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Toward an Understanding of the Risky Choice Behavior of Professional Financial Analysts

James E. Hunton, Ruth Ann McEwen and Sudip Bhattacharjee

Several studies have reported inefficiencies and/or biases in analysts' ability to incorporate new information into their earnings forecasts. We propose that an important psychological factor associated with optimistic earnings forecasts is the propensity of analysts to engage in risky choice behavior as described by prospect theory. Furthermore, the motivational incentives faced by analysts may exacerbate risky choice behavior during forecast revision, thereby magnifying overestimates of earnings.

Sixty professional financial analysts were asked to issue a first quarter and then an annual EPS forecast of a company. The analysts were randomly assigned to two initial forecast accuracy conditions that indicated their initial forecast earnings was 1) essentially the same as actual earnings, or 2) substantially higher than actual earnings. Analysts were also assigned to one of three motivational incentive conditions indicating the analyst and brokerage firm would 1) have no future contact with the forecast firm, 2) begin to follow the forecast firm, or 3) establish an underwriting relationship with the forecast firm.

The results indicate that analysts who perceived a loss function due to the inaccuracy of prior earnings forecasts tended to choose riskier prospects in subsequent forecast revisions than analysts who perceived their prior earnings forecasts to be accurate. These riskier prospects translate into greater overestimates of earnings. Furthermore, while the average risk attitude of the analysts was optimistic, higher levels of motivational incentives were associated with greater risk-seeking behavior by the analysts who perceive a loss function. It appears that the motivational incentives inherent in brokerage firms can exacerbate the risky choice behavior of financial analysts during forecast revision. These findings support the utility of incorporating both cognitive and motivational factors into the prediction of analyst behavior.

Prior research has indicated that financial analysts tend to provide optimistic earnings forecasts (Brown, Foster, and Noreen, 1985; Schipper, 1991; Maines, 1995; and Hunton and McEwen, 1997). The tendency of analysts to overestimate earnings is often heightened immediately after the issuance of "bad news" (Mendenhall, 1991; Abarbanell and Bernard, 1992; Teoh and Wong, 1997).

Researchers attribute this underreaction anomaly to a cognitive processing bias, whereby analysts fail to adequately incorporate negative feedback signals (Francis and Philbrick, 1993; Easterwood and Nutt,

James E. Hunton is the Quinn Eminent Scholar of Accounting Information Systems at the University of South Florida. He earned his Ph.D. in Accounting and Information Systems from the University of Texas at Arlington and his MBA from Rivier College. His research interests include decision theory and judgment in auditing, accounting information systems, and financial accounting. He has published in *The Accounting Review; Accounting, Organizations & Society; Management Science; MIS Quarterly; The Journal of Applied Psychology,* and other academic journals. He teaches accounting information systems primarily at the graduate level.

Ruth Ann McEwen is a Professor of Accounting at the Sawyer School of Management, Suffolk University, Boston. She received her Ph.D. in Accounting and her MS in Industrial Management from Georgia Institute of Technology and she is a CPA. Ruth Ann's research interests focus on the usefulness of accounting information to professional financial analysts in forecasts of earnings. She has published in *The Accounting Review, Accounting Horizons, Advances in Accounting, Decision Sciences,* and other academic journals. Her teaching interests include financial accounting, primarily at the graduate level.

Sudip Bhattacharjee is an Assistant Professor of Accounting at the Pamplin College of Business, Virginia Polytechnic Institute and State University. He has a Ph.D. in Accounting from the University of Massachusetts, an MBA from the Virginia Polytechnic Institute and State University, and a Bachelors of Commerce from the University of Bombay, India. Sudip's research interests include examining decision-making in accounting and auditing contexts using behavioral decision theory and assessing the impact of technology on accounting education. He has published in a number of academic journals, including the *Journal of Accounting Research, Accounting Education: An International Journal,* and *Business Journal.* His teaching interests include undergraduate and graduate courses in financial accounting, management accounting, and cost accounting.

Requests for reprints should be sent to: Ruth Ann McEwen, Accounting Department, Sawyer School of Management, Suffolk University, 8 Ashburton Place, Boston, MA 02108–2770. Email: ruthann@ruthannmcewen.com

1999). We suggest that there is another important psychological factor at play here: the propensity of analysts to engage in risky choice behavior as described by prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1981, 1986). Specifically, when the accuracy of initial earnings forecasts is evaluated as a loss, analysts will choose more risky prospects when issuing revised forecasts. As a result, risky choice may lead to optimistic forecast behavior.

