
ARTICLES

Do Investors React Differently to Range and Point Management Earnings Forecasts?

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This study investigates the differential effects of range and point management earnings forecasts. I focus on investors' reactions to earnings forecasts with both favorable and unfavorable outcomes under high information uncertainty. Based on theories in judgment and decision making, I predict that investors' reactions to range forecasts depend on the perceived favorability of earnings forecasts. Experimental results are consistent with the prediction. Participants allocate the most resources to firms issuing favorable range forecasts and the least to those with unfavorable range forecasts. Interestingly, range and point forecasts do not have differential effects on participants' earnings predictions, confidence judgments, and risk judgments.

Keywords: Point, Range, Management earnings forecasts, Uncertainty, Ambiguity, Gains and losses

INTRODUCTION

Forward looking management earnings forecasts is an important piece of information for investors. Many firms issue earnings forecasts in various communication channels to convey profitability information. In a survey conducted by the National Investor Relations Institute (NIRI) on current earnings guidance practices, 78% of its corporate members indicate that they provide earnings guidance regularly (NIRI, 2003). Interestingly, the majority (75%) choose to provide earnings guidance as a range estimate, while only 11% choose a precise point estimate. The prevalence of range earnings guidance is further supported by academic evidence. Between 1990 and 2003, 51.4% of management earnings forecasts were issued in the form of range estimate, 27.3% in precise point estimate, and the rest were open-ended intervals or qualitative statements about earnings prospects (Anilowski, Feng, and Skinner [2004]).

Unlike a precise point estimate which gives only one possible outcome, a range earnings forecast is imprecise and

provides vague information about future earnings outcomes. A range forecast includes the point estimate and standard error of the forecasts, and makes salient both better and worse possible values (Highhouse [1994]). Given a range forecast, investors must evaluate the range of possible earnings outcomes and make decisions based on vague outcome information. An interesting question is how investors react to forecasts in range form and whether range and point forecasts affect investors' judgments and decisions differently. Hirst, Koonce, and Miller [1999] initiated this line of inquiry. In their experiment, they find that forecast form/precision indeed affects investors' judgments. Specifically, they observe that, compared to the point forecast, the range forecast reduces investors' confidence and decreases their willingness to purchase stocks. Unfortunately, a standard practice in accounting research is to treat the range estimate the same as a point estimate by simply using the midpoint or one of the end points of the range estimate. Substituting a point estimate for a range estimate neglects valuable information and may yield misleading results.

Investors live in a sea of uncertainty. Prior evidence has shown that information uncertainty affects investment behaviors (Zhang [2006, 2006]). Limited understanding exists about how investors evaluate a range forecast when there is high information uncertainty. Hirst et al. [1999] examine investors' reactions to range forecasts, but information

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uncertainty is quite low in their experiment because participants in their experiment evaluate only one firm and are given detailed information about that particular firm. However, investors often face high information uncertainty because the level of available information is low, the quality of information is poor, or their ability to search for or understand the relevant information is limited. Therefore, I expect uncertainty in the information environment exacerbates the difficulty of assessing vague outcomes in a range forecast.

Investors rely on available accounting information to assess potential gains or losses of expected investment outcomes. Psychological theories suggest that the gain or loss frame adopted by individuals directly affects their judgment and decisions (Kahneman and Tversky [1979]). Investors' evaluation of range forecasts is no exception. Hirst et al. [1999] focus on the domain of potential gains by providing participants with favorable earnings forecasts that exceed prior period results. It remains unclear whether investors' reactions to range forecasts may change when they evaluate unfavorable forecasts conveying potential losses. Understanding the impact of range forecasts in an unfavorable setting is as important as, if not more important than, it is in a favorable setting because investors are loss averse and tend to feel losses much more acutely than they feel gains of comparable magnitude. The goal of this study is to shed light on this important question.

