

**How Do Individual Investors Use Analyst Forecasts?  
Implications for Investor Reaction to Forecast Revisions and Earnings Surprises**

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November 2005

\* Georgia State University, apinello@gsu.edu. This paper is based, in part, on my dissertation completed at Florida State University. I thank my dissertation chairman, Richard Morton, and the members of my dissertation committee – Neil Charness, Richard Dusenbury, and Martin Fennema. I gratefully acknowledge receipt of the 2005 ABO Outstanding Dissertation Award of the Accounting, Behavior and Organizations section of the American Accounting Association. I appreciate the helpful comments of Lawrence Brown, Tina Carpenter, Jennifer Francis, Artur Hugon, Bill Messier, Siva Nathan, and workshop participants of the 2005 ABO Midyear Meeting and the 2005 Southeast Summer Accounting Research Colloquium. A prior version of this paper also benefited from the comments of workshop participants at Florida State University, Georgia State University, University of Kentucky, University of Miami, and University of South Florida. I thank the KPMG Foundation and the Florida State University Foundation for financial support.

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**ABSTRACT**

Our current knowledge of how investors use analyst forecasts is limited. I employ controlled experimentation to investigate how analyst forecasts influence investors' earnings expectations and how investors' perceptions of earnings signals influence firm valuation. My findings indicate that investors adjust analyst forecasts downward to set their earnings expectations when they perceive optimistic biases in analyst forecasts. Furthermore, judged firm value is an increasing function of investor expectations after controlling for analyst forecasts, suggesting that investor expectations are reference points in the firm valuation process. Changes in judged firm value exhibit loss aversion in response to revisions in investors' own expectations but not in response to revisions in analyst forecasts. Changes in judged firm value further reveal a stronger reaction to positive than to negative earnings surprises, consistent with the incompletely explained empirical phenomenon that the market reaction to positive vis-à-vis negative surprises is asymmetrically strong. I offer a plausible explanation for this reaction pattern: Investors whose earnings expectations are lower than analyst forecasts evaluate reported earnings against a reference point that is below analyst forecasts, causing investors to perceive a positive (negative) earnings surprise as more positive (less negative) than reported. My findings carry implications for investors and accounting researchers.

*Keywords: Earnings expectations; analyst forecast revisions; earnings surprises; firm valuation; individual investor judgment.*

*Data Availability: Contact the author.*

# **How Do Individual Investors Use Analyst Forecasts? Implications for Investor Reaction to Forecast Revisions and Earnings Surprises**

## **I. INTRODUCTION**

The financial press devotes a great deal of attention to analyst forecasts. Yet, as acknowledged by several researchers, we know little about how investors use analyst forecasts (Givoly and Lakonishok 1984; Lev 1989; Schipper 1991; Williams 1995). Lev (1989) calls for research aimed at understanding the actual use of reported data by investors. Schipper (1991) points out that the role of analyst forecasts in investors' decision process remains unexamined, and Givoly and Lakonishok (1984) state that research providing insight into the way analyst forecasts are used is an unmet need. Kasznik and McNichols (2002) advocate research to further our understanding of how management guidance of analyst forecasts affects firm valuation,<sup>1</sup> and Gleason and Lee (2003) suggest that the reaction to analyst forecast revisions is complex and protracted and deserves scholarly attention. I use controlled experimentation to investigate how analyst forecasts influence investors' earnings expectations and how investors' perceptions of forecast revisions and earnings surprises affect investors' judgments of firm value.<sup>2</sup>

Analyst forecasts are widely available and salient to market participants. However, there is no compelling reason to believe that investors share the same expectations as analysts (Schipper 1991; Williams 1995). Investors and analysts have different loss functions (Schipper 1991; Williams 1995) and investors may adjust analyst forecasts to take account of other information (Schipper 1991; Francis and Philbrick 1993; Gu and Wu 2003). I conjecture that

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<sup>1</sup> Management guidance of analyst forecasts frequently causes analysts to revise their forecasts (e.g., Bartov et al. 2002; Matsumoto 2002).

<sup>2</sup> Earnings expectations and firm value judgments are important in trading decisions. Judgments are predictions about the future or evaluations of a current state of affairs while a decision involves taking a course of action (Bonner 1999). The focus of this study is on investor judgment that would precede a decision to trade.

investors adjust analyst forecasts to eliminate the effects of perceived errors in forecasted earnings. The type of adjustment investors make to analyst forecasts depends on investor beliefs regarding the kind of error reflected in analyst forecasts. Analyst forecasts are known to be overly optimistic early in the reporting period (e.g., Fried and Givoly 1982; Brown et al. 1985; O'Brien 1988; Butler and Lang 1991; Ali et al. 1992; Brous 1992; Francis and Philbrick 1993; Kang et al. 1994; Easterwood and Nutt 1999; Hayes and Levine 2000; Espahbodi et al. 2001) but become increasingly pessimistic as the earnings announcement nears (Bernhardt and Campello 2002; Richardson et al. 2004). I hypothesize that, when other information suggests that initial analyst forecasts may be unduly optimistic, investors make a downward adjustment to the analyst forecast, causing the average initial investor expectation to be lower than the initial analyst forecast. Individuals tend to anchor on initial values and are slow to adjust their judgments when presented with new information (Tversky and Kahneman 1974; Hogarth and Einhorn 1992). Thus, when presented with revised analyst forecasts, investors' pessimism relative to analyst forecasts is likely to persist into their revised expectations, causing the average revised investor expectation to be below the revised analyst forecast.

In judgment under uncertainty, judged value depends on the reference point used, and the decision-maker's expectations can shape the reference point (Kahneman and Tversky 1979). When investors share the same expectation as analysts, the analyst forecast is the relevant reference point. However, when investors adjust analyst forecasts to form their earnings expectations, a shift in reference point occurs. Since judged value depends on the reference point, I hypothesize that, after controlling for the analyst forecast, judged firm value is positively related to investors' earnings expectations. Because value is judged in terms of deviations from a reference point, value is judged in terms of gains and losses. Individuals have a greater aversion

for losses than a positive valence for gains (Kahneman and Tversky 1979). Hence, I hypothesize that changes in investors' firm value judgments are consistent with loss aversion in response to forecast revisions, expecting a more pronounced loss aversion effect in response to revisions in investors' own expectations than in response to revisions in analyst forecasts.<sup>3</sup>

When investors' expectations are more pessimistic than analyst forecasts, investors evaluate reported earnings against a reference point that is lower than analyst forecasts. A lower reference point causes investors to perceive a positive (negative) earnings surprise as more positive (less negative) than reported.<sup>4</sup> Accordingly, I hypothesize a greater change in judged firm value in response to positive vis-à-vis negative reported earnings surprises of equivalent magnitude. To validate that an asymmetrically strong response to positive surprises can be traced to investors' perceptions of earnings surprises, I hypothesize a greater (smaller) change in judged firm value in response to positive (negative) earnings surprises when investor expectations are lower than the analyst forecast than when investor expectations are not lower than the analyst forecast.

To test my hypotheses, I employ an experimental method that enables observation of individual judgments, permits exogenous manipulation of accounting variables holding all else constant, facilitates true random assignment, and alleviates self-selection bias (Kachelmeier and King 2002). Using a 3 x 3 between-participant and repeated-measures design, 246 Master of Business Administration (MBA) student investors (1) formed earnings predictions, (2) rated their confidence in their earnings predictions, and (3) judged firm value in response to an initial

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<sup>3</sup> A revision in investors' earnings expectations is defined as the investor's revised expectation minus the investor's initial expectation. An analyst forecast revision is defined as the revised analyst forecast minus the initial analyst forecast.

<sup>4</sup> A reported earnings surprise is defined as reported earnings minus the revised analyst forecast. A perceived earnings surprise is defined as reported earnings minus the investor's most recent earnings expectation.

analyst forecast, a revised analyst forecast, and an actual earnings announcement.<sup>5</sup> Investors first received financial information for a hypothetical company, including three periods of historical earnings per share (EPS) and an initial analyst forecast for the current quarter. Reported EPS for the most recent three quarters were designed to be substantially below the initial analyst forecast for the current period, suggesting that analysts may be unduly optimistic. After providing initial pre-manipulation earnings predictions and firm value judgments, investors received a report containing a revised analyst forecast, manipulated between-participants to be upward, downward, or constant. After revising their earnings predictions and firm value judgments, investors received an earnings announcement, manipulated between-participants to be high, medium, or low reported earnings, and provided their final firm value judgments.<sup>6</sup>

Results are generally consistent with my hypotheses. Participants' initial earnings expectations are on average lower than the initial analyst forecast, and participants' revised earnings expectations are on average lower than the revised analyst forecast in every forecast revision condition. Although changes in judged firm value reveal an insignificant loss aversion effect in response to analyst forecast revisions, the effect is significant in response to changes in participants' own earnings expectations. In addition, changes in judged firm value are asymmetrically large in response to positive vis-à-vis negative earnings surprises. Consistent with the notion that investors' reactions are determined by their perceptions of earnings surprises, changes in judged firm value are larger (smaller) in response to a positive (negative)

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<sup>5</sup> MBA students are appropriate surrogates for individual investors (Elliott et al. 2004) and are commonly used to proxy for individual investors in studies of nonprofessional investor judgment (e.g., Hirst et al. 1995; Bloomfield and Libby 1996; Kennedy et al. 1998; Lipe 1998; Bloomfield et al. 1999; Hirst et al. 1999; Maines and McDaniel 2000; Frederickson and Miller 2004; Koonce et al. 2005; Krische 2005).