The literature has also suggested that certain motivational and financial incentives inherent in brokerage firms can lead to optimistic estimates of earnings (Schipper, 1991; Francis and Philbrick, 1993; Lin and McNichols, 1993; Dugar and Nathan, 1995; Maines, 1995; Hunton and McEwen, 1997; Kahn and Rudd, 1999). Considering this factor is important because the unique features of a professional environment can mitigate or exacerbate some of the biases observed in the general public (Smith and Kida, 1991; Ricchiute, 1998).

In an experimental setting using professional financial analysts as subjects, Hunton and McEwen [1997] examined the influence of motivational factors on earnings forecasts. They found a positive relationship between forecast optimism and motivational incentives. Based on these findings, we further suggest that motivational incentives may exacerbate risky choice behavior of financial analysts during forecast revision, thereby magnifying overestimates of earnings.

This study contributes to the extant financial analyst research by investigating the influence of the value function proposed in prospect theory on sell-side financial analysts' overestimates of earnings. Concomitantly, we examine if the motivational incentives facing analysts are complementary or conflicting to the value function proposed in prospect theory. We use a 2×3 fully crossed, between-subjects design. Sixty professional financial analysts are randomly assigned to two initial forecast accuracy conditions. Forecast earnings are either 1) essentially the same as actual earnings, or 2) substantially higher than actual earnings. Analysts are also randomly assigned to one of three motivational incentive conditions. The analyst and brokerage firm will 1) have no future contact with the forecast firm, 2) begin to follow the forecast firm, or 3) establish an underwriting relationship with the forecast firm (Hunton and McEwen, 1997).

As expected, analysts who perceive a loss due to the inaccuracy of their initial earnings forecasts seem to choose riskier prospects when issuing a forecast revision. These riskier prospects translate into greater overestimates of earnings. However, while the average risk attitude of the analysts in this study was optimistic, the extent to which motivational incentives influence their choice behavior was contingent on their perceived gain/loss position.

As financial economists become accustomed to thinking about the role of human behavior (Thaler, 1999), studies such as this one will complement traditional finance research and provide additional insight into analyst behavior (McGoun and Skubic, 2000). Subsequent sections of this paper discuss the underlying theories, provide a description of the experiment, present results, and offer suggestions for future research.

Theoretical Background

Traditional research has assumed that financial analysts are rational experts in the market for information who predict future earnings and make trading recommendations (Kahn and Rudd, 1999). This view presumes that analyst earnings forecasts incorporate all new information immediately and in an unbiased manner. However, several studies have reported inefficiencies and/or biases in analysts' ability to incorporate new information into their earnings forecasts, although the results of these studies have been mixed. Some conclude that analysts underreact to information (e.g., Abarbanell and Bernard, 1992; Mendenhall, 1991; Teoh and Wong, 1997); others suggest that analysts overreact to new information. Recently, Easterwood and Nutt [1999] found that analysts underreact to abnormally negative forecast errors, and overreact to abnormally positive forecast errors. While such systematic under- or overreaction may be perceived as inconsistent with rational forecasts, understanding such biases is important to get a complete picture of analyst behavior.

Behavioral finance has incorporated various aspects of human behavior into traditional finance to improve our understanding of analysts and investors (McGoun and Skubic, 2000). For example, Barberis, Shleifer, and Vishny [1997] built a model of typical investor behavior based on concepts from psychology. They suggest that investors ignore the laws of probability and behave as if events recently observed are typical of the earnings generating process (i.e., representativeness). In addition, investors are slow to update their prior beliefs in response to new information. These two behavioral tendencies combined cause underreaction in some situations and overreaction in others.

Daniel, Hirshleifer, and Subrahmanyam [1998] indicate that investors are overconfident and believe too strongly in their private information. Furthermore, investors attach too much significance to signals that confirm their prior beliefs. This stream of research suggests that cognitive factors often influence the valuation of assets by individuals (Thaler, 1999). Our study investigates one psychological factor associated with optimistic earnings forecasts of financial analysts—the propensity to engage in risky choice behavior as de-

scribed by prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1986).