Judgment and decision-making theories focus on individual behaviors under uncertainty, but they distinguish between risk and ambiguity. Risk describes a context where despite uncertain outcomes there is sufficient information to derive a single probability distribution with certainty, while ambiguity captures a setting where information is so imprecise that multiple probability distributions have to be estimated (Camerer and Weber [1992]). Individual decisions and choices under risk and ambiguity are not necessarily the same. In Hirst et al. [1999], because of the relatively low uncertainty, it is fairly easy for participants to derive a single probability distribution (e.g., uniform distribution) and calculate the expected value based on the range forecast. However, high information uncertainty suggests that probabilities must be estimated with some imprecision and there may exist multiple probability distributions about outcomes. Without knowing a single probability distribution, it is difficult for investors to evaluate the vague outcomes entailed by a range forecast and determine the expected value for future earnings. Thus, evaluating range forecasts under high information uncertainty resembles decision under ambiguity.

In general, decision makers dislike ambiguity. Ambiguity aversion describes the desire to avoid unclear situations of imprecise information (Ellsberg [1961]). However, evidence is somewhat mixed concerning the effect of ambiguity aversion on financial decision making. Recent evidence suggests that the decision frame affects reactions to ambiguity. Specifically, ambiguity seeking is found in the domain of gains and ambiguity averse in the domain of losses. The market's

earnings expectation is a natural benchmark for investors to evaluate management earnings forecasts. Archival evidence indicates that investors evaluate their expected gains or losses by the extent that earnings forecasts are greater or less than the market's expectation (Degeorge, Patel, and Zeckhauser [1999]). Therefore, I expect the gain or loss frame adopted by investors affects their reactions to range forecasts.

This study focuses on a decision context with high information uncertainty and relies on theory and evidence of ambiguity for guidance. Specifically, I hypothesize that investors prefer ambiguity when facing potential gains and thus overvalue firms with range forecasts, but prefer precision when facing potential losses and thus undervalue firms with range forecasts. To test these hypotheses, I conduct an experiment with a 2×2 within subjects design with repeated measures, where MBA students evaluate four hypothetical companies that systematically vary in two dimensions, forecast form (range vs. point) and performance favorability (favorable vs. unfavorable). I provide participants with limited information about each company, which includes brief background information and earnings forecast issued by management. Participants make a series of judgments, including earnings (EPS) predictions, confidence judgments, and risk judgments, and make resource allocation decisions. Point and range earnings forecasts are equivalent because the range midpoint equals the point estimate. Performance favorability is manipulated by including a simple statement about whether management earnings forecasts are above or below the prevailing market's expectations. In general, experimental results support the hypotheses. Participants allocate the most resources to firms that issue range forecasts with favorable earnings outcomes and the least resources to firms that issue range forecasts with unfavorable outcomes. This pattern of choice confirms ambiguity seeking in gains but ambiguity averse in losses.

This study contributes to the prior literature in several ways. First, this study extends Hirst et al. [1999] by investigating investors' reactions to range forecasts when investors face unfavorable outcomes. Understanding investors' judgment and decision making in the loss domain is important because investors are extremely loss averse. The evidence that investors are sensitive to the decision frame suggests that the expectations of gains or losses affects investors' decisions and may change their information needs. Next, this study extends prior findings on management voluntary disclosures. Consistent with prior research (Baginski, Conrad, and Hassell [1993], Hirst et al. [1999], Pownall, Wasley, and Waymire [1993]), earnings predictions by participants do not differ across point and range forecasts in this study. This suggests that the effect of forecast form on investors' judgment and decisions is quite subtle and sometimes can be difficult to detect. However, I document a strong effect of forecast form on participants' resource allocation decisions. One important implication is that firms point or range forecasts may differ

systematically in attracting investment capital, and therefore firms should be careful about their choice of disclosure form. Finally, this study is the first to rely on ambiguity attitudes to predict how investors may react to uncertainty in accounting information. This perspective is particularly relevant in the investment setting. Sometimes it is more appropriate to characterize the investment decision for novice investors as decision under ambiguity than under risk because of lack of resources, limited information, or lack of expertise. The knowledge of how investors deal with ambiguity in the information environment improves our understanding of investors' information needs and assists managers and regulators in their efforts to provide better information to reduce investors' uncertainty.

