). For rounds in which the manager selects the last period, we only compute the reporting bias before the compensation period is chosen – there are not any periods afterward.²¹

The third and fourth hypotheses are concerned with reporting behavior prior to the compensation period being chosen. In this case, the manager is expected to report with an upward bias (H3^M) and explanation is not expected to affect reporting behavior (H4^M). To assess the hypotheses, we perform a repeated measures analysis of variance (ANOVA). The dependent measure is the average reporting bias per period within a round – before the compensation period is chosen. The independent variables include explanation (allow versus not allow), round (one through five), and the interaction term. The ANOVA results, shown in Panel A of Table 3, indicate that the intercept is significant at $p < 0.001$. The average reporting bias is 7.22, 12.96, 15.60, 11.21, and 13.82 for rounds 1 – 5, respectively. Hence, the manager reports with an upward bias, on average, prior to choosing the compensation period, which is consistent with H3^M. The insignificant main effect for explanation ($p = 0.878$) is consistent with H4^M.

The fifth hypothesis is concerned with reporting behavior after the compensation period is chosen. In this case, explanation is expected to affect reporting behavior: the manager is more likely to report with a downward bias when explanation is allowed than not allowed (H5^M). The data provide 40 observations (rounds) in which we can compute the average reporting bias after the compensation period is chosen: 21 when explanation is allowed and 19 when not allowed. We find that the mean (median) reporting bias per period within a round is -5.62 (-4.00) when explanation is allowed and 4.25 (4.00) when

²¹ The last period is selected ten times: four times when explanation is allowed and six times when it is not allowed.

not allowed. Parametric and nonparametric tests indicate that the difference is statistically significant at $p < 0.01$, one-tailed test ($t = 2.68$ and $z = -2.63$, respectively). We also investigate the frequency that the average reporting bias is negative, which is indicative of the manager reporting with a downward bias after the compensation period is chosen. As shown in Panel B of Table 3, the manager is more likely to report with a downward bias when explanation is allowed than not allowed: 67 percent versus 21 percent ($\chi^2 = 8.39$, $p = 0.004$). Thus, the findings are consistent with H5^M.

Lastly, to gain additional insight into the manager's behavior, we examine the responses to the post-experiment questionnaire. The manager is asked to characterize reporting behavior on three ten-point scales, with endpoints labeled misleading/truthful, selfish/altruistic, and unjust/fair. We perform three two-way analyses of variance to test for differences between the experimental cells. In all three cases, the interaction effect (predictability by explanation) is statistically significant at $p \leq 0.055$.²² When the manager's behavior is unpredictable *and* explanation is allowed, reporting behavior is characterized as being more truthful (mean of 6.6), more altruistic (mean of 6.2) and fairer (mean of 7.0) as compared to the other experimental cells.²³ Thus, the combination of unpredictable behavior *and* allowing explanation affects the manager's perception of his or her reporting behavior – and perceptions appear to be reflective of actual behavior.

4.2. Investors' Reaction

4.2.1. Descriptive Findings. Investors are aware of the manager's incentive to inflate their expectations and, thus, are likely to respond by adjusting the reported

²² The findings are striking because only 20 managers participated in the experiment (i.e., five per experimental cell).

²³ For the other three cells, the mean response on each scale is at least 1.8 less.

outcome downward. We examine the frequency that the median predicted outcome is less than the reported outcome ($P^M < S$), partitioning the data by experimental group. When the manager's reporting behavior is predictable, the median adjustment is downward about 60 percent of the time, providing weak support for H1¹ (refer to Panel A of Figure 3). Moreover, explanation appears to have little affect on the frequency of investors' downward adjustment (59 percent when explanation is allowed versus 62 percent when not allowed), which is consistent with H2¹.