Prospect Theory

Prospect theory, first put forth by Kahneman and Tversky [1979], describes preferences for risky alternatives that violate the axioms of expected utility theory. According to expected utility theory, the utility of an outcome is weighted by its probability of occurrence, and individuals should be indifferent to choices involving equal expected utility. Prospect theory suggests that expected utility is not a linear function; rather, it follows a value function associated with changes in wealth that is concave in the domain of gains and convex in the domain of losses. The value function is steeper for losses when compared to gains, suggesting that losses exact a greater subjective penalty from affected parties.

Kahneman and Tversky [1979, p. 286] assert that relative changes from status quo, not changes in final asset position, drive risky choice behavior, and they define this phenomenon as the "shifts of reference problem." Under classic utility theory, participants are expected to choose from among risky alternatives so as to maximize their expected final asset position. However, prospect theory posits that gains and losses are coded relative to the status quo (e.g., an expectation or aspiration level). The reference point may tend to shift away from status quo if the participant has suffered a recent loss and failed to adapt to it, or has failed to achieve an expected gain.

Accordingly, when placed in a loss domain, individuals tend to become more risk-seeking and often choose riskier alternatives.[1] When placed in a gain situation, decision-makers seem to prefer certainty over risk because their expectation levels have been either met or exceeded, and their reference points have not shifted away from the status quo.

Analysts' Motivational Incentives

Sell-side analysts are employed by brokerage and investment banking firms and are often offered economic incentives to promote the purchase of stock and generate additional business (see Schipper, 1991; and Carleton, Chen, and Steiner, 1998). Analysts are often more motivated to meet the demands of their employers and the top executives of the forecast firms than to accurately forecast earnings (Easterwood and Nutt, 1999; Kahn and Rudd, 1999). In fact, several studies suggest that motivational incentives at brokerage firms can influence forecast accuracy and lead analysts to provide optimistic estimates of earnings (e.g., Schipper, 1991; Abarbanell and Bernard, 1992; Dugar and Nathan, 1995; Hunton and McEwen, 1997).

Considering the unique motivational incentives faced by professional financial analysts is important when analyzing risky choice behavior. A large body of research suggests that professionals operating in their own environment (such as analysts, corporate managers, and auditors) are prone to different biases than those reported in the general human decision-making literature (see Smith and Kida, 1991 for a review). In addition, the unique features of a professional environment can mitigate or exacerbate some of the biases observed in the general public (e.g., Ahlawat, 1999; Ricchiute, 1998). In the absence of motivational incentives, the value function of prospect theory is likely to produce a tendency toward risky choice behavior of financial analysts. However, in the presence of such incentives, there is an implied crossover point where motivational factors faced by analysts may overpower the risk-seeking force of the value function.

Hypothesis and Research Questions

In this study, we examine an application of the shifts of reference problem described by prospect theory to the underreaction anomaly associated with analyst earnings forecasts. Prior studies have suggested that the underreaction anomaly is the result of an inability to fully incorporate the effects of a negative earnings surprise into future forecasts, thus resulting in an overestimate of future earnings. We attempt to understand this phenomenon more fully by following a chain of logic provided by the value function of prospect theory and the motivational incentives faced by analysts.

We first make a prediction regarding our control group of financial analyst subjects who are offered no motivational incentives when providing forecast revisions. If analysts provide earnings forecasts for a firm and are then told that the firm reported lower earnings numbers, we expect them to code the initial inaccuracy as a loss because their overestimates will differ substantially from their expectations. Consequently, we posit that their reference points will be shifted away from the status quo. If the analysts have not adapted to their loss, this setting is likely to induce more adventurous choice behavior in the forecast revision due to the risk-seeking force of the value function.

Conversely, if analysts are told that their forecasts are essentially correct, we would expect them to code their initial accuracy as a gain (or a "no-loss") relative to expectations. In this situation, the analysts have achieved the status quo and have no losses to which they must adapt. Thus, according to the value function, they are expected to choose certainty over risk in subsequent decisions about forecast. Accordingly, we present the following hypothesis (alternate form):

H1: In the absence of motivational incentives, financial analysts whose initial earnings estimates are substantially higher than reported

earnings will exhibit more risky choice behavior in forecast revision than analysts whose initial forecasts are essentially the same as reported earnings.