The remainder of this article is structured as follows. The second section provides background information, theory, and hypothesis development. The third section describes participants, independent variables, and the experimental task. The fourth section presents results, and the final section concludes.

LITERATURE AND HYPOTHESIS

Management earnings forecasts vary from point estimates to less precise closed or open-ended intervals or to qualitative statements about earnings prospects. Recent evidence indicates that the majority of earnings forecasts are issued in the form of range estimate, taking up more than 50% of the total forecasts (Anilowski et al. [2004]). Managers are found to be more likely to issue range forecasts when the business environment is uncertain, when earnings are unpredictable (King, Pownall, and Waymire [1990], Hassell, Jennings, and Lasser [1988]), or when earnings lack the information on which to base a point forecast (Bamber and Cheon [1998]). The greater proportion of range forecasts has increasingly attracted researchers' interests in understanding how investors react to forecasts varying in degrees of precision. Using a theoretical model, Kim and Verracchia [1991] predict that price reactions to the public release of information is a positive function of both the unexpected component of the information and its precision, highlighting the significance of forecast form. Archival studies focus on market price reactions. Baginski, Conrad, and Hassell [1993] document a decreasing response in market returns to range forecasts, while Pownall, Wasley, and Waymire [1993] observe no differential reactions in stock prices to point and range earnings forecasts. Experimental researchers focus on individual investors' judgments. Hirst et al. [1999] find that the forecast form (a point or a range forecast contained in the "outlook" section of the management discussion and analysis (MD&A)) does not affect participants' earnings predictions, but range forecasts reduce participants' self-reported confidence in their own predictions. Investigating contingent environmental liability disclosed by managers, Kennedy, Mitchell, and Sefcik

[1998] demonstrate that the disclosure form matters and observe that participants predict higher environment liabilities for firms that issue range estimates than for those that issue point estimates. In general, results from prior studies are inconclusive about the specific pattern of reactions to point and range forecasts, but they tend to agree that, comparing to a precise point estimate, less precise range forecasts convey management uncertainty, and investors are fully aware of the uncertainty signaled by range forecasts (King et al. [1990], Hassell et al. [1988]).

A range forecast conveys uncertainty as it includes both the point estimate and the standard error of the forecast. Given a range of possible earnings outcomes, investors must deal with vagueness related to the range estimate. For example, when investors make investment decisions, should the decision be based on the lower endpoint, the midrange, the higher end point, or any other point within the range? Because of the uncertainty involved, investment decision is a prototype of risky decision making and is primarily based on possible outcomes and their relative likelihoods. Decision theories characterize uncertainty as the variance in the probability distribution of possible outcomes and distinguish between risk and ambiguity. Decision under risk entails options that have well-specified or transparent outcome probabilities, such as a bet on a coin toss. Decision under ambiguity, by contrast, entails options whose outcomes depend on natural events such as a victory by the home team or a rise in interest rates, so that probabilities must be estimated by the decision maker with some degree of vagueness or imprecision (Trepel, Fox, and Poldrack [2005]). Therefore, the ability of deriving a well-specified probability distribution affects how investors react to vague outcomes entailed in a range forecast.

If an investor believes that there is a single probability distribution over the outcomes of a range forecast (e.g., outcomes are uniformly distributed), this is a case of decision under risk and the Prospect Theory describes investors' reactions (Kahneman and Tversky [1979]). Herein, the ultimate earning outcome is the result of a probabilistic process and is not known for certain, but we do know the single probability distribution over the potential outcomes to determine the expected value. The concavity (convexity) in the Prospect Theory's value function describes behaviors when decision makers perceive the outcome is better (or worse) than the reference point. Specifically, when perceiving potential gains, investors are risk averse and would prefer the certainty in earnings outcome conveyed by a precise point forecast; perceiving potential losses, investors are risk seeking and would prefer uncertain outcomes entailed in a range forecast. Prior results are largely consistent with these predictions. In Hirst et al. [1999], low information uncertainty makes it fairly easy for participants to determine the likelihood of earnings outcomes, and thus the decision problem can be formulated as decision under risk. Hirst et al. [1999] observe that participants in the gains domain are less willing to purchase stocks from companies with range forecasts and believe their stocks

are less likely to appreciate. This evidence is consistent with the pattern of risk averseness in the domain of gains predicted by the Prospect Theory.