When the manager's reporting behavior is unpredictable, explanation has a slightly more pronounced effect on investors' reaction. We partition the data by whether the compensation period has been chosen, which is expected to affect investors' reaction. Specifically, explanation is expected to affect investors' adjustment *after* the compensation period is chosen, but not *before*. The data indicate that before the period is chosen, the median adjustment is downward roughly 71 percent of the time and explanation does not appear to affect the frequency of downward adjustment, consistent with H3¹ and H4¹, respectively. After the compensation period is chosen, however, investors' adjustment differs noticeably. The frequency of downward adjustment declines and explanation looks to have a marked effect on behavior: the frequency of downward adjustment is 41 percent when explanation is allowed versus 59 percent when not allowed. Further analysis indicates that after the compensation period is chosen, investors are more likely to adjust *upward* when explanation is allowed than not allowed (56 percent versus 42 percent when not allowed), consistent with H5¹.

4.2.2. *Statistical Analysis.* Once again we perform a linear mixed model analysis, using maximum likelihood estimation (Greene, 1997, Ch. 14).²⁴ The independent variables include the predictability of behavior (predictable versus unpredictable), the opportunity to explain inaccurate reports (allow versus do not allow), and the interaction effect. The dependent variable is the investors' reaction per period ($P^M - S$), repeated over four periods per round and five rounds per session (i.e., period and round are included as repeated measures).

Table 4 presents the results of the mixed model analysis. The first and second hypotheses suggest that when behavior is predictable, investors adjust the reported outcome downward and explanation does not affect investors' reaction. The negative estimated marginal means (-2.5 and -5.5) are consistent with H1¹. In addition, we find that when the manager's reporting behavior is predictable, investors' adjustment is negative in 121 of 200 periods (60.5 percent). We also cumulate investors' adjustment over the course of a round (i.e., over the four periods in a round) and find that the sum is negative in 36 of 50 rounds (72 percent). Binomial tests confirm that investors adjust the reported outcome downward a majority of the time ($p < 0.01$).

The significant effect for explanation ($p = 0.055$), along with the insignificant interaction effect, is not consistent with H2¹. The estimated marginal mean for investors' adjustment is -2.12 when explanation is allowed and -4.67 when not allowed. The findings suggest that explanation dampens investors' adjustment, regardless of the

²⁴ As before, we examine whether investors' reaction to the reported outcome exhibits autocorrelation or heterogeneity of variance. We find some evidence of autocorrelation: the Pearson correlation coefficient is significant at $p < 0.10$ for periods 2 and 3 and periods 3 and 4. Heterogeneity of variance, however, does not appear to be a problem: Box's test is unable to reject the null hypothesis of equality of covariance matrices across groups ($p > 0.50$). Thus, we use an AR(1) covariance structure in the mixed model analysis. The results reported in the paper, though, are robust to other specifications.

predictability of the manager's behavior. Investors appear to anticipate *less* reporting bias when the manager has the opportunity to explain inaccurate reports than otherwise.

To investigate the third, fourth, and fifth hypotheses, we focus on investors' reaction when the manager's behavior is unpredictable. For each session, we compute investors' adjustment before and after the compensation period is chosen. Before the compensation period is chosen, investors are expected to adjust the reported outcome downward (H3¹) and explanation is not expected to affect the adjustment (H4¹). After the compensation period is chosen, explanation is expected to affect investors' adjustment: investors are more likely to adjust the reported outcome upward when explanation is allowed than not allowed (H5¹).

To assess H3¹ and H4¹, we perform a repeated measures ANOVA. The dependent measure is the average investor adjustment per period within a round – before the compensation period is chosen. The independent variables include explanation (allow versus not allow), round (one through five), and the interaction term. The ANOVA results, shown in Panel A of Table 5, indicate that the intercept is significant at $p < 0.001$. The average investors' adjustment is -2.60 , -4.67 , -4.92 , -9.00 , and -3.83 for rounds 1 – 5, respectively. The findings indicate that investors adjust the reported outcome downward, on average, before the compensation period is chosen, which is consistent with H3¹. The insignificant main effect for explanation ($p = 0.951$) is consistent with H4¹.