It is difficult to make precise predictions regarding risk behavior in the presence of incentives (i.e., payoffs) because their impact on risky choice depends on a combination of shifts in analyst reference points and the role of the incentives. Depending on the situation, motivational incentives can act in a complementary or a conflicting manner to the value function.

While it is not possible to know a priori the analysts' risk attitude, we can infer their average risk attitude by observing their behavior under different experimental treatment conditions. This is an important issue because it may help explain the underreaction anomaly as well as provide considerable insight into the risk attitudes of professional financial analysts.[2] Accordingly, instead of specific hypotheses, we propose two research questions.

We suggest that analysts who have provided forecasts for a firm and then find that their forecasts are essentially incorrect will perceive a loss relative to their expectations of forecast accuracy. According to the value function of prospect theory, this shift of reference away from the status quo is expected to produce risk-seeking propensities when issuing revised forecasts. Analysts will seek to make up for their earlier loss position, and this may exacerbate their risk-seeking behavior.

However, the amount by which an individual tries to make up their earlier loss position depends somewhat on the nature of the relationship the analyst expects to have with the forecast firm. Analysts who do not expect to have any future contact with the firm will feel little incentive to enhance their relationship with the firm. This may diminish the extent of the risk-seeking behavior that is exhibited. However, if analysts believe they will maintain a future relationship with the forecast firm, and thereby generate future revenue, they may intensify their risk-seeking behavior to make up for their earlier loss position. This leads us to the first research question:

R1: To what extent will increasing motivational incentives lead to more risky behavior on the part of financial analysts whose initial earnings estimates are substantially higher than reported earnings?

Alternatively, we suggest that analysts who have provided forecasts for a firm and who find that their forecasts are essentially correct will not perceive a shift of reference from their status quo. That is, their initial accuracy will be confirmed as expected. Accordingly, we assume they are in a no-loss domain and will code future prospects as a choice between certain gains associated with continued forecast accuracy or risky gains associated with overestimating earnings in an upcoming forecast revision. Under prospect theory alone, these analysts should prefer certainty over risk.

However, analysts who are told that they will begin to follow the case firm or will underwrite a share offering have increasing incentives to overestimate earnings. Prior studies suggest this is so because 1) such forecasts positively affect firm revenue and analyst compensation, and 2) analysts may have access to private information from the firm being analyzed and may jeopardize such access by issuing a pessimistic forecast (Abarbanell and Bernard, 1992; Schipper, 1991; Hunton and McEwen, 1997).

In a firm-following situation, the latter incentive is prevalent, coupled with the possibility of underwriting the target firm at some point in the future. Therefore, if the payoffs are sufficiently high, analysts might encounter a crossover point at which the incentives will offset the value function's impetus toward risk aversion.

In this study, if higher motivation levels lead to more risky choices for analysts in the no-loss domain, it is likely that the incentives are sufficiently strong to overpower the risk-averse nature of the value function. However, if higher motivation levels lead the analysts to choose certainty over risky choices, then it is likely that the motivational incentives faced by analysts are not sufficiently strong to overcome the value function's risk-averse nature. Consequently, the second research question is:

R2: To what extent will increasing motivational incentives lead to more risky behavior on the part of financial analysts whose initial earnings estimates are essentially the same as reported earnings?

Research Design

Sixty "sell-side" professional financial analysts participated in and completed our experiment. They were from a major brokerage firm in New York, who agreed to sponsor the research.[3] The average age of the subjects was 35.7 years, and ranged from 24 to 54. 68% of the subjects were male, 83% were chartered financial analysts, and 68% held a master's degree. The average number of years as a financial analyst was 8.9 (ranging from one to twenty-nine years), and the average number of years with the firm was 7.3 (ranging from one to twenty-three years).

Case Scenario

The case firm was AutoZone, Inc., a company listed on the NYSE. We chose AutoZone because the broker-

age firm did not follow this company or the automotive parts industry. The case was presented in a computerized format and included the complete annual report, a summary of general economic and industry information, and other company information from the 10-K.[4] In addition to the case materials, two manipulations were included in the experiment.