<sup>6</sup> To provide some assurance regarding the external validity of my findings, the experimental stimuli were designed to reflect commonly observed earnings cues in archival data that permit a comparison of experimentally observed findings with archival evidence.

earnings surprise when the participant's expectation is below the analyst forecast than when the participant's expectation is not below the analyst forecast.

My investigation makes several contributions. First, I provide insight into how investors use, and the extent to which they rely on, analyst forecasts. Adjustments to reported information are an essential element of financial statement analysis and the information dissemination process in capital markets, but surprisingly little is known about this important process (Lev 1989). Furthermore, it is unclear whether the systematic optimism in analyst forecasts is limited to analysts or whether the optimistic behavior is typical of investors in general (Easterwood and Nutt 1999). My findings indicate that the optimism does not necessarily persist in investor expectations because investors adjust analyst forecasts to eliminate perceived errors in analyst forecasts. Second, I provide evidence that investors' own earnings expectations act as reference points and hence shape investors' perceptions of, and reactions to, forecast revisions and earnings surprises. Third, my findings offer a possible explanation for an archivally documented but incompletely explained phenomenon that the market reaction is stronger to positive than to negative earnings surprises (e.g., Freeman and Tse 1992; Bartov et al. 2002; Kasznik and McNichols 2002; Lopez and Rees 2002). I replicate the asymmetrically strong reaction to positive earnings surprises in a controlled experimental setting and demonstrate that changes in judged firm value can be traced to investors' perceptions of earnings surprises.

My investigation carries implications for market participants and accounting researchers. My findings raise awareness that conservative earnings expectations relative to analyst forecasts amplify investors' reactions to positive earnings surprises but dampen their reactions to negative earnings surprises. This reaction pattern "rewards" companies for positive surprises more than it "punishes" them for negative surprises. Not surprisingly, corporate officers allegedly employ

earnings management and expectations management strategies to produce precisely this reaction pattern (Levitt 1998; Schonfeld 1998; Vickers 1999; Barsky 2002; Bartov et al. 2002; Bryan-Low 2002; Matsumoto 2002; Fox 2003; Brown and Pinello 2005). An understanding of the systematic effects of investors' expectations on firm valuation can help market participants avoid reaction patterns that can be exploited by corporate officers. In addition, given the importance of reference points in the decision-making process, investors should be cautious when using values suggested by analyst forecasts and might benefit from using multiple reference points when judging firm value. My investigation also has implications for accounting researchers' debate on the rationality of market participants. If investors perceive a positive (negative) earnings surprise to be more positive (less negative) than reported, it may appear that they are over-reacting (under-reacting) when, in fact, they may merely be reacting to the earnings signal as they perceive it, in which case the strength of their reaction may be justified.

The remainder of my paper is organized as follows. Section II provides a synthesis of related literature and Section III develops theory and hypotheses. Section IV describes the research method, followed by a discussion of results in Section V and concluding remarks in Section VI.

## **II. RELATED LITERATURE**

Expected earnings determine the unexpected component of reported earnings and influence firm valuation. The residual income model (Ohlson 1995) provides a framework for how expected earnings map into firm value. As several researchers note, identifying the expectation of earnings is critical (e.g., Brown and Rozeff 1978; Lev 1989; Williams 1995; Demski 2004). Because earnings expectations are unobservable in archival data, a significant body of literature is devoted to identifying an appropriate proxy for earnings expectations. The

current metric of choice that has been documented to be superior to statistical models is analyst forecasts (e.g., Brown and Rozeff 1978; Fried and Givoly 1982; Givoly and Lakonishok 1984; Brown et al. 1985; Brown et al. 1987; O'Brien 1988; Williams 1995).

Given the importance of analyst forecasts, a large stream of research investigates characteristics of analyst forecasts. Analyst forecasts have been shown to be overly optimistic early in the reporting period (e.g., Fried and Givoly 1982; Brown et al. 1985; O'Brien 1988; Butler and Lang 1991; Ali et al. 1992; Brous 1992; Francis and Philbrick 1993; Kang et al. 1994; Easterwood and Nutt 1999; Hayes and Levine 2000; Espahbodi et al. 2001) and pessimistic as the earnings announcement nears (Brown 2001; Bernhardt and Campello 2002; Richardson et al. 2004). Reasons for analysts' optimism have been tied to strategic reporting on the part of analysts to promote revenue-generating businesses for their brokerage firms and to cultivate information access with the management of firms they follow (e.g., Schipper 1991; Francis and Philbrick 1993; Dugar and Nathan 1995; Das et al. 1998; Lim 2001), to the brokerage commission structure faced by analysts (e.g., Espahbodi et al. 2001), to selective reporting on the part of analysts who report their beliefs only when they hold favorable views of the firm (McNichols and O'Brien 1997), and to information-processing biases (e.g., Abarbanell and Bernard 1992; Elgers and Lo 1994; Elliott et al. 1995). The optimistic-then-pessimistic forecast pattern is thought to stem partly from downward forecast guidance (Bernhardt and Campello 2002; Richardson et al. 2004). Further evidence suggests that analysts fail to impound all available earnings and stock return information in their forecasts (e.g., Klein 1990; Lys and Sohn 1990; Abarbanell 1991), fail to efficiently utilize available information when setting forecasts (e.g., Ali et al. 1992), and have a tendency to misinterpret new information (e.g., Elliott et al. 1995).

In light of documented biases in analyst forecasts, investors may adjust analyst forecasts to remove perceived errors in forecasted earnings. Gu and Wu (2003) provide evidence consistent with a market that adjusts for part of analysts' bias. In addition, investors' responses to analyst forecast revisions increase with forecast accuracy (Stickel 1992; Abarbanell et al. 1995; Park and Stice 2000; Gleason and Lee 2003), the value relevance of forecasts is a function of their credibility (Hirst et al. 1999), and market over- or under-reaction depends on the reliability of information (Bloomfield et al. 1998). Other evidence suggests that market participants may not make efficient use of analyst forecasts. For example, investors undervalue information in analysts' annual earnings forecasts (Elgers et al. 2001) and fail to extract some of the information that analyst characteristics can provide about future forecast accuracy (Clement and Tse 2003). Market prices under-react to information reflected in analysts' forecast revisions (Shane and Brous 2001) and market participants do not sufficiently distinguish between forecast revisions that provide new information and those that merely move toward the consensus (Gleason and Lee 2003).

Although empirical associations between analyst forecasts and market movements offer insight into the relationship between analyst forecasts and market expectations, there are few theoretical analyses that investigate the relationship between analyst forecasts and investor beliefs (an exception is Abarbanell et al. 1995). Caution must be exercised when making inferences from archival findings regarding earnings expectations because they are based on a priori reasoning and indirect tests (Schipper 1991). A correlation between stock price changes and analyst forecasts is necessary but not sufficient to conclude that investors use those forecasts. Investors may be using other prediction models whose forecasts are correlated with analyst forecasts (Givoly and Lakonishok 1984). Hence, as several researchers point out, our current

knowledge of how investors use analyst forecasts in forming their own earnings expectations is limited (Givoly and Lakonishok 1984; Lev 1989; Schipper 1991; Williams 1995).

Market participants' earnings expectations affect their reactions to earnings surprises. Empirically documented valuation consequences at the market level reveal an asymmetrically strong reaction to positive vis-à-vis negative earnings surprises and this effect is overwhelmingly robust (e.g., Freeman and Tse 1992; Bartov et al. 2002; Kasznik and McNichols 2002; Lopez and Rees 2002). After controlling for the forecast error,<sup>7</sup> the reward to beating analyst forecasts exceeds the penalty for failing to meet them (Bartov et al. 2002). Furthermore, after controlling for the information in current-year earnings, abnormal annual returns are significantly greater for firms that meet expectations than for firms that fail to meet expectations (Kasznik and McNichols 2002). Similarly, there are greater absolute price responses to positive than to negative unexpected earnings of equal magnitude (Freeman and Tse 1992) and the earnings response coefficient for firms that beat analyst forecasts is greater than the earnings response coefficient for firms that miss analyst forecasts (Lopez and Rees 2002).

Reasons for the asymmetrically strong reaction to positive vis-à-vis negative earnings surprises have been deliberated but remain unresolved. Bartov et al. (2002) pose two possible explanations. Investors may be over-reacting to incidences of meeting or beating the forecast, in which case a market correction should be observed in subsequent periods. However, the authors find no evidence of a reversal of the premium in subsequent periods, so they dismiss investor over-reaction as a feasible explanation. Alternatively, Bartov et al. argue that the firm's success in meeting or beating the forecast could be informative with respect to future firm performance. The authors find positive associations between meeting or beating the forecast and metrics of

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<sup>7</sup> Forecast error is defined as actual earnings minus the initial analyst forecast.

future firm performance, and conclude that investors are rational in assigning a premium to firms that meet or beat forecasts because the firm's current success is informative with respect to future performance. In making this inference, however, the authors assume that investors are aware of this empirical regularity.