To assess H5¹, we examine investors' reaction after the compensation period is chosen, testing for differences between the explanation treatments. We find that the mean (median) adjustment per period within a round is 5.44 (6.67) when explanation is

allowed and -0.21 (2.00) when not allowed. We conduct parametric and nonparametric tests and find some evidence that the adjustment is greater (and positive) when explanation is allowed than not allowed: $t = -1.92$, $p = 0.031$, one-tailed, and $z = -1.56$, $p = 0.061$, one-tailed. Looking at the frequency of positive adjustment on a round-by-round basis, we find that the adjustment is positive a majority of the time (refer to Panel B of Table 5). Moreover, the frequency is slightly higher when explanation is allowed than not allowed (71 percent versus 59 percent), though the difference is not statistically significant ($\chi^2 = 0.80$, $p = 0.370$). Overall, the findings suggest that explanation has a modest effect on the *magnitude* of investors' adjustment after the compensation period is chosen, though it does not affect the *direction* of the adjustment. Accordingly, the results are not entirely supportive of H5¹.²⁵

Finally, we examine investors' responses to the post-experiment questionnaire. Investors are asked to indicate the usefulness of the reported outcome (not useful at all/very useful) and to characterize the manager's reporting behavior (misleading/truthful, selfish/altruistic, and unjust/fair). Investors respond on various ten-point scales. We perform four two-way analyses of variances to test for differences between the experimental groups.

For usefulness, we find that explanation has a significant effect at $p = 0.077$. Investors respond that the reported outcome is more useful when explanation is allowed than not allowed (means of 6.6. versus 5.6). For reporting behavior, the interaction effect is significant at $p \leq 0.045$ in all cases. Investors respond that the manager's reporting

²⁵ A factor that may contribute to our findings for investor reaction is that investors do not observe the outcome realization on a period-by-period basis (as does the manager). Rather, the outcome realizations are observed at round end. Hence, investors are not aware of reporting bias until round end, which makes the task much more difficult.

behavior is more truthful (mean of 5.8), more altruistic (mean of 6.0) and fairer (mean of 6.3) when the manager behavior is unpredictable *and* explanation is allowed as compared to the other experimental groups. These findings are similar to those reported earlier for the manager.

5. Conclusion

This paper reports the results of a dynamic, multi-period experiment designed to examine manager's reporting behavior and investors' reaction. We conduct 20 experimental sessions, with each session consisting of five rounds and each round lasting four periods. The manager has an incentive, in general, to inflate investors' expectations: that is, to report with upward bias. Investors, on the other hand, have an incentive to accurately predict value. We manipulate two variables between experimental sessions: the predictability of the manager's reporting behavior and the manager's opportunity to provide an explanation for inaccurate reports.

We find that the manager reports with an upward bias a majority of the time, as may be expected. The magnitude of the bias, however, is lessened considerably when the manager's reporting behavior is unpredictable *and* the manager has an opportunity to explain inaccurate (biased) reports. The data suggest that, under such conditions, the manager seeks to avoid reporting inaccurately and having to choose an explanation. The managers' behavior in our experiment is consistent with a desire to avoid negative emotion.

Our results provide strong support for indicated behavioral outcomes because we report results of decision-making in an abstract setting. In naturally occurring

environments the effect of negative emotions should be even stronger as they are generated through direct experience.

Importantly, our findings suggest that a non-strategic factor, explanation, significantly affects behavior. A challenge for analytical researchers is to incorporate non-strategic factors, such as explanation, into models of reporting behavior. In a related study, Kandel and Lazear (1992) consider how peer pressure affects incentives in an organizational setting, including aspects of shame and guilt in the model. A similar approach may be useful in modeling reporting behavior. We also encourage future research to investigate other factors that may underlie the anticipation of negative emotions and, in turn, attenuate the manager's incentive to issue biased reports.