All analysts received the same information at the beginning of the experiment. After analyzing this information, subjects activated an icon indicating they were ready to provide a first quarter earnings forecast, an annual earnings forecast, and a buy/sell/hold recommendation.[5] The computer then randomly assigned each analyst to one of the three motivation scenarios, i.e., the subjects were told to assume that their firms would 1) underwrite a 15 million share offering for AutoZone, Inc.,[6] 2) begin to follow the firm or the industry, or 3) have no future contact with the firm or the industry. At this point, subjects could go back and review prior screens before making their forecasts and recommendations. Subjects initially issued the first quarter and the annual EPS forecasts.

Once the forecasts were made, a loss position was randomly manipulated as a surrogate indicator of "shift of reference." In the loss condition, subjects were led to believe they substantially overestimated their first quarter forecasts (i.e., the computer divided their first quarter forecast by a constant factor of 1.5 to arrive at the "actual" first quarter earnings). In the no-loss condition, subjects were told their first quarter forecast and the actual first quarter earnings differed by only $0.01 (i.e., the computer added $0.01 to the subject's first quarter forecast). Manipulation of forecasts in this manner was expected to evoke a personal sense of loss (no-loss) for the subjects.

For financial analysts, motivational incentives can be both extrinsic and intrinsic. Two of the scenarios we ask subjects to consider here, that their brokerage firms will begin to follow the forecast firm or that they will establish an underwriting relationship with the forecast firm, are expected to represent increasing motivational incentives. Since this study is conducted as an experiment, it is not possible to replicate the external incentives associated with these motivational conditions. Hence, we attempt to measure an intrinsic effect as a surrogate indicator of increasing incentives. That is, we assume that the analysts' perceived satisfaction with their own performance represents an asset of interest to our subjects.[7]

Both groups were provided with a 1996 fiscal year earnings per share (FYEPS) probability distribution attributed to analysts who follow the industry and the firm. There are a number of possible distributions involved when predicting future earnings, so we attributed the probability distribution to "expert analysts" in the field in order to provide a consistent reference to subjects. We calculated the probability distribution as follows:

$$P(\text{FYEPS}) = [(\text{Subject's Initial Annual EPS Forecast})(1.01)/n] \quad (1)$$

where P(FYEPS) = the probability of the earnings estimate, and n = 0.1, 0.2, … , 1.0.

For example, an analyst who initially forecast annual earnings at $0.96 would have seen the following probability distribution:

Probability	Fiscal 1996 EPS
100%	0.97
90%	1.08
80%	1.21
70%	1.38
60%	1.62
50%	1.94
40%	2.42
30%	3.23
20%	4.85
10%	9.70

The subject would see that other analysts who follow the automotive parts industry and the case firm believe there is a 100% probability that the fiscal 1996 EPS will be $0.97, a 90% probability that earnings will be $1.08, an 80% probability that earnings will be $1.21, and so on.

Subjects were next asked to choose which prospect (100%, … , 10%) best reflected their expectations concerning fiscal 1996 EPS. For example, analysts who selected the 40% choice would be predicting a 40% probability that fiscal year 1996 EPS would be $2.42. The constant factor of 1.01 was included in the formula to provide subjects with a FYEPS that approximated their own initial annual forecast of earnings at the 100% (certainty) level.[8]

The remainder of the distribution provided increasing levels of uncertain earnings assessments, with the most risky selection being the 10% probability level. Thus, the probability distribution represents the future prospect as a choice between certainty (the 100% probability level) and increasing levels of risky choice (any other probability level). The remainder of the computer-guided experiment requested subjects to respond to manipulation checks[9] items and demographic information.

Results

Prospect theory requires that subjects perceive a gain or loss associated with performance and that these gains or losses be measured relative to a reference point. We assume that analysts' satisfaction with their own performance represents an asset of interest to our subjects and that satisfaction measures reflect perceived value gains and losses in the current asset position with regard to an intrinsic expectation level.[10]

Thus, we infer a shift to the gain or loss domain from self-reported measures of satisfaction.

We performed manipulation checks to estimate the perceived loss position of the subjects. Each subject was asked to rate how satisfied brokerage house management and a hypothetical client would be with their initial quarterly earnings forecast, and to rate their own satisfaction level with the forecast as well. Satisfaction was scaled from 1 to 7, with 1 = very satisfied, 4 = neither satisfied nor dissatisfied, and 7 = very dissatisfied.