Looking at annual data, Kasznik and McNichols (2002) argue that if firms that meet or beat the latest forecast have higher earnings in future years and investors anticipate this, a premium to meeting or beating the forecast may simply be attributable to higher expected future earnings. While the authors document that firms meeting or beating expectations have significantly higher earnings forecasts and realized earnings than firms failing to meet expectations, their findings suggest that the market premium is *incremental* to the higher future earnings that could rationally be expected by investors based on past earnings. Caylor et al. (2004) provide further evidence that the premium to meeting or beating the forecast can be only partially explained as a signal of future performance. Hence, a complete explanation for why investors react more strongly to positive than to negative earnings surprises remains unresolved.

### **III. DEVELOPMENT OF THEORY AND HYPOTHESES**

Lev (1989) argues that if earnings contain an error perceived by investors to detract from earnings' ability to predict returns, investors will adjust for this error in the process of financial analysis. I similarly contend that if investors perceive an error in analyst forecasts, they will adjust for the error in setting their own earnings expectations. I expect the direction of the adjustment investors make to the analyst forecast to depend on their beliefs regarding the type of analyst error. Analysts have been shown to be optimistically biased early in the reporting period (e.g., Lys and Sohn 1990; Abarbanell 1991; Mendenhall 1991; Abarbanell and Bernard 1992; Ali et al. 1992). When other financial information suggests that the analyst forecast may be

unjustifiably optimistic (as is the case in my experimental setting), I expect investors to make a downward adjustment to the analyst forecast when setting their own earnings expectations. Accordingly, my first hypothesis is that, on average, the investor expectation is lower than the analyst forecast:

**H1:** The average investor expectation of earnings is lower than the analyst forecast.

In forming judgments, individuals tend to anchor on an initial value and are slow to adjust their judgments when presented with new information, causing judgments to be biased toward the initial values (Tversky and Kahneman 1974; Hogarth and Einhorn 1992). As an initial value, I expect investors' initial earnings expectations to influence their revised expectations, resulting in an average revised investor expectation that is below the revised analyst forecast. Thus, I test H1 for both initial and revised expectations.

Earnings expectations influence firm valuation. According to prospect theory (Kahneman and Tversky 1979): (1) judged value depends on the reference point used in the decision process, and (2) the decision-maker's expectation affects the location of the reference point. I postulate that investors use their derived earnings expectations as reference points in forming their firm value judgments. Accordingly, my second hypothesis is that, after controlling for analyst forecasts, judged firm value increases in investors' earnings expectations:

**H2:** Judged firm value is an increasing function of investors' earnings expectations after controlling for the analyst forecast.

Since value is judged in terms of deviations from a reference point, value is judged in terms of gains and losses. Individuals respond differently to losses than to gains (Kahneman and Tversky 1979). Specifically, individuals have a greater aversion for losses than a positive valence for gains of identical magnitudes, a phenomenon known as loss aversion. Loss aversion

has been shown to be a robust cognitive effect that is descriptive in a variety of settings (e.g., Thaler 1985, 1999; Lee 1997). I expect investor judgments of firm value to exhibit loss aversion in response to forecast revisions. My third hypothesis is that the magnitude of the change in judged firm value is greater in response to downward than to upward forecast revisions of equivalent magnitude:

**H3:** The absolute value of the change in judged firm value is greater in response to downward than to upward forecast revisions of equivalent magnitude.

I test H3 using both analyst forecast revisions and changes in investors' own earnings expectations. I expect to observe a more pronounced loss aversion effect with investors' own expectations, highlighting the role of investors' earnings expectations in the firm valuation process.

Upon earnings announcement, investors evaluate reported earnings against their earnings expectation immediately preceding the earnings announcement. When investors' expectations are more pessimistic than analyst forecasts, investors evaluate reported earnings against a reference point that is lower than the analyst forecast, causing investors to perceive a positive (negative) earnings surprise as more positive (less negative) than reported. Hence, for a reported earnings surprise of a given magnitude, investors with pessimistic earnings expectations relative to analyst forecasts perceive the reported surprise as greater in magnitude when it is positive than when it is negative.

Figure 1 provides a graphical representation of investors' perceptions of positive and negative earnings surprises when investors' expectations are less optimistic than analyst forecasts. Since firm valuation is a function of investor expectations and investors with earnings expectations lower than analyst forecasts perceive a positive (negative) earnings surprise as more

positive (less negative) than reported, my fourth hypothesis is that, controlling for the magnitude of the earnings surprise, the absolute value of the change in judged firm value is greater in response to positive than to negative earnings surprises:

**H4:** Controlling for the magnitude of the earnings surprise, the absolute value of the change in judged firm value is greater for positive than negative earnings surprises.

[Insert Figure 1 here]

To provide evidence that investors' perceptions of the surprise drive their response patterns to positive versus negative surprises, I hypothesize an interaction effect between the sign of the earnings surprise and whether or not the investor expectation is lower than the analyst forecast. Because a relatively pessimistic investor perceives a reported positive earnings surprise as more positive than an investor who is not more pessimistic than the analyst, I expect the response to an equivalent positive reported earnings surprise to be relatively stronger for the pessimistic investor. On the contrary, because a relatively pessimistic investor perceives a reported negative earnings surprise as less negative than an investor who is not more pessimistic than the analyst, I expect the response to an equivalent negative reported earnings surprise to be relatively weaker for the pessimistic investor. My fifth and final hypothesis is:

**H5:** For a positive (negative) earnings surprise, the absolute value of the change in judged firm value is greater (smaller) when the investor expectation is below the analyst forecast than when the investor expectation is not below the analyst forecast.

## **IV. RESEARCH METHOD**

### **Experimental Design**

Using a 3 x 3 between-participants and repeated-measures design, investors predicted earnings for the current quarter, rated their confidence in their earnings prediction, and judged

firm value at three points in time during the experiment: in response to the (1) initial analyst forecast, (2) revised analyst forecast, and (3) actual earnings announcement. The initial analyst forecast was held constant across all experimental conditions. The revised analyst forecast was manipulated between-participants to reflect a downward, upward, or zero analyst forecast revision. The current quarter's earnings announcement was manipulated between-participants to reflect high, medium, or low reported earnings.<sup>8</sup>

Specific measurement of the dependent variable depends on the particular hypothesis. To test H1, which compares the average investor expectation to the analyst forecast, the response variable is participants' earnings prediction. To test H2, which examines the association between investors' earnings expectations and firm valuation, the response variable is participants' judgments of firm value as a function of their earnings predictions. To test H3, which considers the valuation consequences of forecast revisions, the response variable is the difference between participants' initial and revised judgments of firm value. To test H4 and H5, which deal with the valuation consequences of earnings surprises, the response variable is the difference between participants' revised and final judgments of firm value. Participants' confidence assessment serves as a potential covariate. While participants were asked to provide a value for the earnings prediction and firm valuation questions, an 11-point scale was used for the confidence assessment, with 0 indicating "not at all confident" and 10 indicating "completely confident."<sup>9</sup>

## **Materials and Procedures**

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<sup>8</sup> Experimental stimuli presented an initial analyst forecast, a revised analyst forecast, and actual earnings, leaving it up to participants to compute the magnitude and direction of the analyst forecast revision (the difference between the revised and initial analyst forecast) and the earnings surprise (the difference between actual earnings and the revised analyst forecast).

<sup>9</sup> Although the firm valuation question was open-ended, participants were informed that the company's stock had fluctuated between \$30 and \$80 per share over the most recent two-year period.

Each investor was provided with a package containing written instructions, a participation consent form, and case materials. The case, adapted from Hirst et al. (1999), featured a hypothetical company that manufactures and sells snowmobiles and personal watercraft. The snowmobile and personal watercraft industry was selected to maximize the chances that participants would not possess a significant amount of prior knowledge regarding the industry represented in the case materials. In addition, the sale of both snowmobiles and watercraft would likely occur year-round such that any seasonality in sales would be lessened. Although the company's name was fictitious, the case materials were based on a real company.

Case materials were provided in two separate booklets. Booklet 1 first asked participants to assume the role of investors who are contemplating adding the common stock of the company to their investment portfolio.<sup>10</sup> Booklet 1 then presented information about the company and its industry, including quarterly income statements, balance sheets, and key financial ratios for the most recent three quarters.<sup>11</sup> Reported EPS for the prior three quarters were designed to be substantially below the analyst forecast for the current quarter, suggesting that the analyst forecast for the current quarter may be unduly optimistic. Booklet 1 also provided the company's common stock price per share at closing of the most recent quarter and analysts' consensus forecasts for the current quarter, the upcoming quarter, and the upcoming fiscal year. Experimental stimuli held constant the initial analyst forecast for the current quarter at \$1.60 across all experimental conditions. Consistent with Tan et al. (2002), participants were not provided with additional historical stock price information to avoid possible confounds.

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<sup>10</sup> Participants were not asked to assume the role of an investor who owns the common stock of the company to prevent an endowment effect from affecting results. According to the endowment effect, the judged value of a good can increase when it becomes part of a person's endowment (Thaler 1980). Note that not owning the company's stock biases against finding results because investors are likely to react less strongly to a firm's earnings cues when they are not invested in the firm.

<sup>11</sup> Quarterly earnings tend to be seasonal. To prevent seasonal trends from unduly influencing participants' earnings predictions and firm value judgments, only three quarters of historical financial information was provided.