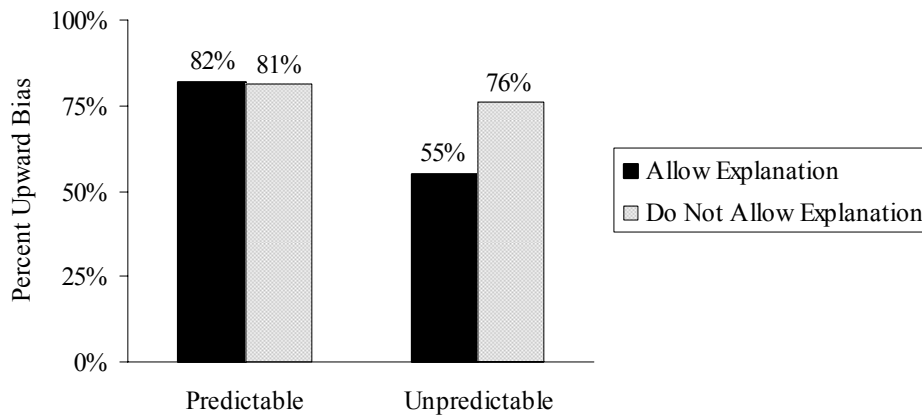
Our findings also suggest that investors adapt to the manager's reporting behavior, to some extent, and anticipate that explanation dampens reporting bias. Interestingly, other experimental research indicates that explanation can affect users' assessments in a one-shot setting. Barton and Mercer (2004) find that financial analysts are more optimistic about a company's future prospects when a plausible explanation is offered for sub-par performance (attributing poor performance to external factors) than not offered. Our findings suggest that simply creating the expectation that an explanation will be provided for deviations in performance – revealed in a multi-period setting – is enough to affect investors' reaction to the manager's report. When explanation is allowed and expected, investors are more inclined to take the manager's report at face value (i.e., investors' adjustment is dampened). Such behavior is adaptive when the manager's reporting behavior is unpredictable, because in this case reporting bias is reduced and deviations in performance are less likely to occur. When the manager's

reporting behavior is predictable, however, investors' reaction seems unfounded: in this case explanation does not diminish reporting bias nor does it affect the occurrence of deviations in performance.

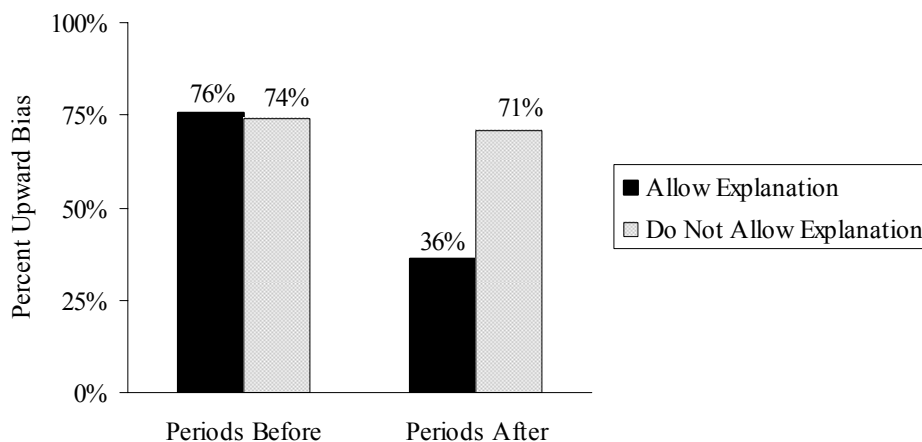
An implication of our findings is that the structure of compensation schemes (i.e., the pay-performance link) and the transparency of compensation disclosures are crucial for investors to consider in light of a manager's explanation for sub-par performance. We encourage archival researchers to investigate explanation along with other facets of executive compensation to determine how investors' welfare is affected. Such research may be of particular interest to regulators.