Table 1, Panel A, shows that the three satisfaction indicators were lower for no-loss domain subjects than for loss domain subjects. Based on this evidence, we suggest that the relatively higher dissatisfaction levels will be coded as intrinsic value losses relative to a personal aspiration level, and that the relatively lower dissatisfaction levels will be coded as either a gain or a no-loss over status quo.

Based on a two-way ANOVA model (see Table 1, Panel B), there is a significant main effect for loss position in assessing the probabilities associated with future earnings. The mean scores reflect the analysts' chosen probabilities. Thus, higher probabilities reflect less risky choices while lower probabilities reflect more risky choices. Overall, subjects in the no-loss domain exhibited significantly less risky choice behavior than subjects in the loss domain.

Results also show a significant main effect for motivation level, indicating that higher motivational incentives lead to greater risky choice. However, the interaction term is significant in the ANOVA model; therefore we use Fisher's least square difference multiple pairwise comparison test as a post-hoc procedure to examine the study's hypothesis and research questions.[11]

Hypothesis

The research hypothesis anticipates that, with no future contact, analysts in the no-loss domain will be less risky in their forecast revisions than analysts in the loss domain. A comparison of those subjects told to assume they would have no future contact with the forecast firm shows that prospect theory may help explain analysts' forecast bias toward overestimates immediately after receiving "bad news."

In a rational sense, we might expect subjects who initially overestimated quarterly earnings to revise their annual earnings downward. Because subjects were not allowed to provide estimates below their initial forecasts, we would then expect them to choose the lowest earnings number available, represented by the 100% probability level. But instead, subjects in the loss domain chose more risky prospects than subjects in the no-loss domain. Hence, the shifts of reference problem and value function described in prospect theory help us to better understand why financial analysts tend to underreact to recent "bad news." Our results support the study hypothesis.

Research Questions

The first research question contemplates whether subjects in the loss domain will choose more or less

Table 1. *Effects of Loss Position and Motivational Factors on Risky Choice Behavior*

Panel A: *Relation of Loss Position to Satisfaction Measures**

	No-Loss	Loss	t-score	p-value
Perceived Management Satisfaction	2.07	5.33	–9.08	0.0001
Perceived Client Satisfaction	2.13	5.43	–11.10	0.0001
Self Satisfaction	1.80	4.97	–11.03	0.0001

Panel B: *Effects of Loss Position and Motivational Factors on Risky Choice ANOVA Model Results***

Source	F-ratio	p-value
Loss Position	86.38	0.0001
Motivation Level	6.78	0.0024
Loss Position by Motivation Level	6.80	0.0023

	Firm Underwriting	Firm Following	No Future Contact	Main Effects
No-Loss	99[a] (n = 10)	98[a] (n = 10)	99[a] (n = 10)	99 (n = 30)
Loss	48[d] (n = 10)	65[c] (n = 10)	81[b] (n = 10)	65 (n = 30)
Main Effects	74 (n = 20)	82 (n = 20)	90 (n = 20)	82 (n = 60)

Note: Considering all six cell means together, means with different superscripts are significantly different using Fisher's least square difference multiple pairwise comparison test (p = 0.02).

*1 = very satisfied; 7 = very dissatisfied.

**The dependent variable represents the probability level, multiplied by 100, chosen by subjects. Accordingly, lower mean scores indicate riskier choices.

risky prospects during forecast revisions as motivational incentives increase. The second research question considers the earnings forecast revision behavior of subjects in the no-loss domain as incentives increase. Our findings indicate that the loss subjects exhibited higher risk-seeking behavior across motivation levels, while the no-loss subjects chose certainty, regardless of the incentive condition. Consequently, there is an interaction between initial forecast accuracy and motivational incentives.

Because the loss subjects chose riskier prospects as motivational levels, it appears that the opportunity to maintain future relationships with the forecast firm or to generate future revenue intensifies the risk-seeking behavior to make up for the earlier loss position. Conversely, since the no-loss subjects preferred certainty over risk, the incentives are not strong enough to overpower the value function's tendency toward risk aversion in the face of gains (or no losses).