However, investors often make resource allocation decisions under high information uncertainty. For example, for newly listed, small, or high tech firms, investors may not be able to specify (or may disagree about) exact probabilities for future earnings, the magnitude of these earnings, or even what all possible earnings may be. In addition, individual investors tend to be further down the information "food chain" and have more difficulty evaluating information because of their relatively lower level of expertise (Olsen [1997]). If investors are unsure about which probability distribution will be used to determine the outcome entailed in a range forecast, investors are said to make decision under ambiguity, and we can rely on individual ambiguity attitudes to predict their reactions to range forecasts (Curley and Yates [1985]).

Extensive work in judgment and decision-making literature examines how individuals react to ambiguous information. This line of research identifies individual attitude toward ambiguity as an important, distinct, and independent factor in decision behavior, similar to individual attitudes toward risk (Kuhn and Budescu [1996]). Earlier research suggests that decision makers tend to avoid ambiguity in that they are generally averse to options with imprecisely specified probabilities and are often even willing to pay a premium to avoid ambiguity in variations of Ellsberg's original problems (Camerer and Weber [1992]). The famous Ellsberg [1961] paradox describes people's tendency to avoid ambiguity by betting on known distributions. In one decision task, urn 1 contains 50 red and 50 black balls whereas urn 2 contains 100 red and black balls in unknown proportions. People prefer to make bets with respect to the 50-50 urn. Ellsberg argues that it is not only subjective probability that matters but also the ambiguity of the event in question. Ambiguity attitudes have also been incorporated in financial models to explain or predict the actions of investors when they face investment options with ambiguous information (Camerer and Weber [1992]).

Experimental evidence clearly shows that individuals' attitudes toward ambiguity are neither universal nor uniform (Budescu et al. [2002], Fox and Tversky [1995]). Fox and Tversky (1995) demonstrate that DMs are ambiguity averse and bet less on imprecise options than on precise ones when the two options are presented and evaluated jointly but not when they are evaluated in isolation. This pattern is also observed at market levels. Sarin and Weber [1993] observe ambiguity premiums when precise and vague bets are traded together, but the premiums disappear when these bets are traded in separate markets. Fox and Tversky [1995] propose the comparative ignorance hypothesis to explain the observed reversal of ambiguity attitudes and argue that when the context of the decision makes people feel especially competent or knowledgeable, they become ambiguity seeking and even prefer to bet on their vague beliefs instead of a precise chance event (Fox and Tversky [1995], Fox and Weber [2002]).

To explain the tendency of ambiguity seeking, other studies focus on the decision frame (Budescu, Kuhn, Kramer, and Johnson [2002], Kuhn and Budescu [1996]). In a recent study, Du and Budescu [2005] investigate how people react to precise and imprecise information. In the experiment, participants evaluate a series of investment options that differ in outcome precision under risk or ambiguity. They manipulate perceived gains and losses through simple comparisons with a benchmark and outcome precision as a point or a range estimate. The authors document that when there is ambiguity, or a lack of well-defined probability, people's responses to vague outcomes are domain specific and contingent on perceived gains or losses. Specifically, participants overwhelmingly prefer investment options with vaguely stated earnings prospects and are willing to pay more for gambles involving vague gains, but they prefer precise options in the loss domain and exhibit strong aversion for losses. To explain reactions to vague outcomes under ambiguity, Du and Budescu [2005] argue that it is the domain that directs participants' focus to different points in the range estimate so they can maximize gains or minimize losses. In the domain of gains, participants focus on the upper end of the range and choose vague options that match the implied gains, but in the domain of losses participants focus on the lower end of the range to prepare for the worst possible losses. However, that study focuses on decision and choices and do not explain how ambiguity may affect investors' earnings predictions, confidence judgments, and risk judgments.