After carefully examining the provided information, Part A of Booklet 1 asked participants to provide their initial pre-manipulation earnings predictions, confidence ratings, and firm value judgments. Participants were strictly instructed not to move on to Part B until Part A was completed. Part B of Booklet 1 provided a revised analyst forecast and instructed participants to again predict earnings, rate their confidence, and judge firm value. In the downward (upward) forecast revision condition, the revised analyst forecast was \$1.50 (\$1.70). In the constant forecast condition, participants were informed that the analyst forecast remained unchanged at \$1.60. Participants were strictly instructed not to move on to Part C until Part B was completed. Part C of Booklet 1 presented the actual earnings announcement and asked participants to judge firm value. In the high, medium, and low reported earnings conditions, actual earnings were \$1.75, \$1.55, and \$1.45, respectively.<sup>12</sup> The high (low) reported earnings condition reflects a positive (negative) earnings surprise in all forecast revision conditions. The medium reported earnings condition reflects a positive earnings surprise in the downward forecast revision condition but a negative earnings surprise in both the upward and constant forecast revision conditions.<sup>13</sup> Participants were allowed to consult the company's background and financial information while providing their judgments in Parts A, B, and C, but they were not permitted to change their responses to prior parts. At least two experimental proctors were present at all times to ensure that participants abided by the instructions.

After completing Booklet 1, participants placed and sealed Booklet 1 in an envelope and then continued with Booklet 2, a post-experimental questionnaire. Post-task questions were designed to assess the success of experimental manipulations and to determine whether

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<sup>12</sup> Note that experimental stimuli held constant the absolute value of forecast revisions at \$0.10 or \$0.00 and the absolute value of earnings surprises at \$0.25, \$0.05, or \$0.15.

<sup>13</sup> The medium actual earnings condition was included in experimental materials based on extant research on expectations management suggesting that positive valuation consequences accrue to firms whose managers guide analyst forecasts downward during the period to transform a negative forecast error to a positive earnings surprise.

differences remain in investor judgments because of differences in investors' perceptions about analyst characteristics or because of differences in investors' risk and ambiguity preferences.<sup>14</sup> Bonner et al. (2003) document that investors' response to forecast revisions depends on their level of sophistication. The post-experimental questionnaire solicited participants' investing experience and collected other demographic information, such as age, gender, level of education, and number of accounting and finance courses taken. Completion of the instrument took approximately 30 minutes.

### **Relationship of Experimental Materials to Archival Data**

The magnitudes of experimental stimuli were designed to reflect the size of commonly observed earnings cues in archival data while being sufficiently large to allow detection of an effect if it exists. I selected combinations of analyst forecast revisions and earnings surprises based on archival studies that investigate market reactions to forecast revisions and earnings surprises. These combinations allow me to compare patterns in my experimental data to patterns observed in archival data to provide some assurance regarding the external validity of my findings.

### **Participants**

251 MBA students from several Graduate Business Schools in the Southeast region of the United States participated in the experiment.<sup>15</sup> Five participants were deleted from the sample

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<sup>14</sup> As potential covariates, risk and ambiguity preference are not main variables of interest. Because of time constraints, measurement of risk preference by eliciting certainty equivalents for a sequence of real lotteries (as suggested by Kachelmeier and Shehata 1992) was impractical. Consistent with Kim (1992), risk attitudes were measured using a hypothetical lottery similar to the ones used by Kahneman and Tversky (1979). Participants were asked their willingness to participate in a lottery providing equal chances of winning \$10 and losing \$10. In addition, participants were asked to self-report their risk preferences on a scale adapted from Pennings and Smidts (2000). Consistent with Ghosh (1992) and Ghosh and Ray (1997), attitudes toward ambiguity were measured using a 16-item scale developed by Budner (1962).

<sup>15</sup> When the focus is on the judgment of general investors, participants are required to have only basic familiarity with accounting and investing (Libby et al. 2002). MBA students are appropriate surrogates for individual investors (Elliott et al. 2004) and are commonly used to proxy for individual investors in studies of nonprofessional investor

because of incomplete responses. The resulting sample size is 246 participants, of which 60% (40%) are male (female). The mean age is 27.65 (SD = 6.32) years. The mean number of accounting courses taken is 3.18 (SD = 2.08), and the mean number of finance courses taken is 2.60 (SD = 1.93). 47% report to have previously invested in common stock and 92% report to plan to invest in common stock in the future. 50% report to have previously invested in mutual funds and 70% report to have previously consulted financial information.<sup>16</sup>

## V. RESULTS

### Manipulation Tests and Reasonableness Checks

98% of participants correctly identified the initial analyst forecast as \$1.60. 90% (91%) of those in the upward (downward) forecast revision condition correctly indicated that there was an upward (downward) revision in the analyst forecast. 74% of those in the constant forecast condition correctly indicated that the analyst forecast did not change. 95% of participants in the high actual earnings condition correctly identified that actual EPS was above the initial forecast. 92% of participants in the medium and low actual earnings conditions, respectively, correctly identified that actual EPS was below the initial forecast.<sup>17</sup> These results indicate that the revised forecast and actual earnings manipulations were successful.

Let  $E_{IFC}$  ( $E_{RFC}$ ) denote participants' initial (revised) EPS predictions and  $C_{IFC}$  ( $C_{RFC}$ ) denote participants' initial (revised) confidence ratings. Further, let  $V_{IFC}$  ( $V_{RFC}$ ) denote participants' initial (revised) firm value judgments and  $V_{AE}$  participants' firm value judgments in

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judgment (e.g., Hirst et al. 1995; Bloomfield and Libby 1996; Kennedy et al. 1998; Lipe 1998; Bloomfield et al. 1999; Hirst et al. 1999; Maines and McDaniel 2000; Frederickson and Miller 2004; Koonce et al. 2005; Krische 2005). The focus of this study is on individual investors who are thought to be non-experts. Investigation of expert investor judgment is left for future research.

<sup>16</sup> Individual difference variables, including demographic data, university affiliation, and attitudes toward risk and ambiguity, are not significant covariates unless otherwise specified.

<sup>17</sup> Results are unchanged when hypotheses are tested using a sample that excludes participants who incorrectly responded to manipulation check questions.

response to actual earnings. Mean  $E_{IFC}$ ,  $E_{RFC}$ ,  $C_{IFC}$ , and  $C_{RFC}$  are reported in Panel A of Table 1.<sup>18</sup> Mean  $V_{IFC}$ ,  $V_{RFC}$ , and  $V_{AE}$  are reported in Panel B of Table 1.<sup>19</sup> Since all participants were provided with identical financial information and initial analyst forecasts, systematic differences in pre-manipulation judgments across experimental conditions should not, and do not, arise.<sup>20</sup> Furthermore, since actual earnings conditions were not revealed until after participants provided  $V_{RFC}$ , systematic differences in  $V_{RFC}$  across actual earnings conditions should not, and do not, arise.<sup>21</sup> Similarly, since participants provided  $V_{AE}$  in response to actual earnings conditions, systematic differences in  $V_{AE}$  across forecast revision conditions should not, and do not, arise.<sup>22</sup>

If experimental manipulations are successful, participants should generally change their earnings expectations and firm value judgments in the direction suggested by experimental stimuli. As can be gleaned from Panel A of Table 1, there is a mean decrease in participants' EPS expectation from  $E_{IFC}$  of \$1.51 ( $SD = 0.18$ ) to  $E_{RFC}$  of \$1.45 ( $SD = 0.13$ ) in response to a downward forecast revision, and a mean increase in participants' EPS expectation from  $E_{IFC}$  of \$1.45 ( $SD = 0.25$ ) to  $E_{RFC}$  of \$1.58 ( $SD = 0.20$ ) in response to an upward forecast revision. As can be gleaned from Panel B of Table 1, there is a mean decrease in participants' firm value

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<sup>18</sup> Sample excludes four outliers (cases with  $E_{IFC}$  and  $E_{RFC}$  z-scores in excess of  $|3.29|$  ( $p < 0.001$ , two-tailed)).

<sup>19</sup> Sample excludes seven outliers (cases with  $V_{IFC}$ ,  $V_{RFC}$ , and/or  $V_{AE}$  z-scores in excess of  $|3.29|$  ( $p < 0.001$ , two-tailed)). Although the firm valuation question was open-ended, participants were provided a stock price per share range of \$30 to \$80. The reason for providing this range was to contain the array of responses while allowing for variation in firm value judgments. There were nine cases in which participants' firm value judgments fell outside the specified range. Four of the nine cases exceeded \$80, while the other five fell short of \$30. Of those exceeding \$80, the highest firm value judgment was \$96.20. Of those falling short of \$30, the lowest firm value judgment was \$15.00. Firm value judgments for these cases were brought into the specified \$30-\$80 range without changing the magnitude of the change in firm value judgments between  $V_{IFC}$  and  $V_{RFC}$ , and between  $V_{RFC}$  and  $V_{AE}$ . Since the distribution of those falling outside of the \$30-\$80 range is approximately half above and half below the range by an approximately equal amount, the procedure of bringing firm value judgments into the range does not significantly change mean firm value judgments and, hence, testing of H1 and H2. In addition, since bringing the nine cases into the range does not affect the change in firm value judgments, this procedure does not affect testing of H3 - H5.

<sup>20</sup> The variation in mean  $E_{IFC}$  across forecast revision conditions is not significant ( $F = 1.48$ ,  $p = 0.230$ ), and the variation in mean  $V_{IFC}$  across forecast revision conditions ( $F = 1.05$ ,  $p = 0.353$ ) or actual earnings conditions ( $F = 0.45$ ,  $p = 0.639$ ) is not significant.