Attempts to reconcile conflicting findings from the loss and no-loss subjects indicate that the average risk attitude of the analysts in this study was optimistic, but the extent to which motivational incentives influenced their behavior was contingent on their perceived gain/loss position. Hence, prospect theory can provide valuable theoretical insight into the tendency of professional financial analysts to overestimate earnings, particularly after receiving "bad news." In addition, considering the unique motivational incentives faced by professional financial analysts is useful in understanding risky choice behavior.

Discussion

These findings provide important insight into the risk attitudes of professional financial analysts. Financial analysts who perceive a loss of personal satisfaction due to the inaccuracy of their prior earnings forecasts tend to choose riskier prospects in subsequent forecast revisions than analysts who perceive their prior earnings forecasts to be accurate. In addition, the behavior exhibited by the analysts in the loss domain indicates that higher levels of motivational incentives are associated with greater risk. It appears that the incentives inherent in brokerage firms can lead to optimistic estimates of earnings, and can exacerbate their risky choice behavior during forecast revisions.

These results imply that the impact of "shifts of reference" via the value function in the prospect theory (Kahneman and Tversky, 1979) and the influence of motivational incentives both contribute to earnings forecast bias. These joint influences may help explain why financial analysts tend to overestimate earnings after receiving "bad news"—a phenomenon observed by Mendenhall [1991], Abarbanell and Bernard [1992], and Francis and Philbrick [1993]. Taken together, these findings also support the utility of incorporating cognitive and motivational factors into the prediction of analyst behavior.

Several limitations are inherent in this study. Our experimental scenario provides only a subset of information available to financial analysts. Since the analysts were employees of the same firm, training and corporate culture may have biased the results. The subjects might also have amplified their degree of optimism since there were no consequences for making optimistic forecasts. Furthermore, the experiment imposed the motivation manipulation after the initial screening task, which is not reflective of the real world.

However, our results suggest that additional research is warranted to determine if education and training can reduce the bias associated with professional analyst earnings forecasts. For example, Kahneman and Tversky [1979] suggest that the most efficient way to alleviate the shifts of reference problem is to focus the subjects' attention on their final asset position instead of on the status quo.

This study suggests that the loss function of professional financial analysts may be defined by a combination of prospect theory and the unique motivational incentives they are offered. Additional research in this area might also further refine the specified functional relationship between forecast bias and analysts' perceived gains and losses. For example, research can examine the impact of other contextual and institutional factors (e.g., the culture of the brokerage firm) on forecast bias.

In addition, the SEC has issued new rules on full disclosure stating that if material non-public information is disclosed to certain enumerated persons (in general, securities market professionals), then it must also be disclosed to the public (SEC, 2000). Additional studies need to investigate the impact of these new rules on analyst forecasts in order to gain an even more comprehensive understanding of analyst forecast behavior.

Notes

1. Kahneman and Tversky [1979] describe this behavior in terms of an individual who has not made peace with his losses and is thus likely to accept gambles that would be unacceptable to him otherwise. This phenomenon is exemplified by the tendency to bet on long shots at the end of a losing betting day.
2. We understand that risk attitude is an individual attribute. In this experiment there are ten analysts per treatment condition. Hence, when discussing the risk attitudes of financial analysts, we are referring here to their mean risk attitude within each experimental condition.
3. The brokerage firm wishes to remain anonymous.
4. At the exit stage of the experiment, subjects were asked to maintain secrecy concerning the case until the experiment was completed.
5. Fifty-eight of the sixty subjects indicated a "buy" position. This question was included only to enhance task realism and will be omitted from any additional analyses.

6. 15 million shares was arbitrarily chosen as approximately 10% of AutoZone's outstanding shares.
7. Acceptable or superior performance is assumed to represent future increases in wealth or reputation.
8. The analysts were not allowed to underestimate earnings for two reasons. First, we are concerned with an examination of prospect theory and its inferences for the underreaction anomaly; therefore, only overestimates are of interest. Second, we believe that any subject unable to reduce his (her) estimate below the lower bound would choose the 100% probability level, thus biasing the study toward non-significant differences.
9. 100% of the subjects correctly indicated the manipulations to which they were randomly assigned.
10. Since Kahneman and Tversky [1979, p. 288] suggest that their theory is readily applicable to functions other than the value function for money, we might also assume that satisfaction is the asset of interest to our subjects instead of a representation of this asset.
11. The data used here were part of a broader study.

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