A unique feature of investment decisions is the salience of expected gains or losses. Prior evidence suggests that investors evaluate expected gains or losses by comparing their performance with various reference points or benchmarks (Krische [2004], Schrand and Walther [2000]). The market's earnings expectation is one of the performance benchmarks often used by investors. Investors tend to perceive earnings forecasts higher than the market expectations (i.e., good news) as potential gains, while those below (i.e., bad news) as potential losses (Degeorge et al. [1999]). Empirical evidence indicates that firms issuing earnings forecasts exceeding benchmarks are rewarded by an immediate short-term run-up in stock prices, and those missing benchmarks see the value of their stocks drop (Bartov, Givoly, and Hayn [2002]). Given the salience of expected gains or losses, it is important to understand how investors react to range forecasts when they face potential gains or losses.

Prior evidence indicates that the form of earnings forecast does not influence investors' earnings predictions (Hirst et al. [1999]). Thus, I expect investors' earnings predictions to be the same across point and range forecasts. In addition, I do not expect range forecasts to reduce investors' confidence more than point forecasts. I expect investors to deem firms with point and range forecasts to be equally risky because when investors face high information uncertainty, earnings forecasts issued by managers, regardless of their form/precision, are limited in their ability to reduce the overwhelming

uncertainty felt by investors. Hypothesis one summarizes the effects of forecast form on investors' earnings predictions, confidence judgments, and risk judgments.

H1: Earnings predictions and confidence and risk judgments do not differ for firms with range or point earnings forecasts.

However, ambiguity attitudes predict that investors will behave differently in their decisions and choices. When investors receive range earnings forecasts which are higher than the market's expectations, they perceive potential gains. Ambiguity seeking in the gains domain suggests that investors may take advantage of the favorable outcomes and explore the range of possible values to extract information for the highest gains, while ambiguity averseness predicts that investors try to avoid the highest possible losses implied in a range estimate in the loss domain. Hypothesis two describes investors' resource allocation decisions.

H2: Investors will allocate the most resources to firms with favorable range forecasts and the least to those with unfavorable range forecasts.

METHOD

Participants

Participants are 80 MBA students from a large private university. Students volunteered to participate in response to in-class announcements. Demographic information collected at the end of the experiment indicates that most participants are likely to have the necessary knowledge and experience to complete the task. The majority of participants have both work and investment experience.

Procedure and Task

I use a 2 (range vs. point forecast) $\times$ 2 (favorable vs. unfavorable condition) between-subjects design with repeated measures. This design includes variation within subjects. For each subject, he/she will evaluate four different companies that vary in both dimensions, either forecast form or favorability (See Appendix A). Furthermore, to avoid order effects, the presentation sequence of the four companies is counterbalanced. I manipulate forecast form as point or range forecast for the next year's annual earnings per share (EPS) issued by CEOs. Point forecasts for the four companies are \$1.00, \$1.50, \$3.00, and \$4.50, respectively. Range forecasts are \$0.80–1.20, \$1.20–1.80, \$2.40–3.60, and \$3.60–5.40, respectively. Point forecasts are set at the range midpoint. I manipulate favorability by stating whether the earnings forecasts are higher or lower than the current market expectation. See Appendix B for the experimental instrument.

Participants are asked to assume the role of an investor to evaluate four different companies. For each company, I

provide participants with brief background information and annual EPS forecasts issued by the company's CEO. Participants answer questions about EPS predictions, confident judgments, and risk judgments, as well as how much to invest if they are given \$10,000. Then they assess the precision and favorability of the forecasts. Finally, participants finish by answering a short series of manipulation check questions and are fully debriefed. The entire experiment takes 30 minutes on average to complete.