Figure 1
Manager's Reporting Behavior

Panel A: Upward Reporting Bias – All Experimental Groups



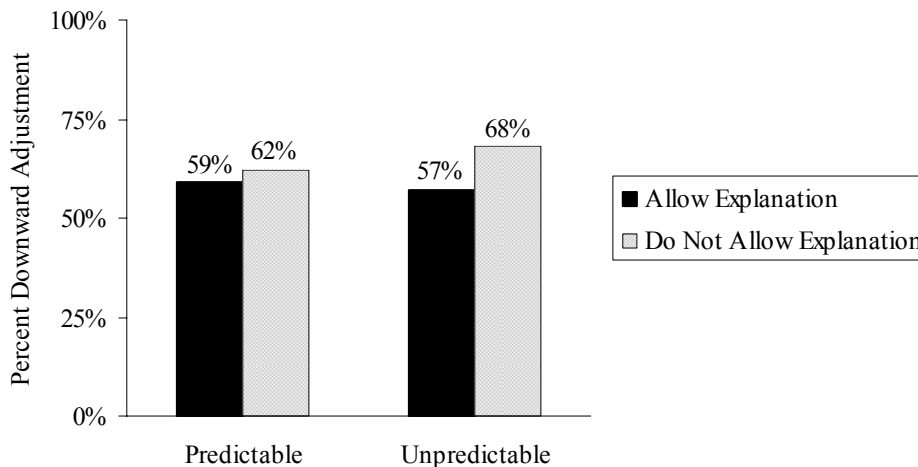
Panel B: Upward Reporting Bias – Only Groups with Unpredictable Behavior



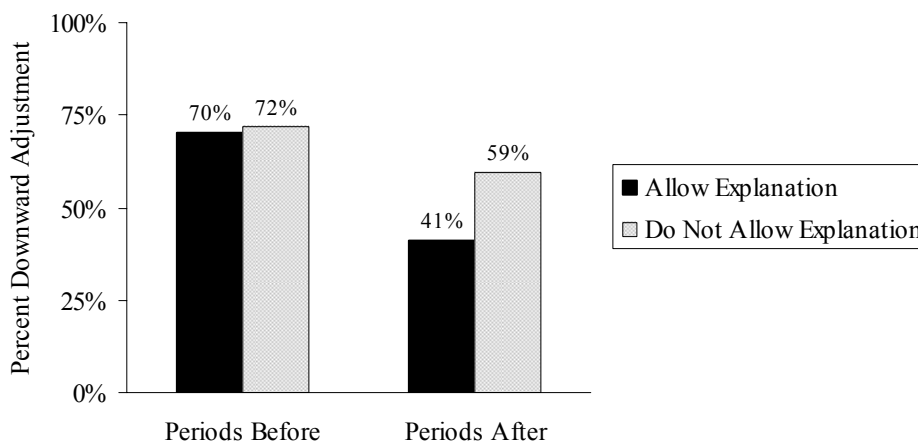
Notes: Predictable and unpredictable refer to the predictability of the manager's reporting behavior. Allow explanation and do not allow explanation refers to whether the manager has the opportunity to explain inaccurate reports. Periods before and after are based on *when* the manager chooses a period to determine compensation with unpredictable behavior: that is, before or after the compensation period is chosen and announced.

Figure 2
Investors' Reaction

Panel A: Downward Adjustment – All Experimental Cells



Panel B: Downward Adjustment – Only Cells with Unpredictable Behavior



Notes: Predictable and unpredictable refer to the predictability of the manager's reporting behavior. Allow explanation and do not allow explanation refers to whether the manager has the opportunity to explain inaccurate reports. Periods before and after are based on *when* the manager chooses a period to determine compensation with unpredictable behavior: that is, before or after the compensation period is chosen and announced.

Table 1
Experimental Setting

Panel A: Experimental Procedures

Beginning of experimental session

1. All participants are informed of the distribution used to generate the realized outcome.
2. The manager is endowed with information on the distribution of the error term (e) used to generate the forecasted outcome.