<sup>21</sup> The variation in  $V_{RFC}$  across actual earnings conditions is insignificant ( $F = 0.97$ ,  $p = 0.380$ ).

<sup>22</sup> The variation in  $V_{AE}$  across forecast revision conditions is insignificant ( $F = 0.22$ ,  $p = 0.804$ ).

assessment from  $V_{IFC}$  of \$60.59 ( $SD = 7.74$ ) to  $V_{RFC}$  of \$57.12 ( $SD = 8.36$ ) in response to a downward forecast revision, and a mean increase in their firm value assessment from  $V_{IFC}$  of \$58.99 ( $SD = 7.44$ ) to  $V_{RFC}$  of \$62.50 ( $SD = 7.75$ ) in response to an upward forecast revision.

The high actual earnings condition reflects a positive forecast error, while the low (medium) actual earnings condition reflects a negative (slightly negative) forecast error. As can be gleaned from Panel B of Table 1, there is an increase in mean judged firm value from  $V_{IFC}$  of \$59.95 ( $SD = 6.98$ ) to  $V_{AE}$  of \$67.45 ( $SD = 6.99$ ) in response to a positive forecast error, a decrease in mean judged firm value from  $V_{IFC}$  of \$59.39 ( $SD = 8.43$ ) to  $V_{AE}$  of \$57.75 ( $SD = 9.32$ ) in response to a slightly negative forecast error, and a decrease in mean judged firm value from  $V_{IFC}$  of \$60.48 ( $SD = 6.27$ ) to  $V_{AE}$  of \$56.78 ( $SD = 8.28$ ) in response to a negative forecast error. The high (low) actual earnings condition reflects a positive (negative) earnings surprise. There is an increase in mean judged firm value from  $V_{RFC}$  of \$60.46 ( $SD = 8.19$ ) to  $V_{AE}$  of \$67.45 ( $SD = 6.99$ ) in response to a positive earnings surprise, and a decrease in mean judged firm value from  $V_{RFC}$  of \$61.17 ( $SD = 7.22$ ) to  $V_{AE}$  of \$56.78 ( $SD = 8.28$ ) in response to a negative earnings surprise. The medium reported earnings condition reflects a positive earnings surprise for participants assigned to the downward forecast revision condition, but a negative earnings surprise for participants assigned to the upward and no forecast revision conditions. Consistent with a net negative reported earnings surprise across the three forecast revision conditions, there is a decrease in mean judged firm value from  $V_{RFC}$  of \$59.47 ( $SD = 7.67$ ) to  $V_{AE}$  of \$57.75 ( $SD = 9.32$ ) in the medium reported earnings condition. These results suggest that participants revised their judgments in the direction of experimental stimuli, providing comfort that experimental manipulations were successful.

Participants' confidence ratings are presented in Panel A of Table 1. On a scale of 0 (not at all confident) to 10 (completely confident), the overall mean  $C_{IFC}$  is 5.50 ( $SD = 2.09$ ) which is significantly higher ( $t = 3.71, p < 0.001$ , two-tailed) than the scale's midpoint. To the extent that the scale's midpoint represents average confidence, participants' confidence level is above average. Participants in the constant forecast condition experienced an increase in confidence of 0.58 from their initial to their revised earnings predictions, and this increase is significantly greater than the mean increase in confidence in either the upward (mean increase = 0.09,  $t = 2.70, p = 0.008$ , two-tailed) or downward (mean increase = 0.05,  $t = 3.13, p = 0.002$ , two-tailed) forecast revision condition. This result suggests that when analyst forecasts remain stable, investors become more confident in their earnings expectations. The increased confidence in the constant forecast condition is accompanied by an increase in EPS prediction and judged firm value.

[Insert Table 1 here]

## Hypothesis Testing

H1 states that the average investor expectation is less optimistic than the analyst forecast. Table 2 reports participants' mean initial and revised earnings expectations compared to the initial and revised analyst forecasts.<sup>23</sup> In support of H1, Panel A reveals that the mean  $E_{IFC}$  of \$1.47 ( $SD = 0.22$ ) for the overall sample is significantly below ( $t = 8.98, p < 0.001$ ) the initial analyst forecast of \$1.60. This level of relative pessimism is consistent with investors making use of other information suggesting that analyst forecasts may be optimistically biased.<sup>24</sup> Panel B of

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<sup>23</sup> Sample excludes four outliers (cases with  $E_{IFC}$  and  $E_{RFC}$  z-scores in excess of  $|3.29|$  ( $p < 0.001$ , two-tailed)). Results for H1 are unchanged when outliers are not excluded.

<sup>24</sup> An examination of post-experimental questions reveals that, on average, participants believe more that analysts have a desire to be overly optimistic than they believe that analysts have a desire to be overly pessimistic. On a scale of 0 (very low) to 10 (very high), participants rated the extent to which they believe that: (1) analysts have a desire to generate forecasted numbers that are too high to ensure that they portray the most positive expectation of

Table 2 indicates that, for the downward forecast revision condition, the mean  $E_{RFC}$  of \$1.45 ( $SD = 0.13$ ) is significantly lower ( $t = 3.60, p < 0.001$ ) than the revised analyst forecast of \$1.50; for the constant forecast condition, the mean  $E_{RFC}$  of \$1.53 ( $SD = 0.16$ ) is significantly lower ( $t = 3.75, p < 0.001$ ) than the revised analyst forecast of \$1.60; for the upward forecast revision condition, the mean  $E_{RFC}$  of \$1.58 ( $SD = 0.20$ ) is significantly lower ( $t = 5.17, p < 0.001$ ) than the revised analyst forecast of \$1.70. Note that mean  $E_{RFC}$  is highest in the upward forecast revision condition, but even so, mean  $E_{RFC}$  in the upward forecast revision condition is below the *initial* analyst forecast of \$1.60 (although it is not statistically different from \$1.60). These results support H1 for revised earnings expectations in all forecast revision conditions, suggesting that investors' initial expectations affect their revised expectations.

[Insert Table 2 here]

H2 states that judged firm value is an increasing function of investors' earnings expectations after controlling for the analyst forecast. Table 3 reports results from analyses of covariance for both initial and revised judgments.<sup>25</sup> Using  $V_{IFC}$  as the dependent variable,  $E_{IFC}$  as the independent variable, and  $C_{IFC}$  as a covariate, Panel A shows that investors' initial earnings expectations are positively related ( $F = 22.88, p < 0.001$ ) to investors' initial judged firm values.<sup>26</sup> Using  $V_{RFC}$  as the dependent variable,  $E_{RFC}$  as the independent variable, and  $C_{RFC}$  as well as the revised analyst forecast condition as covariates, Panel B shows that investors' revised

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what they expect to occur, and (2) analysts have a desire to generate forecasted numbers that are too low so that management can ensure that it is able to meet or beat the forecast. The mean belief that analysts have a desire to be too optimistic is 4.33 ( $SD = 2.39, N = 246$ ) which is significantly greater ( $t = 3.18, p = 0.002$ , two-tailed) than the mean belief that analysts have a desire to be too pessimistic (mean = 3.76,  $SD = 2.24, N = 246$ ). These results suggest that participants believe that the analyst forecast is overly optimistic, consistent with the observed mean downward adjustment to the analyst forecast.

<sup>25</sup> Sample excludes seven outliers (cases with  $V_{IFC}$ ,  $V_{RFC}$ , and/or  $V_{AE}$  z-scores in excess of |3.29| ( $p < 0.001$ , two-tailed)). Results for H2 are unchanged when outliers are not excluded.

<sup>26</sup> Since the initial analyst forecast is constant across all experimental conditions, it need not enter the model as a control variable.

earnings expectations are positively related ( $F = 21.96, p < 0.001$ ) to their revised firm value judgments. Results support H2 for both initial and revised judgments, consistent with my contention that investors' earnings expectations act as reference points in the firm valuation process.

[Insert Table 3 here]

H3 predicts loss aversion in forecast revisions and is tested using both analyst forecasts and participants' own forecasts of earnings. To test H3, the dependent variable is the difference between the revised and initial judged firm value ( $V_{RFC} - V_{IFC}$ ). The mean change in judged firm value in response to analyst forecast revision conditions is displayed in Panel A of Table 4.<sup>27</sup> Although  $|V_{RFC} - V_{IFC}|$  in response to the downward analyst forecast revision condition (mean = 3.26,  $SD = 4.33$ ) exceeds  $|V_{RFC} - V_{IFC}|$  in response to the upward analyst forecast revision condition (mean = 2.47,  $SD = 3.39$ ), the difference is almost but not quite statistically significant at conventional levels ( $t = 1.28, p = 0.101$ , one-tailed). To test participants' response to changes in their own earnings expectations, I classify participants into three categories based on the direction of the difference between  $E_{RFC}$  and  $E_{IFC}$ . A change in earnings expectation is downward when  $E_{RFC} - E_{IFC} < 0$ , upward when  $E_{RFC} - E_{IFC} > 0$ , and constant when  $E_{RFC} - E_{IFC} = 0$ . The mean change in judged firm value in response to the direction of participants' revisions in their expectations is reported in Panel B of Table 4. In support of H3,  $|V_{RFC} - V_{IFC}|$  in response to a downward change in expectation (mean = 3.63,  $SD = 4.09$ ) is significantly greater ( $t = 2.34, p = .010$ , one-tailed) than to an upward change in earnings expectation (mean = 2.09,  $SD = 3.97$ ).