RESULTS

Manipulation Checks

For each company, participants determine the precision of forecast provided by the CEO on a scale from 1 (not at all) to 11 (very precise). Participants believe the point forecast to be more precise than the range forecast. Means (standard deviations) are 6.13 (0.20) and 5.47 (0.19), respectively ($F_{(1,75)} = 5.87$, $p = 0.02$). They also determine the favorability of forecast provided by the CEO on a scale from 1 (not at all) to 11 (very favorable). Participants believe the forecasts higher than the current market expectations to be more favorable than those lower than the market expectations. Means (standard deviations) are 6.81 (0.18) and 5.32 (0.18), respectively ($F_{(1,75)} = 33.80$, $p = 0.00$).

Test of Hypothesis

Hypothesis one predicts that the form of earnings forecasts does not differentially affect participants' earnings predictions, confidence judgments and risk judgments. Panel A of Table 1 reports the descriptive statistics, and Panel B reports results of the one-way ANOVAs with repeated measures. Participants predict EPS for four different companies. Recall that

TABLE 1
Results for Hypothesis One (Various Judgments).

Panel A: Descriptive Statistics Means (Standard Deviations)					
	Point		Range		
EPS prediction	2.46 (0.04)		2.40 (0.04)		
Confidence judgment	5.99 (0.19)		5.94 (0.19)		
Risk judgment	6.29 (0.19)		6.38 (0.19)		
Panel B: One-way ANOVA for EPS Prediction					
Source	SS	df	MS	F	P (2-sided)
Form	0.28	1	0.28	1.07	0.30
Within cells (error)	19.56	75	0.26		
Panel C: One-way ANOVA for Confidence Judgment					
Source	SS	df	MS	F	P (2-sided)
Form	0.16	1	0.16	0.03	0.87
Within cells (error)	438.76	76	5.77		
Panel D: One-way ANOVA for Risk Judgment					
Source	SS	df	MS	F	P (2-sided)
Form	0.57	1	0.57	0.10	0.75
Within cells (error)	420.26	76	5.53		

TABLE 2
Results for Hypothesis Two (Resource Allocation Decisions).

Panel A: Descriptive Statistics Means (Standard Deviations)					
	Point		Range		
Favorable	3,611 (502) <i>N</i> = 18		4,800 (476) <i>N</i> = 20		
Unfavorable	2,958 (516) <i>N</i> = 17		2,842 (476) <i>N</i> = 20		
Panel B: Two-way ANOVA with Repeated Measures for Investment \$					
Source	SS	df	MS	F	P (2-sided)
Form × Favorability	94,443,074	3	31,481,024	3.47	0.02
Within cells (error)	644,380,658	71	9,075,783		
Panel C: Post Hoc Tests (LSD)					
	Mean Difference			P (1-sided)	
Range favorable vs. Range unfavorable	1,957			0.01	
Point favorable vs. Point unfavorable	652			0.27	
Range favorable vs. Point favorable	1,189			0.05	
Range unfavorable vs. Pont unfavorable	−116			0.85	

point forecasts, as well as the midpoints of range forecasts, for the four companies are \$1.00, \$1.50, \$3.00, and \$4.50, with an average forecast of \$2.50. In general, EPS predictions provided by participants are slightly lower than the forecasts. The average EPS predicted by participants for the four companies are \$1.05, \$1.44, \$2.86, and \$4.34, respectively. The fact that EPS predictions are monotonically increasing suggests that participants attend to the experimental stimuli. In addition, the mean EPS predicted by participants is \$2.40 for range forecasts and \$2.46 for point forecasts, not significantly different from each other ($F_{(1,75)} = 1.07$, $p = 0.30$). Interestingly, these predictions are only slightly lower than the average forecasts of \$2.50, implying participants closely follow the forecasts issued by managers. Furthermore, the mean confidence judgment is 5.99 for the range condition and 5.94 for the point condition, not significantly different from each other ($F_{(1,76)} = 0.03$, $p = 0.87$). Apparently, participants are not very confident about the management forecasts, regardless of the forecast form. Moreover, participants' risk judgments about range and point forecast firms do not differ significantly. Means are 6.29 and 6.38 ($F_{(1,76)} = 0.10$, $p = 0.75$). Thus, participants do not believe firms issue range forecasts are riskier than point firms. The same degree of risk perceived by participants suggests that predictions of the Prospect Theory may not be applicable here. These results support hypothesis one.