Each period

1. The manager observes the forecasted outcome (F).
2. The manager chooses the reported outcome (S).
3. The investors observe the reported outcome and individually predict the outcome (P).
4. The manager is informed of the realized outcome (R).
5. The manager and investors are informed of the median predicted outcome (P^M).
6. For the unpredictable treatment, the manager decides whether to choose the current period to determine compensation. Once a period is chosen, it is announced to the investors.

End of round

1. The investors are informed of the realized outcome for the four periods.
2. If an explanation is allowed, the manager chooses an explanation when reporting inaccuracies, cumulated over the course of a round, exceed a threshold.
3. The manager and investors compute their experimental earnings.

Panel B: Experimental Parameters

Manager's compensation per period (Mgr)

Predictable Treatment

$$\text{Mgr} = 15 + (P^M - F), \text{ bounded below at } 0$$

Unpredictable Treatment

$$\text{Mgr} = 4 \times [15 + (P^M - F)] \text{ or } 0, \text{ where the manager chooses one period to determine compensation for the round}$$

Investor's compensation per period (Inv)

$$\text{Inv} = 35 - |P - R|, \text{ bounded below at } 0$$

Realized outcome

$$N(200, 50)$$

Forecasted outcome

$$F = R + e$$

Error term associated with forecast

$$e \sim N(0, 20)$$

Manager's reporting threshold

$$F - 20 \leq S \leq F + 20$$

Threshold for providing an explanation

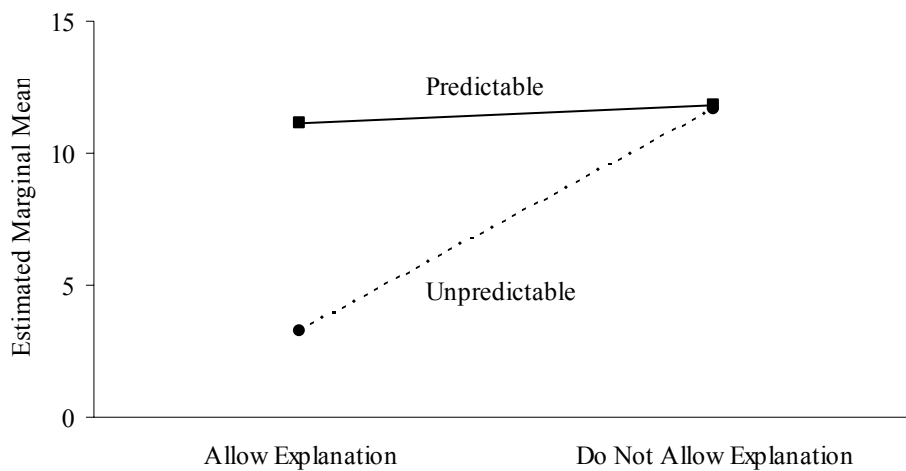
$$\sum_{t=1}^4 (S - R) > 20 \text{ or } \sum_{t=1}^4 (S - R) < -20$$

Table 2
Manager's Reporting Behavior: All Experimental Groups

Panel A: Mixed Model Analysis Results

<i>Source</i>	<i>F-statistic</i>	<i>P-value</i>
Intercept	175.10	0.000
Predictability	8.03	0.005
Explanation	10.21	0.002
Interaction	7.36	0.008

Panel B: Estimated Marginal Means



Notes: The mixed model analysis assumes an AR(1) covariance structure with heteroskedasticity for the random effects, though the results are robust to other specifications. Predictability refers to the predictability of the manager's reporting behavior (predictable versus unpredictable). Explanation refers to whether the manager has an opportunity to explain inaccurate reports (allow versus do not allow).