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<sup>27</sup> Sample excludes six outliers (cases with  $V_{RFC} - V_{IFC}$  z-scores in excess of  $|3.29|$  ( $p < 0.001$ , two-tailed)). When outliers are not excluded, the difference between  $|V_{RFC} - V_{IFC}|$  in response to the downward forecast revision condition and  $|V_{RFC} - V_{IFC}|$  in response to the upward forecast revision condition is statistically insignificant. Similarly, the difference between  $|V_{RFC} - V_{IFC}|$  in response to downward changes in investors' expectations and  $|V_{RFC} - V_{IFC}|$  in response to upward changes in investors' expectations is statistically insignificant. A potential reason for these insignificant results is that four of the six outliers are in the upward forecast revision condition, while only one is in the downward forecast revision condition (the sixth outlier is in the constant forecast condition).

Consistent with my expectation, the loss aversion effect is more pronounced in investors' response to changes in their own earnings expectations than in their response to analyst forecast revisions.

Interestingly,  $V_{RFC} - V_{IFC}$  in the constant analyst forecast condition is significantly positive (mean = 1.22,  $t = 3.81$ ,  $p < 0.001$ , two-tailed), even though there was no change in earnings expectation based on analyst forecasts. This result suggests that investors perceive a zero reported forecast revision as positive, consistent with an investor expectation that is lower than the analyst forecast. On the other hand,  $V_{RFC} - V_{IFC}$  is insignificantly different from zero (mean = 0.34,  $t = 1.03$ ,  $p = 0.308$ , two-tailed) in response to a zero change in investors' own earnings expectations, highlighting the importance of investors' own earnings expectations in the firm valuation process.

[Insert Table 4 here]

H4 predicts that the absolute value of the change in judged firm value is greater for positive than negative reported earnings surprises, after controlling for the magnitude of the earnings surprise. To test H4, the dependent variable is the difference between the final and revised judged firm value ( $V_{AE} - V_{RFC}$ ). The mean change in judged firm value in response to positive versus negative earnings surprise conditions is reported in Panel C of Table 4.<sup>28</sup>  $|V_{AE} - V_{RFC}|$  is 3.51 ( $SD = 7.55$ ) in the negative earnings surprise condition and 6.08 ( $SD = 6.40$ ) in the positive earnings surprise condition and these means are significantly different from zero. As indicated in Panel A of Table 5, after controlling for the absolute magnitude of the reported earnings surprise, the analyst forecast revision conditions to which participants were exposed prior to the earnings announcement, and investors' confidence, the sign of the reported earnings

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<sup>28</sup> Sample excludes two outliers (cases with  $V_{AE} - V_{RFC}$  z-scores in excess of  $|3.29|$  ( $p < 0.001$ , two-tailed)). Results for H4 are unchanged when the outliers are not excluded.

surprise is significant ( $F = 7.31, p = 0.007$ ) in explaining the change in judged firm value. In support of H4, the mean change in judged firm value is significantly larger for positive than for negative earnings surprises.

H5 predicts that the change in judged firm value is greater (smaller) for positive (negative) surprises when investors are more pessimistic than analysts than when investors are not more pessimistic than analysts. Panel D of Table 4 reports mean changes in judged firm value by the sign of the earnings surprise when participants are versus are not more pessimistic than analysts.<sup>29</sup> In support of H5, the change in judged firm value is greater in response to a positive earnings surprise when investors are more pessimistic (mean = 6.35,  $SD = 5.37$ ) than when they are not more pessimistic (mean = 5.94,  $SD = 6.94$ ) than analysts. Furthermore, the change in judged firm value is less negative in response to a negative earnings surprise when investors are more pessimistic (mean = -1.97,  $SD = 7.84$ ) than when they are not more pessimistic (mean = -4.85,  $SD = 7.08$ ) than analysts. Controlling for the magnitude of the earnings surprise, the analyst forecast revision condition, and investors' confidence, Panel B of Table 5 shows that the predicted interaction is statistically significant ( $F = 5.21, p = 0.023$ ). My results suggest that when investors' expectations are relatively pessimistic, they perceive the magnitude of a positive (negative) earnings surprise as larger (smaller) than reported, giving rise to a stronger reaction to positive vis-à-vis negative surprises.

[Insert Table 5 here]

### **Relationship of the Experimental Data to Evidence in Extant Literature**

One of the strengths of experimental methods is internal validity. However, a general concern with experimentally collected data is external validity. To provide some comfort in the

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<sup>29</sup> Sample excludes two outliers (cases with  $V_{AE} - V_{RFC}$  z-scores in excess of  $|3.29|$  ( $p < 0.001$ , two-tailed)). Results for H5 are unchanged when outliers are not excluded.

generalizability of my results, I compare my experimental evidence with archival evidence in the extant literature. Patterns in investors' firm value judgments are remarkably consistent with the empirical evidence.<sup>30</sup> For example, consistent with the notion that firms benefit from managing analyst forecasts downward to avoid reporting negative earnings surprises (Bartov et al. 2002), I find that the penalty to a negative forecast error is smallest (mean  $V_{AE} - V_{IFC} = -0.68$ ,  $SD = 4.82$ ,  $N = 25$ ) when a downward forecast revision turns it into a positive earnings surprise. Consistent with Soffer et al.'s (2000) result that firms preannouncing a portion of bad news experience greater negative excess returns compared to firms releasing all of their bad news at once, I find that for an equivalent forecast error, a downward forecast revision combined with a negative earnings surprise is associated with a more negative reaction (mean  $V_{AE} - V_{IFC} = -5.46$ ,  $SD = 6.04$ ,  $N = 29$ ) than a constant forecast combined with a negative earnings surprise (mean  $V_{AE} - V_{IFC} = -2.48$ ,  $SD = 6.42$ ,  $N = 26$ ).

Consistent with Caylor et al. (2004), I find that an upward forecast revision combined with a positive earnings surprise has the most positive reaction (mean  $V_{AE} - V_{IFC} = 7.75$ ,  $SD = 6.76$ ,  $N = 26$ ) of all cases with a positive forecast error, while a downward forecast revision combined with a negative earnings surprise has the most negative reaction (mean  $V_{AE} - V_{IFC} = -5.46$ ,  $SD = 6.04$ ,  $N = 29$ ) of all cases with a negative forecast error. Consistent with Miller (2001), I find that forecast revisions consistent in sign with the earnings surprise elicit stronger reactions than those inconsistent in sign with the earnings surprise. Specifically, for positive forecast errors, the mean reaction to an upward forecast revision combined with a positive earnings surprise (mean  $V_{AE} - V_{IFC} = 7.75$ ,  $SD = 6.76$ ,  $N = 26$ ) is stronger than the mean reaction to a downward forecast revision combined with a positive earnings surprise (mean  $V_{AE} - V_{IFC} =$

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<sup>30</sup> Sample excludes three outliers (cases with  $V_{AE} - V_{IFC}$  z-scores in excess of  $|3.29|$  ( $p < 0.001$ , two-tailed)).

6.20,  $SD = 6.01$ ,  $N = 26$ ). For negative forecast errors, the mean reaction to a downward forecast revision combined with a negative earnings surprise (mean  $V_{AE} - V_{IFC} = -5.46$ ,  $SD = 6.04$ ,  $N = 29$ ) is stronger than that to an upward forecast revision combined with a negative earnings surprise (mean  $V_{AE} - V_{IFC} = -2.39$ ,  $SD = 9.43$ ,  $N = 30$ ). The consistency of my reaction patterns with the empirical evidence reported in existing literature provides comfort in the external validity of my results and strengthens my conclusions.<sup>31</sup>

## VI. SUMMARY AND CONCLUSIONS

I employ the comparative strengths of an experimental method to investigate how analyst forecasts influence individual investors' earnings expectations and how investors' perceptions of forecast revisions and earnings surprises affect their judgments of firm value. I provide evidence that investors adjust analyst forecasts to eliminate perceived errors in analyst forecasts. I further show that judged firm value is an increasing function of investor expectations after controlling for analyst forecasts, indicating that investor expectations act as reference points in the firm valuation process. As reference points, investors' expectations determine their perception of earnings signals and affect firm valuation. Changes in firm value judgments reveal loss aversion in response to revisions in investors' expectations, but the effect is insignificant in response to analyst forecast revisions. When investor expectations are less optimistic than analyst forecasts, reported earnings are evaluated against a reference point that is lower than the analyst forecast, resulting in a perception that a positive (negative) earnings surprise is more positive (less negative) than reported and causing greater changes in judged firm value in response to positive

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<sup>31</sup> The consistency of my results with archivally documented reaction patterns lends credence to the notion that individual investors' judgmental effects play a nontrivial role in the price adjustment process. Because individual judgmental effects tend to be systematic, they can aggregate to create effects at the market level (Bonner 1999). However, my investigation is limited to investor reaction at the individual level. An examination of the link between individual market participants' reactions and market-wide reactions is beyond the scope of this study and is left for future research.

vis-à-vis negative earnings surprises.