Hypothesis two predicts that favorability of forecasts affects reactions to point and range forecasts. Panel A of Table 2 presents descriptive statistics, and Figure 1 plots the pattern of participants' resource allocation decisions. Indeed, participants allocate the most resources (\$4,800) in the favorable range condition and the least (\$2,842) in the unfavorable range condition. Panel B of Table 2 reports two-way ANOVA with repeated measures. Apparently, the form and favorability interaction is significant ($F_{(3,71)} = 3.47$, 2-sided $p < 0.05$), indicating that the effect of forecast form depends on the favorability of the forecasts. In addition, I perform post-hoc tests to compare the simple means across favorability and

form conditions. Tukey's LSD tests (see Panel C of Table 2) indicate that the mean difference of \$1,958 between favorable and unfavorable conditions is significantly different for range forecasts (1-sided $p < 0.05$), but the mean difference of \$653 is not significantly different for point forecasts ($p = 0.27$). Thus, when participants evaluate range forecasts, their decisions are influenced by the favorability of management forecasts because they allocate much higher investment dollars in the favorable condition than in the unfavorable condition, but the favorability factor does not affect their decisions when they evaluate earnings forecasts in point estimate. Moreover, when forecasts are favorable, the effect of form on investment decisions is obvious because participants allocate significantly higher dollar amounts to firms with range forecasts than those with point forecasts. The mean difference is \$1,189 (1-sided $p = 0.05$). However, when forecasts are unfavorable, the forecast form does not appear to affect investors' decisions at all, because the mean difference of -\$116 between point and range forecasts is not significant ($p = 0.85$). The insignificant result with the unfavorable forecasts could be due to loss aversion, which overshadows the concern

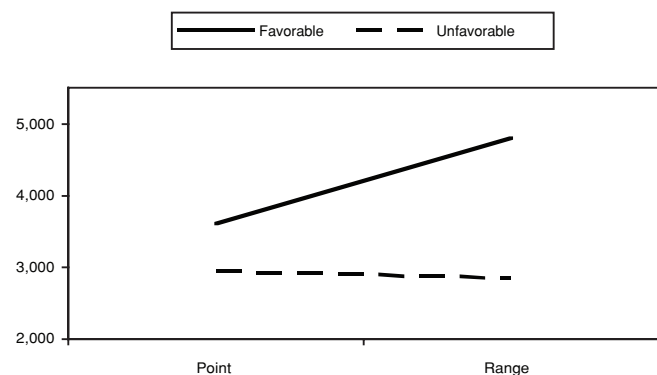


FIGURE 1 Resource allocation decision (dependent variable: investment \$).

for the form difference (see Benartzi and Thaler [1995], Du and Budescu [2005]). In general, experimental results support hypothesis two and are consistent with predictions based on ambiguity attitudes. The highest dollar amounts associated with favorable range forecasts suggest that participants are ambiguity seeking and prefer range forecasts in the domain of potential gains, while the lowest resource associated with unfavorable range forecasts confirms the claim that participants are ambiguity averse and dislike range forecasts in the domain of potential losses.

CONCLUSIONS

This study investigates whether investors' reactions to range forecasts differ from their reactions to point forecasts. Prior results suggest that range forecasts convey uncertainty and thus, reduce investors' confidence. However, prior studies often focus on favorable forecasts when investors perceive potential gains. In this study, I examine both favorable and unfavorable forecasts, and extend this line of inquiry to the domain of potential losses. In addition, prior studies are interested in settings with low information uncertainty. Unfortunately, investors often face a high degree of uncertainty in the information environment and have to make investment decision based on limited or poor-quality information. The high information uncertainty makes it difficult for investors to specify a clear probability distribution to calculate the expected earnings outcomes. Relying on theory and evidence about ambiguity, I predict that investors' preference for range forecasts depends on the favorability of earnings forecasts when investors face high information uncertainty. Specifically, when investors receive favorable (unfavorable) forecasts, they prefer (dislike) vagueness in the range estimate. Experimental results are consistent with my prediction. Participants allocate the most resources to firms issuing favorable range forecasts and the least to firms with unfavorable range forecasts. Interestingly, range and point forecasts do not affect participants' earnings predictions, confidence judgments, and risk judgments. The results suggest that ambiguity attitudes are different from individual risk attitudes and have a significant impact on investors' decision and choices.