Table 3
Manager's Reporting Behavior: Unpredictable Treatment

Panel A: Repeated Measures ANOVA Results Before the Compensation Period is Chosen

<i>Within-Subject Effects</i>	<i>F-statistic</i>	<i>P-value</i>
Round	1.77	0.159
Round x Explanation	0.57	0.687
<i>Between-Subject Effects</i>		
Intercept	82.35	0.000
Explanation	0.03	0.878

Panel B: Frequency of Downward Bias After the Compensation Period is Chosen

Explanation	Reporting Bias	
	Downward (Bias < 0)	Otherwise (Bias ≥ 0)
Not Allowed	4	15
Allowed	14	7
Chi-Square Test	$\chi^2 = 8.39, p = 0.004$	

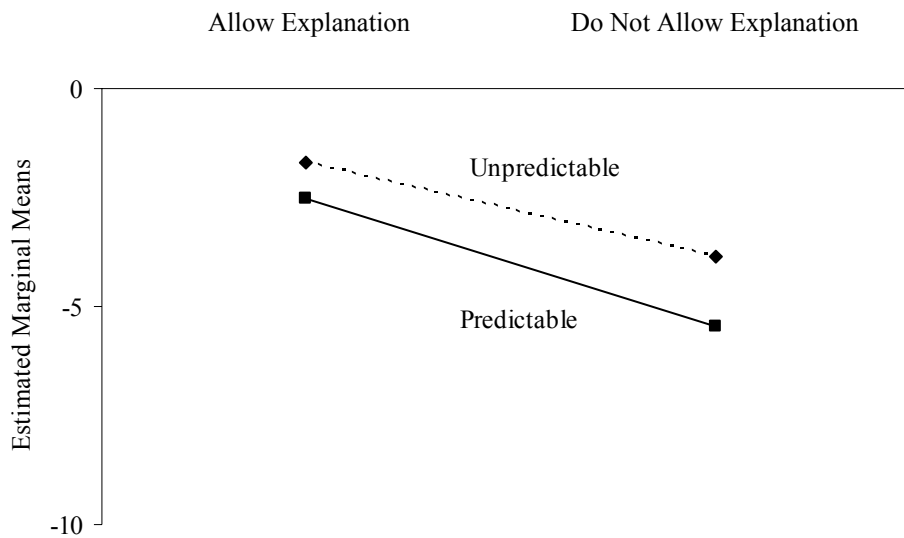
Notes: The dependent measure in the repeated measures ANOVA is the average reporting bias per period within a round, computed using periods before the compensation period is chosen. Round refers to the round in the experimental session (one through five). Explanation refers to whether the manager has an opportunity to explain inaccurate reports (allow versus do not allow).

Table 4
Investors' Reaction: All Experimental Groups

Panel A: Mixed Model Analysis Results

<i>Source</i>	<i>F-statistic</i>	<i>P-value</i>
Intercept	26.58	0.000
Predictability	0.84	0.361
Explanation	3.76	0.055
Interaction	0.91	0.764

Panel B: Estimated Marginal Means



Notes: The mixed model analysis assumes an AR(1) covariance structure for the random effects, though the results are robust to other specifications. Predictability refers to the predictability of the manager's reporting behavior (predictable versus unpredictable). Explanation refers to whether the manager has an opportunity to explain inaccurate reports (allow versus do not allow).

Table 5
Investors' Reaction: Unpredictable Treatment

Panel A: Repeated Measures ANOVA Before the Compensation Period is Chosen

<i>Within-Subject Effects</i>	<i>F-statistic</i>	<i>P-value</i>
Round	1.64	0.189
Round x Explanation	0.17	0.951
<i>Between-Subject Effects</i>		
Intercept	14.37	0.005
Explanation	0.00	0.951

Panel B: Frequency of Upward Adjustment After the Compensation Period is Chosen

Explanation	Investors' Adjustment	
	Upward (Bias > 0)	Otherwise (Bias ≤ 0)
Not Allowed	11	8
Allowed	15	6
Chi-Square Test	$\chi^2 = 0.80, p = 0.370$	

Notes: The dependent measure in the repeated measures ANOVA is the average investors' adjustment per period within a round, computed using periods before the compensation period is chosen. Round refers to the round in the experimental session (one through five). Explanation refers to whether the manager has an opportunity to explain inaccurate reports (allow versus do not allow).

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