My investigation advances our understanding of how investors use analyst forecasts in deriving their earnings expectations. I provide evidence that biases in analyst forecasts do not necessarily persist in investor expectations. In addition, I provide insight into how investors' earnings expectations that shape their perceptions of earnings signals affect their judgments of firm value. My examination is relevant to market participants and accounting researchers. For market participants, my findings raise awareness that relatively conservative earnings expectations relative to analysts amplifies (dampens) investors' reactions to positive (negative) surprises. This reaction pattern "rewards" companies for positive surprises more than it "punishes" them for negative surprises. Not surprisingly, corporate officers allegedly employ earnings management and expectations management strategies to produce precisely this reaction pattern (Levitt 1998; Schonfeld 1998; Vickers 1999; Barsky 2002; Bartov et al. 2002; Bryan-Low 2002; Matsumoto 2002; Fox 2003; Brown and Pinello 2005). An understanding of the systematic effects of investors' expectations on firm valuation can help market participants avoid reaction patterns that can be exploited by corporate officers. Given the importance of reference points, investors should be cautious when using values suggested by analyst forecasts. Investors would benefit from considering multiple reference points before finalizing judgments of firm value.

My investigation complements and extends the archival literature by (1) replicating the asymmetrically strong reaction to positive vis-à-vis negative earnings surprises and (2) identifying a plausible explanation for this response pattern. An implication for accounting researchers is that when using analyst forecasts as a proxy for market participants' expectations, it may appear that investors are over-reacting or under-reacting to earnings cues; however,

investors may merely be reacting to earnings cues as they perceive them, in which case the extent of their reaction may be justified.

I close with some caveats and suggestions for future research. Without performance-contingent compensation, it is unknown whether participants exert as much information processing effort as in an environment with explicit incentives (Kachelmeier and King 2002). In my experimental setting, participants exerting less information processing effort would fare better with simply using the analyst forecast as their earnings prediction without making an adjustment. However, since this would bias against finding results, the lack-of-effort concern is mitigated. In addition, the choice of values for experimental stimuli (e.g., initial analyst forecasts, revised analyst forecasts, actual earnings) may influence the magnitude of response patterns. Therefore, caution should be exercised in making inferences about parameter estimates with respect to investor response. However, my focus is on the relative direction of investor response as a function of earnings cues. Variations in the values of stimuli should only affect the magnitude of results, not their direction. Furthermore, when an experiment measures only individual judgment, the potentially mitigating force of market competition remains an open question (Kachelmeier and King 2002). I demonstrate the consistency of patterns in my experimental data with archivally documented market evidence. Nevertheless, my study should be viewed as a piece of a larger puzzle that furthers our understanding of how analyst forecasts affect investor judgment, leaving examination of the link between individual investors' judgment patterns and market-wide movements for future research.

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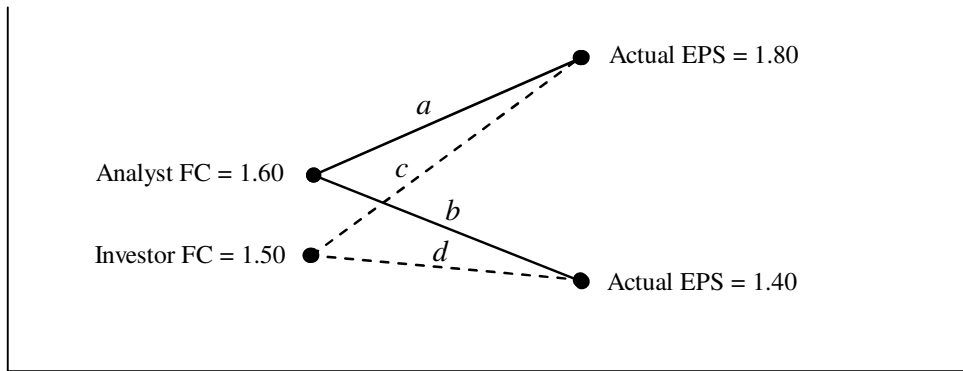
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**FIGURE 1**  
**Illustration of Investors' Perceptions of Reported Earnings Surprises**



————— Reported earnings surprise  
 - - - - - Perceived earnings surprise for a relatively pessimistic investor

Slopes *a* through *d* represent the earnings surprise as follows:

- a* represents a reported positive earnings surprise
- b* represents a reported negative earnings surprise
- c* represents a relatively pessimistic investor's perception of a positive earnings surprise
- d* represents a relatively pessimistic investor's perception of a negative earnings surprise

When the investor expectation is pessimistic relative to the analyst forecast, the perceived positive earnings surprise is greater than reported, i.e.,  $c > a$ , while the perceived negative earnings surprise is smaller than reported, i.e.,  $|d| < |b|$ . FC denotes forecast and EPS denotes earnings per share.

**TABLE 1**  
**Mean Earnings Expectations, Confidence Ratings, and Firm Value Judgments**

<b>Panel A: Initial and Revised Earnings Expectations and Confidence Ratings<sup>a</sup></b>					
	<u>N</u>	<u>E<sub>IFC</sub> (SD)</u>	<u>E<sub>RFC</sub> (SD)</u>	<u>C<sub>IFC</sub> (SD)</u>	<u>C<sub>RFC</sub> (SD)</u>
Overall Sample	242	1.47 (0.22)	1.52 (0.18)	5.50 (2.09)	5.74 (2.14)
<i>By Analyst Forecast Revision Condition</i>					
Downward Forecast Revision	79	1.51 (0.18)	1.45 (0.13)	5.71 (1.94)	5.76 (1.94)
Constant Forecast	82	1.47 (0.22)	1.53 (0.16)	5.46 (1.95)	6.04 (2.19)
Upward Forecast Revision	81	1.45 (0.25)	1.58 (0.20)	5.32 (2.37)	5.41 (2.25)
<b>Panel B: Initial, Revised, and Final Judgments of Firm Value<sup>b</sup></b>					
	<u>N</u>	<u>V<sub>IFC</sub> (SD)</u>	<u>V<sub>RFC</sub> (SD)</u>	<u>V<sub>AE</sub> (SD)</u>	
Overall Sample	239	59.95 (7.24)	60.38 (7.70)	60.66 (9.53)	
<i>By Analyst Forecast Revision Condition</i>					
Downward Forecast Revision	80	60.59 (7.74)	57.12 (8.36)	60.41 (9.50)	
Constant Forecast	82	60.22 (6.51)	61.58 (5.78)	61.23 (9.60)	
Upward Forecast Revision	77	58.99 (7.44)	62.50 (7.75)	60.33 (9.58)	
<i>By Reported Earnings Condition</i>					
High Reported Earnings	80	59.95 (6.98)	60.46 (8.19)	67.45 (6.99)	
Medium Reported Earnings	77	59.39 (8.43)	59.47 (7.67)	57.75 (9.32)	
Low Reported Earnings	82	60.48 (6.27)	61.17 (7.22)	56.78 (8.28)	

$E_{IFC}$  and  $E_{RFC}$  denote participants' prediction of earnings in response to the initial and revised analyst forecast stimuli, respectively.  $C_{IFC}$  and  $C_{RFC}$  denote participants' rating of their confidence in  $E_{IFC}$  and  $E_{RFC}$ , respectively.  $V_{IFC}$ ,  $V_{RFC}$ , and  $V_{AE}$  denote participants' firm value judgment in response to the initial analyst forecast, the revised analyst forecast, and the reported earnings stimuli, respectively. The analyst forecast revision, computed as the revised analyst forecast less the initial analyst forecast, is considered downward (upward) when the revised analyst forecast is lower (greater) than the initial analyst forecast. In the constant analyst forecast condition the revised analyst forecast equals the initial analyst forecast.

<sup>a</sup> Sample excludes four outliers (cases with  $E_{IFC}$  and  $E_{RFC}$  z-scores in excess of |3.29| ( $p < 0.001$ , two-tailed)).

<sup>b</sup> Sample excludes seven outliers (cases with  $V_{IFC}$ ,  $V_{RFC}$ , and/or  $V_{AE}$  z-scores in excess of |3.29| ( $p < 0.001$ , two-tailed)).

**TABLE 2**  
**Investors' Earnings Expectations Relative to Analyst Forecasts**

<b>Panel A: Initial earnings expectations<sup>a</sup></b>						
	<u>N</u>	<u>Analyst IFC</u>	<u>Mean <math>E_{IFC}</math></u>	<u>SD</u>	<u>t</u>	<u>p<sup>b</sup></u>
Overall Sample	242	1.60	1.47	0.22	8.98	<0.001
<b>Panel B: Revised earnings expectations<sup>a</sup></b>						
<u>Forecast Revision Conditon</u>	<u>N</u>	<u>Analyst RFC</u>	<u>Mean <math>E_{RFC}</math></u>	<u>SD</u>	<u>t</u>	<u>p<sup>b</sup></u>
Downward Forecast Revision	79	1.50	1.45	0.13	3.60	<0.001
Constant Forecast	82	1.60	1.53	0.16	3.75	<0.001
Upward Forecast Revision	81	1.70	1.58	0.20	5.17	<0.001

$E_{IFC}$  and  $E_{RFC}$  denote participants' prediction of earnings in response to the initial and revised analyst forecast stimuli, respectively. IFC and RFC denote initial and revised forecast, respectively. The analyst forecast revision, computed as the revised analyst forecast less the initial analyst forecast, is considered downward (upward) when the revised analyst forecast is lower (greater) than the initial analyst forecast. In the constant analyst forecast condition the revised analyst forecast equals the initial analyst forecast.