This experimental investigation, like others, is limited in several respects. I only focus on point and range earnings guidance. In reality, a large portion of vague earnings forecasts is open-ended or qualitative in nature (Anilowski et al. [2004]). Future research should test whether investors' reactions to these forecasts may differ from point or range forecasts. In addition, in this study, I set the widths of the range to be \$0.40, \$0.60, \$1.20, or \$1.80, respectively. In reality, range management earnings forecasts are much narrower than those used in this study. However, the width of the range in this study allows me to conduct a powerful test of the theory, but results of this study could be sensitive to the levels chosen for this variable. Furthermore, in this study,

potential gains or losses are inferred by the favorability of earnings forecasts. Future studies should directly examine the gains or losses experienced by subjected, such as monetary gains or losses. Finally, this study uses MBA students rather than financial analysts. MBA students may not have strong knowledge of management incentives and may use management earnings forecasts differently than sophisticated market participants. Future studies should explore how professionals may react to forecast form.

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APPENDIX A: MANAGEMENT EARNING GUIDANCE

Company A provides communication systems and software for business enterprises. The company also makes network cabling and connectivity products and offers consulting and outsourcing services.

The CEO expects next year's annual earnings per share (EPS) to be approximately **\$1.00**, which is **higher** than the current market expectation.

Company B operates department stores. It sells moderately priced apparel, shoes, accessories and home products targeted to middle-income customers through its stores. The company operates 652 stores in 40 states across the United States.

The CEO expects next year's annual EPS to be approximately **\$1.50**, which is **lower** than the current market expectation.

Company C manufactures and distributes residential furniture in the United States. The furniture products include case goods, stationary upholstery products, occasional furniture, recliners, motion furniture, sleep sofas and accessories.

The CEO expects next year's annual EPS in the range of **\$2.40 to \$3.60**, which is **higher** than the current market expectation.

Company D manufactures automotive parts and supplies a broad range of integrated systems, modules, and components for light vehicles, commercial trucks, trailer and specialty original equipment manufacturers globally.

The CEO expects next year's annual EPS in the range of **\$3.60 to \$5.40**, which is **lower** than the current market expectation.

APPENDIX B: EXPERIMENTAL INSTRUMENT

Imagine you are an investor. You have access to information about four different companies. The information includes brief background information and annual earnings per share (EPS) forecasts made by the company's CEO. Please answer a few questions based on the provided information.

Company A provides communication systems and software for business enterprises. The company also makes network cabling and connectivity products and offers consulting and outsourcing services.

The CEO expects next year's annual EPS to be approximately \$1.00, which is higher than the current market expectation.

- 1) What is your best estimate of next year's EPS for Company A? _____ (*Provide a number*)
- 2) How confident are you in the forecast provided by Company A's CEO? (*Circle one number*)
(Not confident at all) 1 2 3 4 5 6 7 8 9 10 11 (Very confident)
- 3) If you are given \$10,000 solely for investment purpose, how much would you invest in Company A?
_____ (*Provide a number between \$0 and \$10,000*)
- 4) How risky is it to invest in Company A? (*Circle one number*)
(Not risky at all) 1 2 3 4 5 6 7 8 9 10 11 (Very risky)
- 5) How likely is it that you would invest in Company A? (*Circle one number*)
(Very unlikely) 1 2 3 4 5 6 7 8 9 10 11 (Very likely)
- 6) How precise is the EPS forecast provided by Company A's CEO? (Please circle on number)
(Not at all) 1 2 3 4 5 6 7 8 9 10 11 (Very Precise)
- 7) How favorable is the EPS forecast provided by Company A's CEO? (Circle on number)
(Not at all) 1 2 3 4 5 6 7 8 9 10 11 (Very favorable)

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