<sup>a</sup> Sample excludes four outliers (cases with  $E_{IFC}$  and  $E_{RFC}$  z-scores in excess of |3.29| ( $p < 0.001$ , two-tailed)).

<sup>b</sup> P-values are one-tailed under  $H_{null}$ : Mean  $E_{IFC}$  = Analyst IFC (Panel A) or Mean  $E_{RFC}$  = Analyst RFC (Panel B).

**TABLE 3**  
**Effect of Investor Expectations on Judged Firm Value<sup>a</sup>**

<u>Source</u>	<u>df</u>	<u>Type III SS</u>	<u>F</u>	<u>p</u>
<b>Panel A: Initial Earnings Expectations<sup>b</sup></b>				
Model	2	1,267.35	13.33	<0.001
Error	236	11,215.99		
Corrected Total	238	12,483.34		
<i>Covariate</i>				
Investors' Initial Confidence ( $C_{IFC}$ )	1	103.79	2.18	0.141
<i>Independent Variable</i>				
Investors' Initial Earnings Expectation ( $E_{IFC}$ )	1	1,087.55	22.88	<0.001
<b>Panel B: Revised Earnings Expectations<sup>c</sup></b>				
Model	3	2,355.86	15.70	<0.001
Error	235	11,753.26		
Corrected Total	238	14,109.12		
<i>Covariates</i>				
Investors' Revised Confidence ( $C_{RFC}$ )	1	55.59	1.11	0.293
Revised Analyst Forecast Condition	1	450.75	9.01	0.003
<i>Independent Variable</i>				
Investors' Revised Earnings Expectation ( $E_{RFC}$ )	1	1,098.29	21.96	<0.001

$E_{IFC}$  and  $E_{RFC}$  denote participants' prediction of earnings in response to the initial and revised analyst forecast stimuli, respectively.  $C_{IFC}$  and  $C_{RFC}$  denote participants' rating of their confidence in  $E_{IFC}$  and  $E_{RFC}$ , respectively.

<sup>a</sup> Sample excludes seven outliers (cases with  $V_{IFC}$ ,  $V_{RFC}$ , and/or  $V_{AE}$  z-scores in excess of |3.29| ( $p < 0.001$ , two-tailed)).

<sup>b</sup> The dependent variable is the initial judged firm value ( $V_{IFC}$ ).

<sup>c</sup> The dependent variable is the revised judged firm value ( $V_{RFC}$ ).

**TABLE 4**  
**Changes in Judged Firm Value in Response to Forecast Revisions and Earnings Surprises**

<b>Panel A: Mean Change in Judged Firm Value by Analyst Forecast Revision Conditions<sup>a</sup></b>					
<u>Analyst Forecast Revision Condition</u>	<u>N</u>	<u><math>V_{REC} - V_{IFC}</math></u>	<u>SD</u>	<u><math>t^b</math></u>	<u><math>p^c</math></u>
Downward Forecast Revision	79	-3.26	4.33	-6.70	<0.001
Constant Forecast	82	1.22	2.91	3.81	<0.001
Upward Forecast Revision	79	2.47	3.39	6.48	<0.001
<b>Panel B: Mean Change in Judged Firm Value by the Direction of the Change in the Investor's Earnings Expectation<sup>a</sup></b>					
<u>Change in Investor's Earnings Expectation</u>	<u>N</u>	<u><math>V_{REC} - V_{IFC}</math></u>	<u>SD</u>	<u><math>t^b</math></u>	<u><math>p^c</math></u>
Downward Revision ( $E_{RFC} - E_{IFC} < 0$ )	58	-3.63	4.09	-6.76	<0.001
No Revision ( $E_{RFC} - E_{IFC} = 0$ )	76	0.34	2.92	1.03	0.308
Upward Revision ( $E_{RFC} - E_{IFC} > 0$ )	106	2.09	3.97	5.42	<0.001
<b>Panel C: Mean Change in Judged Firm Value by the Sign of the Reported Earnings Surprise<sup>d</sup></b>					
<u>Sign of Reported Earnings Surprise<sup>e</sup></u>	<u>N</u>	<u><math>V_{AE} - V_{REC}</math></u>	<u>SD</u>	<u><math>t^b</math></u>	<u><math>p^c</math></u>
Positive Earnings Surprise	106	6.08	6.40	9.79	<0.001
Negative Earnings Surprise	138	-3.51	7.55	-5.46	<0.001
<b>Panel D: Mean Change in Judged Firm Value by the Sign of the Reported Earnings Surprise and the Investor's Expectation Relative to the Analyst Forecast<sup>d</sup></b>					
	<u>N</u>	<u><math>V_{AE} - V_{REC}</math></u>	<u>SD</u>	<u><math>t^b</math></u>	<u><math>p^c</math></u>
<i>Positive Earnings Surprise</i>					
$E_{RFC}$ Lower than Analyst Revised Forecast	38	6.35	5.37	7.28	<0.001
$E_{RFC}$ Not Lower than Analyst Revised Forecast	68	5.94	6.94	7.06	<0.001
<i>Negative Earnings Surprise</i>					
$E_{RFC}$ Lower than Analyst Revised Forecast	64	-1.97	7.84	-2.01	0.049
$E_{RFC}$ Not Lower than Analyst Revised Forecast	74	-4.85	7.08	-5.89	<0.001

$E_{IFC}$  and  $E_{RFC}$  denote participants' prediction of earnings in response to the initial and revised analyst forecast stimuli, respectively.  $V_{IFC}$ ,  $V_{RFC}$ , and  $V_{AE}$  denote participants' firm value judgment in response to the initial analyst forecast, the revised analyst forecast, and the reported earnings stimuli, respectively. The analyst forecast revision, computed as the revised analyst forecast less the initial analyst forecast, is considered downward (upward) when the revised analyst forecast is lower (greater) than the initial analyst forecast. In the constant analyst forecast condition the revised analyst forecast equals the initial analyst forecast. The revision in investors' earnings expectation, computed as the investor's revised expectation less the investor's initial expectation, is considered downward (upward) when the revised expectation is lower (greater) than the initial expectation. The no revision category reflects cases with a revised investor expectation that equals the initial investor expectation. The sign of the reported earnings surprise is positive (negative) when reported earnings are greater (less) than the analyst revised forecast. Investors' revised earnings expectation is classified dichotomously based on whether or not the investor expectation is lower than the revised analyst forecast.

<sup>a</sup> Sample excludes six outliers (cases with  $V_{RFC} - V_{IFC}$  z-scores in excess of |3.29| ( $p < 0.001$ , two-tailed)).

<sup>b</sup> T-statistics test whether means are significantly different from zero.

<sup>c</sup> P-values are two-tailed.

<sup>d</sup> Sample excludes two outliers (cases with  $V_{AE}-V_{RFC}$  z-scores in excess of 13.291 ( $p < 0.001$ , two-tailed)).

<sup>e</sup> The negative earnings surprise category reflects the low reported earnings condition for all three analyst forecast revision conditions and the medium reported earnings condition for the upward and zero analyst forecast revision conditions. The positive earnings surprise category reflects the high reported earnings condition for all three analyst forecast revision conditions and the medium reported earnings condition for the downward analyst forecast revision condition.

**TABLE 5**  
**Effect of Reported Earnings Surprises on Judged Firm Value**

<u>Source</u>	<u>df</u>	<u>Type III SS</u>	<u>F</u>	<u>p</u>
<b>Panel A: Effect of the Sign of the Earnings Surprise on the Change in Judged Firm Value<sup>a</sup></b>				
Model	4	1,021.84	5.32	<0.001
Error	239	11,484.90		
Corrected Total	243	12,506.74		
<i>Covariates</i>				
Revised Analyst Forecast Condition	1	24.72	0.51	0.474
Absolute Value of Reported Earnings Surprise	1	623.10	12.97	<0.001
Investors' Revised Confidence ( $C_{RFC}$ )	1	4.79	0.10	0.753
<i>Independent Variable</i>				
Sign of Reported Earnings Surprise	1	351.46	7.31	0.007
<b>Panel B: Effect of the Sign of the Earnings Surprise and Investor Expectations Relative to Analyst Forecasts on the Change in Judged Firm Value<sup>a</sup></b>				
Model	6	1,395.08	4.96	<0.001
Error	237	11,111.66		
Corrected Total	243	12,506.74		
<i>Covariates</i>				
Revised Analyst Forecast Condition	1	16.27	0.35	0.556
Absolute Value of Reported Earnings Surprise	1	693.90	14.80	<0.001
Investors' Revised Confidence ( $C_{RFC}$ )	1	17.60	0.38	0.541
<i>Independent Variables</i>				
Sign of Reported Earnings Surprise	1	17.45	0.37	0.542
Investor Expectation Relative to Analyst Revised Forecast	1	347.06	7.40	0.007
Sign of Earnings Surprise * Relative Investor Expectation	1	244.38	5.21	0.023

The sign of the reported earnings surprise is positive (negative) when reported earnings are greater (less) than the analyst revised forecast. Investors' revised earnings expectation is classified dichotomously based on whether or not the investor expectation is lower than the revised analyst forecast.

<sup>a</sup> Sample excludes two outliers (cases with  $V_{AE}-V_{RFC}$  z-scores in excess of |3.29| ( $p < 0.001$ , two-tailed)).